

Directional Survey
MAR 06 2015

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM
Surface Legal Location Sec. 28 T23S R33E	API/UWI 3002541896	Latitude (") 32° 16' 56.653" N	Longitude (") 103° 35' 3.914" W	KB - GL (ft) 3,683.00
				Orig KB Elev (ft) 3,708.00
				Tubing Head Elevation (ft)

Wellbores				
Wellbore Name OH	Parent Wellbore	SAP Well ID	Kick Off Depth (ftKB) 10,600.0	Vertical Section Direction (") 179.40
Actual Deviation Survey GYRO/MWD, Proposed? No		Definitive? No	Proposed? No	Proposed Deviation Survey

Deviation Survey					
Date 10/1/2014	Description GYRO/MWD				
MD Tie In (ftKB) 0.00	TVD Tie In (ftKB) 0.00	Inclination Tie In (") 0.00	Azimuth Tie In (") 0.00	NSTie In (ft) 0.00	EW Tie In (ft) 0.00

Survey Data									
Date	MD (ftKB)	Incl (")	Azm (")	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS ("/100ft)	Survey Tool
10/1/2014	100.00	0.23	42.04	100.00	-0.15	0.15	0.13	0.23	GYRO
10/1/2014	200.00	0.21	140.96	200.00	-0.15	0.16	0.38	0.33	GYRO
10/1/2014	300.00	0.24	122.78	300.00	0.11	-0.10	0.68	0.08	GYRO
10/1/2014	400.00	0.24	125.45	400.00	0.35	-0.33	1.02	0.01	GYRO
10/1/2014	500.00	0.40	130.02	500.00	0.70	-0.68	1.46	0.16	GYRO
10/1/2014	600.00	0.20	284.12	600.00	0.88	-0.86	1.56	0.59	GYRO
10/1/2014	700.00	0.22	250.65	699.99	0.90	-0.88	1.21	0.12	GYRO
10/1/2014	800.00	0.25	290.93	799.99	0.88	-0.87	0.82	0.16	GYRO
10/1/2014	900.00	0.23	288.79	899.99	0.73	-0.73	0.43	0.02	GYRO
10/1/2014	1,000.00	0.53	284.48	999.99	0.54	-0.55	-0.21	0.30	GYRO
10/1/2014	1,100.00	0.54	270.63	1,099.99	0.41	-0.43	-1.13	0.13	GYRO
10/1/2014	1,200.00	0.59	272.97	1,199.98	0.37	-0.39	-2.11	0.06	GYRO
10/1/2014	1,300.00	0.54	293.58	1,299.98	0.15	-0.18	-3.06	0.21	GYRO
10/1/2014	1,400.00	0.65	292.72	1,399.97	-0.27	0.23	-4.01	0.11	GYRO
10/1/2014	1,500.00	0.72	295.87	1,499.96	-0.78	0.72	-5.10	0.08	GYRO
10/1/2014	1,600.00	0.90	290.79	1,599.95	-1.34	1.28	-6.40	0.19	GYRO
10/1/2014	1,700.00	0.87	282.11	1,699.94	-1.80	1.71	-7.88	0.14	GYRO
10/1/2014	1,800.00	0.95	303.62	1,799.93	-2.43	2.33	-9.31	0.35	GYRO
10/1/2014	1,900.00	1.16	281.05	1,899.91	-3.10	2.98	-11.00	0.46	GYRO
10/1/2014	2,000.00	1.20	290.32	1,999.89	-3.68	3.54	-12.97	0.19	GYRO
10/1/2014	2,100.00	1.24	269.92	2,099.87	-4.06	3.90	-15.03	0.43	GYRO
10/1/2014	2,200.00	1.24	286.45	2,199.85	-4.39	4.21	-17.15	0.36	GYRO
10/1/2014	2,300.00	1.22	287.02	2,299.82	-5.03	4.83	-19.21	0.02	GYRO
10/1/2014	2,400.00	1.14	293.74	2,399.80	-5.76	5.54	-21.14	0.16	GYRO
10/1/2014	2,500.00	1.15	292.64	2,499.78	-6.57	6.33	-22.98	0.02	GYRO
10/1/2014	2,600.00	1.20	302.33	2,599.76	-7.53	7.27	-24.79	0.20	GYRO
10/1/2014	2,700.00	1.18	298.53	2,699.74	-8.60	8.32	-26.58	0.08	GYRO
10/1/2014	2,800.00	1.22	299.60	2,799.72	-9.64	9.34	-28.41	0.05	GYRO
10/1/2014	2,900.00	1.03	300.66	2,899.70	-10.64	10.33	-30.10	0.19	GYRO
10/1/2014	3,000.00	1.07	289.73	2,999.68	-11.43	11.10	-31.76	0.20	GYRO
10/1/2014	3,100.00	1.26	289.76	3,099.66	-12.14	11.79	-33.67	0.19	GYRO
10/1/2014	3,200.00	1.11	296.95	3,199.64	-12.97	12.60	-35.57	0.21	GYRO
10/1/2014	3,300.00	1.01	289.17	3,299.62	-13.71	13.33	-37.26	0.18	GYRO
10/1/2014	3,400.00	0.73	294.42	3,399.61	-14.28	13.88	-38.68	0.29	GYRO
10/1/2014	3,500.00	0.98	295.76	3,499.60	-14.93	14.51	-40.03	0.25	GYRO
10/1/2014	3,600.00	0.83	296.43	3,599.59	-15.64	15.21	-41.45	0.15	GYRO
10/1/2014	3,700.00	0.61	323.21	3,699.58	-16.40	15.96	-42.41	0.40	GYRO
10/1/2014	3,800.00	0.63	318.17	3,799.57	-17.24	16.79	-43.10	0.06	GYRO
10/1/2014	3,900.00	0.54	317.66	3,899.57	-18.01	17.55	-43.78	0.09	GYRO
10/1/2014	4,000.00	0.63	290.87	3,999.56	-18.56	18.09	-44.61	0.28	GYRO
10/1/2014	4,100.00	0.51	322.88	4,099.56	-19.12	18.64	-45.40	0.33	GYRO
10/1/2014	4,200.00	0.35	303.35	4,199.56	-19.65	19.17	-45.92	0.21	GYRO
10/1/2014	4,300.00	0.31	328.96	4,299.56	-20.05	19.57	-46.31	0.15	GYRO
10/1/2014	4,400.00	0.16	26.59	4,399.55	-20.41	19.92	-46.39	0.26	GYRO
10/1/2014	4,500.00	0.47	85.44	4,499.55	-20.56	20.08	-45.92	0.41	GYRO
10/1/2014	4,600.00	0.17	97.84	4,599.55	-20.57	20.09	-45.36	0.31	GYRO
10/1/2014	4,700.00	0.89	88.85	4,699.55	-20.55	20.09	-44.44	0.72	GYRO

MAR 17 2015



THISTLE UNIT 51H

WEST UNRESTRICTED

Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM			
Surface Legal Location Sec. 28 T23S R33E	API/UWI 3002541896	Latitude (") 32° 16' 56.653" N	Longitude (") 103° 35' 3.914" W	Ground Elev... 3,683.00	KB - GL (ft) 25.00	Orig KB Elev (ft) 3,708.00	Tubing Head Elevation (ft)

Survey Data										
Date	MD (ftKB)	Incl. (°)	Azm. (°)	TVD (ftKB)	VS (ft)	NS (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
10/1/2014	4,800.00	1.01	106.38	4,799.53	-20.30	19.86	-42.82	0.31	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	4,900.00	1.42	92.11	4,899.51	-19.99	19.56	-40.73	0.51	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,000.00	1.29	95.46	4,999.48	-19.81	19.41	-38.38	0.15	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,100.00	1.45	98.25	5,099.45	-19.50	19.12	-36.00	0.17	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,200.00	1.36	87.51	5,199.42	-19.34	18.99	-33.57	0.28	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,300.00	1.36	88.65	5,299.40	-19.40	19.07	-31.19	0.03	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,400.00	1.42	93.41	5,399.37	-19.32	19.02	-28.77	0.13	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,500.00	1.44	82.22	5,499.34	-19.39	19.12	-26.29	0.28	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,600.00	1.11	87.20	5,599.31	-19.59	19.34	-24.08	0.35	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,700.00	1.41	81.58	5,699.29	-19.79	19.57	-21.89	0.32	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,800.00	1.43	76.36	5,799.26	-20.24	20.04	-19.46	0.13	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	5,900.00	1.36	89.13	5,899.23	-20.53	20.35	-17.06	0.32	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,000.00	1.21	85.38	5,999.20	-20.61	20.46	-14.82	0.17	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,100.00	1.27	96.87	6,099.18	-20.54	20.41	-12.67	0.26	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,200.00	1.32	91.78	6,199.15	-20.35	20.24	-10.42	0.13	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,300.00	1.18	91.77	6,299.13	-20.26	20.17	-8.24	0.14	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,400.00	1.39	95.83	6,399.10	-20.08	20.02	-6.00	0.23	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,500.00	1.36	95.75	6,499.07	-19.81	19.77	-3.62	0.03	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,600.00	1.38	90.20	6,599.05	-19.66	19.65	-1.23	0.13	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,700.00	1.25	73.33	6,699.02	-19.95	19.96	1.02	0.41	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,800.00	1.19	85.94	6,799.00	-20.31	20.35	3.10	0.27	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	6,900.00	1.12	83.41	6,898.98	-20.48	20.53	5.11	0.09	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,000.00	0.89	63.73	6,998.96	-20.92	20.99	6.77	0.41	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,100.00	1.08	69.00	7,098.95	-21.58	21.67	8.35	0.21	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,200.00	1.09	74.72	7,198.93	-22.15	22.26	10.15	0.11	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,300.00	1.22	75.25	7,298.91	-22.65	22.78	12.09	0.13	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,400.00	1.21	98.46	7,398.89	-22.75	22.90	14.17	0.49	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,500.00	1.31	86.39	7,498.86	-22.64	22.81	16.35	0.28	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,600.00	1.35	95.25	7,598.84	-22.58	22.78	18.67	0.21	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,700.00	1.39	103.38	7,698.81	-22.17	22.39	21.02	0.20	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,800.00	1.35	109.97	7,798.78	-21.46	21.70	23.31	0.16	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	7,900.00	1.44	107.69	7,898.75	-20.65	20.92	25.61	0.11	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,000.00	1.36	107.12	7,998.72	-19.90	20.19	27.94	0.08	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,100.00	1.23	102.31	8,098.69	-19.30	19.61	30.12	0.17	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,200.00	1.00	108.33	8,198.68	-18.77	19.11	32.00	0.26	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,300.00	1.11	114.63	8,298.66	-18.08	18.43	33.71	0.16	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,400.00	1.06	120.82	8,398.64	-17.18	17.55	35.38	0.13	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,500.00	1.07	116.24	8,498.62	-16.28	16.67	37.02	0.09	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,600.00	1.13	115.02	8,598.60	-15.43	15.84	38.75	0.06	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,700.00	1.00	128.50	8,698.59	-14.45	14.88	40.32	0.28	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,800.00	1.00	130.52	8,798.57	-13.33	13.77	41.67	0.04	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	8,900.00	0.88	153.66	8,898.56	-12.06	12.51	42.67	0.39	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,000.00	0.83	148.47	8,998.55	-10.75	11.20	43.39	0.09	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,100.00	0.93	170.37	9,098.54	-9.33	9.79	43.91	0.35	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,200.00	1.01	186.83	9,198.52	-7.65	8.11	43.94	0.29	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,300.00	0.93	186.22	9,298.51	-5.97	6.43	43.75	0.08	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,400.00	0.81	140.48	9,398.50	-4.62	5.08	44.11	0.69	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,500.00	1.15	178.48	9,498.48	-3.06	3.53	44.58	0.71	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,600.00	1.45	169.38	9,598.46	-0.81	1.28	44.84	0.36	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,700.00	1.35	159.44	9,698.43	1.54	-1.06	45.49	0.26	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,800.00	1.20	159.95	9,798.40	3.63	-3.15	46.26	0.15	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	9,900.00	1.27	164.23	9,898.38	5.69	-5.20	46.92	0.12	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	10,000.00	1.10	189.48	9,998.36	7.71	-7.21	47.07	0.54	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	10,100.00	1.19	213.38	10,098.34	9.51	-9.03	46.34	0.48	GYRO	VAUHG N ENERGY SERVICES
10/1/2014	10,200.00	1.83	232.02	10,198.31	11.34	-10.88	44.51	0.80	GYRO	VAUHG N ENERGY SERVICES

THISTLE UNIT 51H

WEST UNRESTRICTED

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Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM
Surface Legal Location Sec. 28 T23S R33E	API/UWI 3002541896	Latitude (") 32° 16' 56.653" N	Longitude (") 103° 35' 3.914" W	Ground Elev... 3,683.00
			KB - GL (ft) 25.00	Orig KB Elev (ft) 3,708.00
				Tubing Head Elevation (ft)

Survey Data										
Date	MD (ftKB)	Incl (")	Azm (")	TVD (ftKB)	VS (ft)	N/S (ft)	EW (ft)	DLS ("/100ft)	Survey Tool	Survey Company
10/1/2014	10,300.00	1.78	238.86	10,298.26	13.10	-12.66	41.92	0.22	GYRO	VAUHGN ENERGY SERVICES
10/1/2014	10,400.00	1.45	242.87	10,398.22	14.46	-14.04	39.47	0.35	GYRO	VAUHGN ENERGY SERVICES
10/1/2014	10,500.00	1.13	223.96	10,498.19	15.72	-15.33	37.65	0.53	GYRO	VAUHGN ENERGY SERVICES
10/1/2014	10,532.00	1.70	217.90	10,530.18	16.32	-15.93	37.14	1.84	GYRO	VAUHGN ENERGY SERVICES
10/2/2014	10,564.00	1.50	214.40	10,562.17	17.03	-16.65	36.62	0.70	GYRO	VAUHGN ENERGY SERVICES
10/2/2014	10,595.00	1.20	207.50	10,593.16	17.65	-17.27	36.24	1.10	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,627.00	3.10	171.80	10,625.14	18.81	-18.43	36.21	6.99	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,658.00	6.20	172.50	10,656.03	21.30	-20.92	36.54	10.00	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,690.00	9.30	170.10	10,687.74	25.57	-25.18	37.21	9.74	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,722.00	12.30	171.30	10,719.17	31.49	-31.10	38.17	9.40	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,753.00	15.50	170.40	10,749.25	38.86	-38.45	39.36	10.35	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,785.00	19.30	170.10	10,779.78	48.30	-47.88	40.99	11.88	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,816.00	23.00	171.50	10,808.69	59.36	-58.92	42.76	12.05	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,848.00	27.20	175.40	10,837.66	72.86	-72.40	44.28	14.10	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,880.00	30.40	179.60	10,865.71	88.25	-87.79	44.92	11.83	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,911.00	34.00	182.00	10,891.93	104.76	-104.30	44.67	12.32	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,943.00	37.30	183.60	10,917.93	123.38	-122.92	43.75	10.72	MWD	LEAM DRILLING SYSTEMS
10/2/2014	10,974.00	40.30	182.90	10,942.09	142.75	-142.32	42.65	9.78	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,006.00	43.80	182.00	10,965.85	164.15	-163.72	41.74	11.10	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,037.00	47.50	182.20	10,987.52	186.29	-185.87	40.93	11.94	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,068.00	50.90	182.00	11,007.77	209.73	-209.32	40.07	10.98	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,100.00	54.30	182.60	11,027.20	235.11	-234.72	39.05	10.73	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,132.00	57.30	182.40	11,045.19	261.54	-261.16	37.89	9.39	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,163.00	60.10	181.30	11,061.29	288.00	-287.63	37.04	9.53	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,195.00	62.90	180.80	11,076.56	316.11	-315.74	36.53	8.86	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,226.00	65.70	182.60	11,090.00	344.01	-343.66	35.69	10.44	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,258.00	67.00	183.30	11,102.84	373.27	-372.93	34.19	4.53	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,289.00	70.30	180.80	11,114.12	402.10	-401.78	33.16	13.03	MWD	LEAM DRILLING SYSTEMS
10/2/2014	11,321.00	73.60	180.10	11,124.04	432.52	-432.20	32.92	10.52	MWD	LEAM DRILLING SYSTEMS
10/3/2014	11,353.00	76.90	178.70	11,132.18	463.46	-463.14	33.25	11.15	MWD	LEAM DRILLING SYSTEMS
10/3/2014	11,384.00	79.70	178.50	11,138.47	493.81	-493.48	33.99	9.05	MWD	LEAM DRILLING SYSTEMS
10/3/2014	11,415.00	82.70	177.10	11,143.21	524.43	-524.09	35.17	10.66	MWD	LEAM DRILLING SYSTEMS
10/3/2014	11,446.00	85.30	177.30	11,146.45	555.23	-554.88	36.67	8.41	MWD	LEAM DRILLING SYSTEMS
10/4/2014	11,478.00	87.20	177.10	11,148.55	587.14	-586.77	38.23	5.97	MWD	LEAM DRILLING SYSTEMS
10/4/2014	11,509.00	88.50	177.10	11,149.71	618.09	-617.71	39.80	4.19	MWD	LEAM DRILLING SYSTEMS
10/4/2014	11,603.00	88.80	177.60	11,151.92	712.01	-711.58	44.15	0.62	MWD	LEAM DRILLING SYSTEMS
10/4/2014	11,698.00	89.30	177.60	11,153.50	806.95	-806.49	48.12	0.53	MWD	LEAM DRILLING SYSTEMS
10/4/2014	11,792.00	89.20	178.20	11,154.73	900.91	-900.41	51.57	0.65	MWD	LEAM DRILLING SYSTEMS
10/5/2014	11,886.00	88.80	178.30	11,156.37	994.87	-994.36	54.44	0.44	MWD	LEAM DRILLING SYSTEMS
10/5/2014	11,981.00	88.30	179.60	11,158.77	1,089.84	-1,089.31	56.18	1.47	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,075.00	87.60	180.10	11,162.14	1,183.77	-1,183.25	56.42	0.91	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,170.00	87.10	180.60	11,166.53	1,278.66	-1,278.14	55.85	0.74	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,264.00	86.80	181.30	11,171.53	1,372.49	-1,372.00	54.29	0.81	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,358.00	87.30	181.90	11,176.37	1,466.29	-1,465.83	51.67	0.83	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,453.00	87.40	181.30	11,180.76	1,561.12	-1,560.69	49.02	0.64	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,547.00	88.20	181.20	11,184.37	1,655.00	-1,654.60	46.97	0.86	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,642.00	88.90	181.20	11,186.77	1,749.93	-1,749.55	44.98	0.74	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,736.00	88.50	181.50	11,188.90	1,843.85	-1,843.50	42.77	0.53	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,830.00	88.90	181.20	11,191.04	1,937.77	-1,937.45	40.55	0.53	MWD	LEAM DRILLING SYSTEMS
10/5/2014	12,925.00	89.30	181.70	11,192.53	2,032.69	-2,032.41	38.15	0.67	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,019.00	89.70	181.30	11,193.35	2,126.63	-2,126.37	35.69	0.60	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,114.00	90.00	181.90	11,193.60	2,221.56	-2,221.33	33.04	0.71	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,208.00	89.60	182.40	11,193.93	2,315.45	-2,315.26	29.51	0.68	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,302.00	89.60	180.30	11,194.58	2,409.39	-2,409.23	27.29	2.23	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,397.00	89.60	179.90	11,195.25	2,504.38	-2,504.23	27.13	0.42	MWD	LEAM DRILLING SYSTEMS



THISTLE UNIT 51H

WEST UNRESTRICTED

Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM
Surface Legal Location Sec. 28 T23S R33E	API/UWI 3002541896	Latitude (") 32° 16' 56.653" N	Longitude (") 103° 35' 3.914" W	Ground Elev... 3,683.00
			KB - GL (ft) 25.00	Orig KB Elev (ft) 3,708.00
				Tubing Head Elevation (ft)

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	VD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS ("/100ft)	Survey Tool	Survey/Company
10/5/2014	13,491.00	89.00	180.80	11,196.39	2,598.35	-2,598.22	26.55	1.15	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,586.00	88.10	180.10	11,198.80	2,693.31	-2,693.18	25.81	1.20	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,680.00	88.50	180.10	11,201.59	2,787.26	-2,787.14	25.64	0.43	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,775.00	88.80	179.40	11,203.82	2,882.23	-2,882.11	26.06	0.80	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,869.00	89.00	179.40	11,205.63	2,976.21	-2,976.09	27.04	0.21	MWD	LEAM DRILLING SYSTEMS
10/5/2014	13,963.00	90.30	178.90	11,206.20	3,070.21	-3,070.08	28.44	1.48	MWD	LEAM DRILLING SYSTEMS
10/5/2014	14,058.00	90.60	178.90	11,205.46	3,165.20	-3,165.06	30.26	0.32	MWD	LEAM DRILLING SYSTEMS
10/5/2014	14,152.00	89.00	179.80	11,205.79	3,259.20	-3,259.05	31.33	1.95	MWD	LEAM DRILLING SYSTEMS
10/5/2014	14,246.00	89.70	180.60	11,206.85	3,353.18	-3,353.04	31.00	1.13	MWD	LEAM DRILLING SYSTEMS
10/5/2014	14,341.00	90.30	180.60	11,206.85	3,448.16	-3,448.03	30.00	0.63	MWD	LEAM DRILLING SYSTEMS
10/6/2014	14,436.00	91.40	181.30	11,205.44	3,543.11	-3,543.01	28.43	1.37	MWD	LEAM DRILLING SYSTEMS
10/6/2014	14,530.00	91.80	181.50	11,202.82	3,637.02	-3,636.94	26.13	0.48	MWD	LEAM DRILLING SYSTEMS
10/7/2014	14,624.00	89.70	182.60	11,201.59	3,730.90	-3,730.87	22.77	2.52	MWD	LEAM DRILLING SYSTEMS
10/7/2014	14,719.00	89.00	182.70	11,202.67	3,825.74	-3,825.76	18.38	0.74	MWD	LEAM DRILLING SYSTEMS
10/7/2014	14,813.00	88.50	181.90	11,204.72	3,919.60	-3,919.66	14.61	1.00	MWD	LEAM DRILLING SYSTEMS
10/7/2014	14,908.00	89.40	181.20	11,206.46	4,014.51	-4,014.61	12.04	1.20	MWD	LEAM DRILLING SYSTEMS
10/7/2014	15,002.00	88.60	180.30	11,208.10	4,108.47	-4,108.58	10.81	1.28	MWD	LEAM DRILLING SYSTEMS
10/7/2014	15,097.00	91.50	179.00	11,208.01	4,203.46	-4,203.57	11.39	3.35	MWD	LEAM DRILLING SYSTEMS
10/7/2014	15,191.00	94.40	179.80	11,203.18	4,297.32	-4,297.43	12.37	3.20	MWD	LEAM DRILLING SYSTEMS
10/7/2014	15,285.00	92.80	179.60	11,197.28	4,391.13	-4,391.24	12.86	1.72	MWD	LEAM DRILLING SYSTEMS
10/7/2014	15,380.00	91.30	179.90	11,193.88	4,486.07	-4,486.17	13.28	1.61	MWD	LEAM DRILLING SYSTEMS
10/8/2014	15,475.00	91.00	180.10	11,191.97	4,581.04	-4,581.15	13.28	0.38	MWD	LEAM DRILLING SYSTEMS
10/8/2014	15,569.00	90.90	180.50	11,190.41	4,675.02	-4,675.14	12.79	0.44	MWD	LEAM DRILLING SYSTEMS
10/8/2014	15,582.00	90.80	180.50	11,190.22	4,688.01	-4,688.14	12.67	0.77	MWD	LEAM DRILLING SYSTEMS
10/8/2014	15,636.00	90.80	180.50	11,189.46	4,742.00	-4,742.13	12.20	0.00	BIT	LEAM DRILLING SYSTEMS