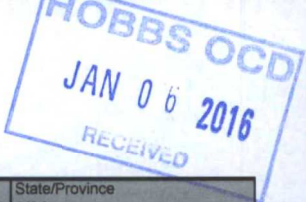




Directional Survey



Well Name: THISTLE UNIT 54H

Sub-Division	Region	Field Name	County	State/Province		
DELAWARE BASIN EAST	BASIN EAST	JOHNSON RANCH	LEA	NM		
Surface Legal Location	API/UWI	Latitude (°)	Longitude (°)	Orig KB Elevation (ft)	Ground Elev MSL (ft)	KB - GL (ft)
SEC 28-23S-33E	3002541795	32° 16' 56.648" N	103° 34' 20.338" W	3,725.80	3,700.80	25.00

Wellbores			
Wellbore Name	Parent Wellbore	SAP Well ID	Vertical Section Direction (°)
OH	OH	38688	177.25

Kick Offs & Key Depths			
Date	Type	Top Depth (ftKB)	
7/28/2015	CURVE	10,660.0	
Date	Type	Top Depth (ftKB)	
8/13/2015	CURVE	10,650.0	
Actual Deviation Survey	Definitive?	Proposed?	Proposed Deviation Survey
EXTREME SURVEYS, Proposed? No	No	No	EXTREME SURVEYS, Proposed? No

Deviation Survey					
Date	Description				
7/31/2015	EXTREME SURVEYS				
MD Tie In (ftKB)	TVD Tie In (ftKB)	Inclination Tie In (°)	Azimuth Tie In (°)	NSTie In (ft)	EWtie In (ft)

Survey Data										
Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
7/31/2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MWD	EXTREME SURVEY
7/31/2015	176.00	0.62	40.23	176.00	-0.70	0.73	0.62	0.35	MWD	EXTREME SURVEY
7/31/2015	267.00	0.70	354.61	266.99	-1.61	1.66	0.88	0.57	MWD	EXTREME SURVEY
7/31/2015	356.00	0.79	354.42	355.98	-2.77	2.81	0.77	0.10	MWD	EXTREME SURVEY
7/31/2015	447.00	0.70	358.22	446.98	-3.95	3.99	0.69	0.11	MWD	EXTREME SURVEY
7/31/2015	539.00	0.48	1.13	538.97	-4.90	4.94	0.68	0.24	MWD	EXTREME SURVEY
7/31/2015	632.00	0.62	17.64	631.97	-5.76	5.80	0.84	0.23	MWD	EXTREME SURVEY
7/31/2015	727.00	0.40	351.32	726.96	-6.57	6.62	0.95	0.33	MWD	EXTREME SURVEY
7/31/2015	822.00	0.31	287.42	821.96	-6.99	7.03	0.65	0.40	MWD	EXTREME SURVEY
7/31/2015	916.00	0.31	284.21	915.96	-7.15	7.17	0.16	0.02	MWD	EXTREME SURVEY
7/31/2015	1,011.00	0.40	268.83	1,010.96	-7.23	7.22	-0.42	0.14	MWD	EXTREME SURVEY
7/31/2015	1,105.00	0.62	256.13	1,104.95	-7.14	7.09	-1.24	0.26	MWD	EXTREME SURVEY
7/31/2015	1,200.00	0.62	268.52	1,199.95	-7.06	6.96	-2.25	0.14	MWD	EXTREME SURVEY
7/31/2015	1,292.00	0.79	269.05	1,291.94	-7.09	6.93	-3.38	0.18	MWD	EXTREME SURVEY
7/31/2015	1,469.00	0.70	261.73	1,468.93	-7.02	6.76	-5.67	0.07	MWD	EXTREME SURVEY
7/31/2015	1,627.00	0.53	277.03	1,626.92	-7.05	6.71	-7.35	0.15	MWD	EXTREME SURVEY
7/31/2015	1,816.00	0.53	269.47	1,815.91	-7.24	6.81	-9.10	0.04	MWD	EXTREME SURVEY
7/31/2015	2,005.00	0.26	246.44	2,004.91	-7.12	6.63	-10.36	0.16	MWD	EXTREME SURVEY
7/31/2015	2,195.00	0.09	228.86	2,194.90	-6.87	6.36	-10.87	0.09	MWD	EXTREME SURVEY
7/31/2015	2,384.00	0.09	140.80	2,383.90	-6.66	6.14	-10.89	0.07	MWD	EXTREME SURVEY
7/31/2015	2,575.00	0.09	182.81	2,574.90	-6.39	5.88	-10.80	0.03	MWD	EXTREME SURVEY
7/31/2015	2,763.00	0.09	227.10	2,762.90	-6.15	5.63	-10.92	0.04	MWD	EXTREME SURVEY
7/31/2015	2,952.00	0.26	256.28	2,951.90	-5.97	5.43	-11.44	0.10	MWD	EXTREME SURVEY
7/31/2015	3,142.00	0.09	189.49	3,141.90	-5.74	5.18	-11.89	0.13	MWD	EXTREME SURVEY
7/31/2015	3,331.00	0.09	235.54	3,330.90	-5.52	4.95	-12.03	0.04	MWD	EXTREME SURVEY
7/31/2015	3,521.00	0.09	182.98	3,520.90	-5.29	4.71	-12.16	0.04	MWD	EXTREME SURVEY
7/31/2015	3,711.00	0.26	204.60	3,710.90	-4.76	4.17	-12.35	0.09	MWD	EXTREME SURVEY
7/31/2015	3,901.00	0.18	229.74	3,900.90	-4.20	3.59	-12.76	0.07	MWD	EXTREME SURVEY
7/31/2015	4,090.00	0.44	216.91	4,089.90	-3.46	2.82	-13.42	0.14	MWD	EXTREME SURVEY
7/31/2015	4,279.00	0.53	174.90	4,278.89	-2.02	1.37	-13.78	0.19	MWD	EXTREME SURVEY
7/31/2015	4,467.00	1.49	130.60	4,466.86	0.52	-1.09	-11.84	0.62	MWD	EXTREME SURVEY
7/31/2015	4,562.00	1.49	128.84	4,561.83	2.19	-2.67	-9.94	0.05	MWD	EXTREME SURVEY
7/31/2015	4,657.00	1.32	130.25	4,656.80	3.76	-4.15	-8.15	0.18	MWD	EXTREME SURVEY
7/31/2015	4,751.00	1.93	117.59	4,750.76	5.29	-5.58	-5.92	0.75	MWD	EXTREME SURVEY
7/31/2015	4,846.00	2.55	117.94	4,845.69	7.18	-7.32	-2.63	0.65	MWD	EXTREME SURVEY
7/31/2015	4,941.00	2.29	117.94	4,940.60	9.23	-9.20	0.91	0.27	MWD	EXTREME SURVEY
7/31/2015	5,035.00	1.23	114.60	5,034.56	10.65	-10.49	3.49	1.13	MWD	EXTREME SURVEY
7/31/2015	5,174.00	1.23	124.10	5,173.53	12.23	-11.95	6.08	0.15	MWD	EXTREME SURVEY
7/31/2015	5,308.00	0.97	130.95	5,307.50	13.88	-13.50	8.13	0.22	MWD	EXTREME SURVEY
7/31/2015	5,402.00	1.32	111.79	5,401.48	14.88	-14.43	9.73	0.55	MWD	EXTREME SURVEY
7/31/2015	5,496.00	2.20	103.88	5,495.44	15.84	-15.26	12.49	0.97	MWD	EXTREME SURVEY
7/31/2015	5,591.00	3.34	99.84	5,590.33	16.97	-16.17	16.99	1.22	MWD	EXTREME SURVEY
7/31/2015	5,685.00	4.84	96.50	5,684.08	18.20	-17.09	23.63	1.62	MWD	EXTREME SURVEY
7/31/2015	5,873.00	4.66	88.06	5,871.44	19.58	-17.73	39.14	0.38	MWD	EXTREME SURVEY
7/31/2015	6,062.00	4.40	86.83	6,059.85	19.64	-17.07	54.05	0.15	MWD	EXTREME SURVEY
7/31/2015	6,254.00	3.78	80.85	6,251.36	18.88	-15.65	67.65	0.39	MWD	EXTREME SURVEY
7/31/2015	6,444.00	4.13	83.49	6,440.91	17.73	-13.88	80.63	0.21	MWD	EXTREME SURVEY
7/31/2015	6,633.00	4.75	89.64	6,629.34	17.61	-13.06	95.22	0.41	MWD	EXTREME SURVEY
7/31/2015	6,822.00	4.48	88.06	6,817.73	18.04	-12.76	110.42	0.16	MWD	EXTREME SURVEY
7/31/2015	7,012.00	4.66	93.86	7,007.13	19.04	-13.03	125.54	0.26	MWD	EXTREME SURVEY
7/31/2015	7,198.00	4.22	94.21	7,192.57	20.74	-14.04	139.90	0.24	MWD	EXTREME SURVEY
7/31/2015	7,388.00	3.69	94.21	7,382.11	22.32	-15.00	152.97	0.28	MWD	EXTREME SURVEY
7/31/2015	7,576.00	4.31	90.52	7,569.66	23.46	-15.51	166.07	0.36	MWD	EXTREME SURVEY
7/31/2015	7,766.00	3.52	93.86	7,759.21	24.54	-15.97	179.03	0.43	MWD	EXTREME SURVEY
7/31/2015	7,955.00	3.34	97.38	7,947.87	26.18	-17.07	190.28	0.15	MWD	EXTREME SURVEY
7/31/2015	8,145.00	2.90	104.41	8,137.59	28.57	-18.97	200.42	0.31	MWD	EXTREME SURVEY
7/31/2015	8,334.00	2.37	106.34	8,326.39	31.26	-21.26	208.80	0.28	MWD	EXTREME SURVEY
7/31/2015	8,523.00	2.11	116.01	8,515.25	34.21	-23.89	215.68	0.24	MWD	EXTREME SURVEY
7/31/2015	8,711.00	1.85	118.47	8,703.13	37.45	-26.85	221.46	0.15	MWD	EXTREME SURVEY
7/31/2015	8,901.00	1.58	127.61	8,893.05	40.73	-29.91	226.23	0.20	MWD	EXTREME SURVEY
7/31/2015	9,089.00	1.41	123.74	9,080.98	43.79	-32.78	230.21	0.11	MWD	EXTREME SURVEY
7/31/2015	9,279.00	0.79	132.53	9,270.95	46.11	-34.96	233.12	0.34	MWD	EXTREME SURVEY
7/31/2015	9,468.00	0.79	151.34	9,459.93	48.20	-36.99	234.70	0.14	MWD	EXTREME SURVEY
7/31/2015	9,657.00	0.26	160.48	9,648.92	49.79	-38.53	235.47	0.28	MWD	EXTREME SURVEY
7/31/2015	9,846.00	0.62	163.47	9,837.92	51.19	-39.92	235.90	0.19	MWD	EXTREME SURVEY



Directional Survey

Well Name: THISTLE UNIT 54H

Sub-Division	Region	Field Name		County	State/Province	
DELAWARE BASIN EAST	BASIN EAST	JOHNSON RANCH		LEA	NM	
Surface Legal Location	API/UWI	Latitude (°)	Longitude (°)	Orig KB Elevation (ft)	Ground Elev MSL (ft)	KB - GL (ft)
SEC 28-23S-33E	3002541795	32° 16' 56.648" N	103° 34' 20.338" W	3,725.80	3,700.80	25.00

Survey Data										
Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
7/31/2015	10,035.00	0.97	211.64	10,026.90	53.50	-42.26	235.35	0.38	MWD	EXTREME SURVEY
7/31/2015	10,223.00	1.85	230.09	10,214.84	56.65	-45.56	232.19	0.52	MWD	EXTREME SURVEY
7/31/2015	10,318.00	1.76	218.84	10,309.80	58.67	-47.68	230.10	0.38	MWD	EXTREME SURVEY
7/31/2015	10,507.00	1.58	223.41	10,498.72	62.64	-51.84	226.49	0.12	MWD	EXTREME SURVEY
7/31/2015	10,597.00	1.49	228.68	10,588.68	64.23	-53.51	224.76	0.19	MWD	EXTREME SURVEY
7/31/2015	10,664.00	3.17	203.02	10,655.63	66.44	-55.79	223.38	2.89	MWD	EXTREME SURVEY
7/31/2015	10,695.00	6.77	188.96	10,686.51	69.01	-58.39	222.76	12.17	MWD	EXTREME SURVEY
7/31/2015	10,727.00	10.64	181.05	10,718.13	73.80	-63.20	222.41	12.63	MWD	EXTREME SURVEY
7/31/2015	10,758.00	14.33	176.48	10,748.40	80.50	-69.90	222.59	12.31	MWD	EXTREME SURVEY
7/31/2015	10,789.00	17.85	175.95	10,778.18	89.08	-78.47	223.17	11.36	MWD	EXTREME SURVEY
7/31/2015	10,836.00	23.65	176.83	10,822.11	105.73	-95.08	224.20	12.36	MWD	EXTREME SURVEY
7/31/2015	10,884.00	28.93	176.83	10,865.13	126.98	-116.30	225.37	11.00	MWD	EXTREME SURVEY
7/31/2015	10,931.00	32.71	178.59	10,905.48	151.05	-140.36	226.31	8.27	MWD	EXTREME SURVEY
7/31/2015	10,978.00	38.51	178.41	10,943.68	178.40	-167.70	227.03	12.34	MWD	EXTREME SURVEY
7/31/2015	11,025.00	43.18	177.36	10,979.22	209.13	-198.41	228.18	10.04	MWD	EXTREME SURVEY
7/31/2015	11,073.00	49.42	175.07	11,012.37	243.80	-233.01	230.51	13.45	MWD	EXTREME SURVEY
7/31/2015	11,120.00	55.66	174.02	11,040.95	281.05	-270.13	234.06	13.39	MWD	EXTREME SURVEY
7/31/2015	11,167.00	61.03	174.55	11,065.60	320.99	-309.92	238.04	11.47	MWD	EXTREME SURVEY
7/31/2015	11,214.00	65.25	177.01	11,086.84	362.89	-351.73	241.11	10.12	MWD	EXTREME SURVEY
7/31/2015	11,261.00	69.56	177.71	11,104.89	406.27	-395.06	243.10	9.27	MWD	EXTREME SURVEY
7/31/2015	11,308.00	73.42	178.41	11,119.81	450.83	-439.60	244.61	8.33	MWD	EXTREME SURVEY
7/31/2015	11,356.00	77.91	177.18	11,131.69	497.32	-486.05	246.40	9.68	MWD	EXTREME SURVEY
7/31/2015	11,403.00	81.95	177.36	11,139.91	543.58	-532.27	248.61	8.60	MWD	EXTREME SURVEY
7/31/2015	11,472.00	85.03	178.24	11,147.73	612.13	-600.76	251.24	4.64	MWD	EXTREME SURVEY
7/31/2015	11,567.00	86.35	178.59	11,154.87	706.84	-695.46	253.86	1.44	MWD	EXTREME SURVEY
7/31/2015	11,662.00	89.16	178.76	11,158.59	801.72	-790.35	256.05	2.96	MWD	EXTREME SURVEY
7/31/2015	11,757.00	89.60	178.76	11,159.62	896.69	-885.32	258.11	0.46	MWD	EXTREME SURVEY
7/31/2015	11,852.00	88.72	179.29	11,161.01	991.63	-980.30	259.72	1.08	MWD	EXTREME SURVEY
7/31/2015	11,946.00	87.58	178.76	11,164.04	1,085.53	-1,074.23	261.32	1.34	MWD	EXTREME SURVEY
7/31/2015	12,040.00	88.02	178.06	11,167.65	1,179.44	-1,168.13	263.93	0.88	MWD	EXTREME SURVEY
7/31/2015	12,135.00	87.76	177.01	11,171.15	1,274.38	-1,262.97	268.01	1.14	MWD	EXTREME SURVEY
7/31/2015	12,229.00	88.20	175.95	11,174.46	1,368.31	-1,356.73	273.78	1.22	MWD	EXTREME SURVEY
7/31/2015	12,323.00	87.49	176.13	11,178.00	1,462.22	-1,450.44	280.26	0.78	MWD	EXTREME SURVEY
7/31/2015	12,417.00	87.05	175.78	11,182.48	1,556.09	-1,544.10	286.89	0.60	MWD	EXTREME SURVEY
7/31/2015	12,512.00	87.32	175.25	11,187.14	1,650.93	-1,638.70	294.31	0.63	MWD	EXTREME SURVEY
7/31/2015	12,607.00	88.29	175.07	11,190.78	1,745.80	-1,733.29	302.32	1.04	MWD	EXTREME SURVEY
7/31/2015	12,701.00	89.78	175.95	11,192.36	1,839.74	-1,826.98	309.67	1.84	MWD	EXTREME SURVEY
7/31/2015	12,795.00	89.60	176.30	11,192.87	1,933.72	-1,920.77	316.03	0.42	MWD	EXTREME SURVEY
7/31/2015	12,890.00	88.64	175.78	11,194.33	2,028.68	-2,015.53	322.59	1.15	MWD	EXTREME SURVEY
7/31/2015	12,985.00	88.99	176.13	11,196.29	2,123.64	-2,110.27	329.29	0.52	MWD	EXTREME SURVEY
7/31/2015	13,080.00	90.04	176.30	11,197.10	2,218.62	-2,205.06	335.56	1.12	MWD	EXTREME SURVEY
7/31/2015	13,174.00	90.57	176.30	11,196.60	2,312.60	-2,298.86	341.62	0.56	MWD	EXTREME SURVEY
7/31/2015	13,269.00	88.90	175.42	11,197.04	2,407.57	-2,393.61	348.48	1.99	MWD	EXTREME SURVEY
7/31/2015	13,363.00	88.46	174.72	11,199.20	2,501.48	-2,487.23	356.56	0.88	MWD	EXTREME SURVEY
7/31/2015	13,457.00	90.66	175.78	11,199.92	2,595.41	-2,580.90	364.34	2.60	MWD	EXTREME SURVEY
7/31/2015	13,552.00	90.13	174.72	11,199.27	2,690.35	-2,675.57	372.21	1.25	MWD	EXTREME SURVEY
7/31/2015	13,646.00	90.22	173.49	11,198.98	2,784.20	-2,769.07	381.86	1.31	MWD	EXTREME SURVEY
7/31/2015	13,741.00	90.13	173.67	11,198.69	2,879.01	-2,863.47	392.48	0.21	MWD	EXTREME SURVEY
7/31/2015	13,835.00	90.13	175.42	11,198.48	2,972.90	-2,957.04	401.42	1.86	MWD	EXTREME SURVEY
7/31/2015	13,929.00	89.87	176.83	11,198.48	3,066.88	-3,050.83	407.77	1.53	MWD	EXTREME SURVEY
7/31/2015	14,024.00	90.48	177.53	11,198.19	3,161.88	-3,145.71	412.45	0.98	MWD	EXTREME SURVEY
7/31/2015	14,119.00	89.78	177.36	11,197.97	3,256.87	-3,240.62	416.68	0.76	MWD	EXTREME SURVEY
7/31/2015	14,213.00	89.43	176.30	11,198.62	3,350.87	-3,334.47	421.88	1.19	MWD	EXTREME SURVEY
7/31/2015	14,308.00	88.72	177.36	11,200.16	3,445.85	-3,429.31	427.13	1.34	MWD	EXTREME SURVEY
7/31/2015	14,402.00	88.11	177.53	11,202.76	3,539.81	-3,523.18	431.32	0.67	MWD	EXTREME SURVEY
7/31/2015	14,497.00	88.99	176.30	11,205.16	3,634.78	-3,618.01	436.43	1.59	MWD	EXTREME SURVEY
7/31/2015	14,592.00	89.78	177.18	11,206.18	3,729.77	-3,712.85	441.83	1.24	MWD	EXTREME SURVEY
7/31/2015	14,687.00	90.13	178.41	11,206.25	3,824.76	-3,807.77	445.49	1.35	MWD	EXTREME SURVEY
7/31/2015	14,782.00	91.71	178.59	11,204.73	3,919.72	-3,902.73	447.97	1.67	MWD	EXTREME SURVEY
7/31/2015	14,876.00	91.98	178.24	11,201.70	4,013.66	-3,996.64	450.57	0.47	MWD	EXTREME SURVEY
7/31/2015	14,970.00	92.07	177.89	11,198.38	4,107.59	-4,090.53	453.74	0.38	MWD	EXTREME SURVEY
7/31/2015	15,065.00	91.98	178.06	11,195.02	4,202.52	-4,185.41	457.10	0.20	MWD	EXTREME SURVEY
7/31/2015	15,159.00	91.71	177.36	11,192.00	4,296.47	-4,279.29	460.85	0.80	MWD	EXTREME SURVEY
7/31/2015	15,254.00	91.80	177.18	11,189.09	4,391.42	-4,374.13	465.38	0.21	MWD	EXTREME SURVEY
7/31/2015	15,349.00	91.45	177.01	11,186.39	4,486.39	-4,468.97	470.19	0.41	MWD	EXTREME SURVEY
7/31/2015	15,443.00	91.45	177.01	11,184.02	4,580.35	-4,562.82	475.09	0.00	MWD	EXTREME SURVEY
7/31/2015	15,538.00	91.00	176.83	11,181.98	4,675.33	-4,657.66	480.19	0.51	MWD	EXTREME SURVEY
7/31/2015	15,574.00	91.10	176.83	11,181.32	4,711.32	-4,693.59	482.18	0.28	MWD	EXTREME SURVEY
7/31/2015	15,627.00	91.10	176.83	11,180.31	4,764.31	-4,746.50	485.11	0.00	BIT	EXTREME SURVEY