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Directional Survey**

30-015-43931

**NM OIL CONSERVATION
ARTESIA DISTRICT**

Wellbore Details

SEP 26 2018

RECEIVED

Well Name HH SO 8 P2 14H		Lease HH SO 8 P2		Field Name Purple Sage		Business Unit Mid-Continent				
Ground Elevation (ft) 3,247		Original RKB Elevation (ft) 3,275		Current RKB Elevation 3,275.00, 5/7/2017		Mud Line Elevation (ft) Water Depth (ft)				
Current KB to Ground (ft) 28.00		Current KB to Mud Line (ft)		Current KB to Csg Flange (ft)		Current KB to Tubing Head (ft)				
Logs										
Type		Logging Company		Date		Planned? Cased?				
Wellbore		Job		Depth Top (MD) (ROTH)		Bottom Depth (ROTH)				
Comment										
Wellbores										
Wellbore Name ST-01		Parent Wellbore Original Hole		Directional Type Horizontal		Start Depth (MD) (ROTH) 9,076.0				
Alt. Wellbore Identifier		TAML Classification N/A		TAML Functionality		Casing Configuration Class 1				
Bottom Hole Legal Location		Wellbore UWI 300154393101		Wellbore ChevNo PJ8438-00		Vertical Section Direction (°) 0.92				
Wellbore Sections										
		End Date		Act Top (ROTH)		Act Btm (ROTH)				
Kick Offs & Key Depths										
Date 8/20/2017	Type Kick Off	Point or Interval Point	Top Depth (ROTH) 9,076.0	Depth Top (TVD) (ROTH) 9,054.8	Method Whipstock					
Date 8/22/2017	Type Kick Off	Point or Interval Point	Top Depth (ROTH) 9,525.0	Depth Top (TVD) (ROTH) 9,499.5	Method					
Date 8/28/2017	Type Heel	Point or Interval Point	Top Depth (ROTH) 10,372.0	Depth Top (TVD) (ROTH) 10,006.7	Method					
Last 5 PBTD's										
Type	Date	PBTD (ROTH)	Depth (TVD) (ROTH)	Method	Com					
Geologic Horizons										
Formation Name		Prog Top (TVD SS) Override (ft)	Prog Top (TVD) (ROTH)	Prog Btm (TVD SS) Override (ft)	Prog Btm (TVD) (ROTH)	Drill Top MD (ROTH)	Drill Btm MD (ROTH)			
Directional Surveys										
Description Curve and Lateral		Date 8/20/2017	Definitive? N	Planned? N	Job Drill and Suspend, 5/7/2017 00:00					
Azimuth Tie In (°) 181.58		MD Tie In (ROTH) 9,016.00	Inclination Tie In (°) 3.07	NSTie In (ft) -48.30	EWtie In (ft) 185.42	TVDtie In (ROTH) 8,994.81				
Comment										
Survey Data										
Date	MD (ROTH)	Incl (°)	Azm (°)	TVD (ROTH)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Method	Survey Company
8/22/2017	9,016.00	3.07	181.58	8,994.81	-45.32	-48.30	185.42	0.00	Magn MWD	
8/22/2017	9,131.00	5.38	23.52	9,109.68	-43.42	-46.43	187.49	7.22	Magn MWD	
8/22/2017	9,225.00	9.50	7.94	9,202.87	-31.64	-34.70	190.32	4.84	Magn MWD	
8/22/2017	9,320.00	9.10	7.27	9,296.62	-16.39	-19.49	192.36	0.44	Magn MWD	
8/22/2017	9,414.00	8.03	3.85	9,389.57	-2.45	-5.56	193.74	1.26	Magn MWD	
8/22/2017	9,508.00	7.54	1.35	9,482.71	10.28	7.16	194.32	0.63	Magn MWD	
8/22/2017	9,603.00	17.80	9.23	9,575.28	30.93	27.78	196.81	10.93	Magn MWD	
8/22/2017	9,696.00	29.54	3.78	9,660.31	68.03	64.82	200.61	12.83	Magn MWD	
8/22/2017	9,790.00	35.12	0.81	9,739.72	118.25	115.02	202.52	6.17	Magn MWD	
8/22/2017	9,833.00	40.58	1.34	9,773.66	144.63	141.39	203.02	12.72	Magn MWD	
8/22/2017	9,885.00	48.90	1.13	9,810.56	181.20	177.95	203.81	16.00	Magn MWD	
8/22/2017	9,916.00	52.76	0.22	9,830.14	205.23	201.98	204.09	12.66	Magn MWD	
8/22/2017	9,963.00	55.83	359.67	9,857.56	243.38	240.14	204.05	6.60	Magn MWD	
8/22/2017	10,010.00	58.53	0.24	9,883.04	282.87	279.63	204.02	5.83	Magn MWD	
8/22/2017	10,057.00	60.27	0.53	9,906.96	323.32	320.08	204.29	3.74	Magn MWD	
8/22/2017	10,104.00	62.01	0.90	9,929.64	364.48	361.24	204.81	3.77	Magn MWD	
8/22/2017	10,120.00	62.12	0.49	9,937.14	378.62	375.38	204.98	2.37	Magn MWD	
8/22/2017	10,151.00	63.51	0.52	9,951.30	406.19	402.95	205.22	4.48	Magn MWD	
8/22/2017	10,183.00	65.74	359.58	9,965.02	435.10	431.86	205.24	7.46	Magn MWD	
8/22/2017	10,214.00	68.80	357.53	9,976.99	463.66	460.44	204.52	11.60	Magn MWD	
8/22/2017	10,246.00	72.30	356.62	9,987.65	493.76	490.57	202.97	11.26	Magn MWD	
8/22/2017	10,277.00	76.80	355.65	9,995.90	523.53	520.37	200.96	14.83	Magn MWD	
8/22/2017	10,309.00	80.95	355.34	10,002.08	554.78	551.67	198.49	13.00	Magn MWD	
8/22/2017	10,340.00	85.18	354.98	10,005.82	585.39	582.32	195.90	13.69	Magn MWD	



Wellbore Details

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Current KB to Ground (ft) 28.00	Current KB to Mud Line (ft)	Current KB to Csg Flange (ft)	Current KB to Tubing Head (ft)	

Survey Data

Date	MD (ROTH)	Incl (")	Azm (")	TVD (ROTH)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Method	Survey Company
8/22/2017	10,372.00	91.54	354.59	10,006.73	617.18	614.16	192.99	19.91	Magn MWD	
8/22/2017	10,459.00	91.65	356.21	10,004.31	703.74	700.84	186.01	1.87	Magn MWD	
8/22/2017	10,553.00	90.84	358.03	10,002.27	797.51	794.70	181.29	2.12	Magn MWD	
9/2/2017	10,635.00	90.62	357.70	10,001.23	879.38	876.63	178.24	0.48	Magn MWD	
9/2/2017	10,729.00	91.82	358.48	9,999.22	973.24	970.56	175.11	1.52	Magn MWD	
9/2/2017	10,824.00	95.02	0.83						Magn MWD	
9/2/2017	10,919.00	95.41	0.89	9,987.24	1,162.78	1,160.13	174.06	2.27	Magn MWD	
9/2/2017	11,014.00	94.01	0.06	9,979.44	1,257.45	1,254.80	174.84	1.71	Magn MWD	
9/2/2017	11,157.00	89.72	358.04	9,974.79	1,400.26	1,397.67	172.47	3.32	Magn MWD	
9/2/2017	11,204.00	86.27	355.18	9,976.43	1,447.08	1,444.55	169.69	9.53	Magn MWD	
9/2/2017	11,298.00	89.92	355.19	9,979.56	1,540.55	1,538.15	161.81	3.88	Magn MWD	
9/2/2017	11,343.00	92.16	355.63	9,978.74	1,585.33	1,582.99	158.21	5.07	Magn MWD	
9/3/2017	11,393.00	86.36	352.69	9,979.39	1,634.95	1,632.70	153.12	13.00	Magn MWD	
9/3/2017	11,456.00	88.85	356.57	9,982.02	1,697.50	1,695.35	147.24	7.31	Magn MWD	
9/3/2017	11,488.00	91.48	358.88	9,981.93	1,729.44	1,727.32	145.97	10.94	Magn MWD	
9/3/2017	11,520.00	94.23	359.55	9,980.34	1,761.39	1,759.28	145.53	8.84	Magn MWD	
9/3/2017	11,551.00	91.01	358.73	9,978.92	1,792.33	1,790.24	145.06	10.72	Magn MWD	
9/3/2017	11,583.00	90.14	359.61	9,978.60	1,824.32	1,822.23	144.60	3.87	Magn MWD	
9/3/2017	11,614.00	89.27	358.97	9,978.76	1,855.30	1,853.23	144.22	3.48	Magn MWD	
9/3/2017	11,678.00	89.38	1.44	9,979.51	1,919.29	1,917.22	144.45	3.86	Magn MWD	
9/3/2017	11,709.00	92.07	1.88	9,979.12	1,950.28	1,948.20	145.34	8.79	Magn MWD	
9/4/2017	11,741.00	94.09	2.39	9,977.40	1,982.23	1,980.13	146.53	6.51	Magn MWD	
9/4/2017	11,773.00	95.80	3.09	9,974.64	2,014.09	2,011.97	148.06	5.77	Magn MWD	
9/4/2017	11,868.00	97.21	3.91	9,963.88	2,108.38	2,106.18	153.82	1.71	Magn MWD	
9/4/2017	11,963.00	97.04	3.55	9,952.10	2,202.53	2,200.25	159.95	0.42	Magn MWD	
9/5/2017	12,057.00	95.91	4.37	9,941.50	2,295.80	2,293.42	166.40	1.48	Magn MWD	
9/5/2017	12,152.00	93.33	3.41	9,933.84	2,390.35	2,387.89	172.82	2.90	Magn MWD	
9/5/2017	12,247.00	91.15	3.12	9,930.13	2,485.20	2,482.65	178.23	2.31	Magn MWD	
9/5/2017	12,342.00	94.34	3.95	9,925.58	2,579.98	2,577.35	184.08	3.47	Magn MWD	
9/5/2017	12,436.00	87.65	358.22	9,923.95	2,673.87	2,671.23	185.85	9.37	Magn MWD	
9/5/2017	12,531.00	89.80	357.56	9,926.06	2,768.71	2,766.13	182.35	2.37	Magn MWD	
9/5/2017	12,626.00	86.56	356.42	9,929.08	2,863.42	2,860.94	177.37	3.62	Magn MWD	
9/5/2017	12,721.00	88.29	357.20	9,933.35	2,958.08	2,955.69	172.09	2.00	Magn MWD	
9/6/2017	12,816.00	90.84	358.47	9,934.07	3,052.93	3,050.61	168.50	3.00	Magn MWD	
9/6/2017	12,911.00	89.97	354.82	9,933.40	3,147.64	3,145.43	162.94	3.95	Magn MWD	
9/6/2017	13,005.00	91.15	354.40	9,932.48	3,241.07	3,239.01	154.11	1.33	Magn MWD	
9/6/2017	13,100.00	92.01	355.56	9,929.86	3,335.52	3,333.61	145.80	1.52	Magn MWD	
9/6/2017	13,194.00	91.93	356.81	9,926.63	3,429.14	3,427.34	139.55	1.33	Magn MWD	
9/6/2017	13,289.00	93.75	2.25	9,921.92	3,523.96	3,522.18	138.77	6.03	Magn MWD	
9/6/2017	13,384.00	90.56	1.02	9,918.35	3,618.87	3,617.06	141.48	3.60	Magn MWD	
9/6/2017	13,479.00	91.12	3.41	9,916.95	3,713.83	3,711.97	145.15	2.58	Magn MWD	
9/6/2017	13,574.00	92.35	6.39	9,914.08	3,808.54	3,806.57	153.26	3.39	Magn MWD	
9/7/2017	13,640.00	89.08	4.87	9,913.25	3,874.30	3,872.24	159.73	5.46	Extrap.	
9/7/2017	13,669.00	89.08	4.87	9,913.72	3,903.23	3,901.13	162.19	0.00	Magn MWD	
9/7/2017	13,763.00	91.96	6.66	9,912.86	3,996.88	3,994.63	171.63	3.61	Magn MWD	
9/7/2017	13,858.00	94.54	7.25	9,907.48	4,091.19	4,088.78	183.12	2.79	Magn MWD	
9/7/2017	13,952.00	91.93	1.41	9,902.17	4,184.82	4,182.31	190.19	6.80	Magn MWD	
9/7/2017	14,047.00	89.83	358.99	9,900.71	4,279.79	4,277.29	190.52	3.37	Magn MWD	
9/7/2017	14,142.00	88.15	356.79	9,902.39	4,374.64	4,372.20	187.03	2.91	Magn MWD	
9/7/2017	14,237.00	91.51	357.25	9,902.67	4,469.40	4,467.05	182.09	3.57	Magn MWD	
9/8/2017	14,331.00	96.36	358.42	9,896.22	4,563.01	4,560.74	178.55	5.31	Magn MWD	
9/8/2017	14,426.00	91.57	357.38	9,889.65	4,657.63	4,655.42	175.07	5.16	Magn MWD	
9/8/2017	14,553.00	88.88	358.09	9,889.15	4,784.42	4,782.30	170.05	2.19	Magn MWD	
9/8/2017	14,616.00	90.73	358.81	9,889.37	4,847.36	4,845.28	168.35	3.15	Magn MWD	
9/8/2017	14,710.00	90.11	0.27	9,888.68	4,941.32	4,939.27	167.59	1.69	Magn MWD	
9/8/2017	14,805.00	90.64	1.64	9,888.06	5,036.32	5,034.25	169.18	1.55	Magn MWD	
9/8/2017	14,900.00	85.04	358.63	9,891.64	5,131.19	5,129.13	169.41	6.69	Magn MWD	



Wellbore Details

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Current KB to Ground (ft) 28.00	Current KB to Mud Line (ft)	Current KB to Csg Flange (ft)	Current KB to Tubing Head (ft)	

Survey Data										
Date	MD (ROTH)	Incl (°)	Azm (°)	TVD (ROTH)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Method	Survey Company
9/8/2017	14,995.00	85.58	358.28	9,899.40	5,225.79	5,223.78	166.85	0.68	Magn MWD	
9/9/2017	15,089.00	86.53	357.94	9,905.87	5,319.45	5,317.51	163.76	1.07	Magn MWD	
9/9/2017	15,184.00	86.05	357.76	9,912.02	5,414.11	5,412.24	160.20	0.54	Magn MWD	
9/9/2017	15,279.00	85.32	356.45	9,919.17	5,508.63	5,506.85	155.42	1.58	Magn MWD	
9/9/2017	15,374.00	88.38	357.30	9,924.39	5,603.24	5,601.55	150.25	3.34	Magn MWD	
9/9/2017	15,468.00	89.33	359.20	9,926.26	5,697.11	5,695.48	147.38	2.26	Magn MWD	
9/9/2017	15,563.00	92.86	359.83	9,924.45	5,792.05	5,790.45	146.58	3.77	Magn MWD	
9/9/2017	15,658.00	89.83	359.51	9,922.22	5,886.99	5,885.41	146.03	3.21	Magn MWD	
9/9/2017	15,753.00	88.43	0.53	9,923.66	5,981.97	5,980.39	146.06	1.82	Magn MWD	
9/10/2017	15,848.00	87.12	0.89	9,927.35	6,076.89	6,075.31	147.24	1.43	Magn MWD	
9/10/2017	15,943.00	86.30	0.87	9,932.80	6,171.73	6,170.14	148.69	0.86	Magn MWD	
9/10/2017	16,038.00	90.06	2.57	9,935.82	6,266.66	6,265.03	151.55	4.34	Magn MWD	
9/10/2017	16,134.00	87.48	1.59	9,937.88	6,362.61	6,360.94	155.03	2.87	Magn MWD	
9/10/2017	16,229.00	90.64	3.58	9,939.44	6,457.54	6,455.81	159.31	3.93	Magn MWD	
9/10/2017	16,324.00	89.64	4.08	9,939.21	6,552.41	6,550.60	165.66	1.18	Magn MWD	
9/10/2017	16,419.00	88.85	1.38	9,940.46	6,647.35	6,645.47	170.18	2.96	Magn MWD	
9/10/2017	16,514.00	88.80	0.08	9,942.41	6,742.32	6,740.44	171.39	1.37	Magn MWD	
9/10/2017	16,609.00	90.98	2.09	9,942.59	6,837.31	6,835.41	173.19	3.12	Magn MWD	
9/10/2017	16,704.00	87.62	1.70	9,943.75	6,932.28	6,930.34	176.33	3.56	Magn MWD	
9/10/2017	16,799.00	87.70	358.76	9,947.63	7,027.18	7,025.25	176.71	3.09	Magn MWD	
9/10/2017	16,894.00	88.35	357.89	9,950.90	7,122.03	7,120.15	173.94	1.14	Magn MWD	
9/10/2017	16,987.00	90.25	1.18	9,952.04	7,214.98	7,213.12	173.18	4.08	Magn MWD	
9/10/2017	17,083.00	90.73	3.01	9,951.22	7,310.95	7,309.05	176.69	1.97	Magn MWD	
9/10/2017	17,178.00	89.83	359.28	9,950.75	7,405.93	7,404.01	178.59	4.04	Magn MWD	
9/10/2017	17,273.00	88.60	358.35	9,952.06	7,500.85	7,498.98	176.63	1.62	Magn MWD	
9/10/2017	17,368.00	87.90	356.91	9,954.96	7,595.65	7,593.85	172.70	1.68	Magn MWD	
9/10/2017	17,462.00	91.37	357.82	9,955.56	7,689.45	7,687.74	168.38	3.82	Magn MWD	
9/10/2017	17,557.00	84.56	356.49	9,958.93	7,784.13	7,782.50	163.67	7.30	Magn MWD	
9/10/2017	17,652.00	85.17	357.20	9,967.43	7,878.51	7,876.98	158.47	0.98	Magn MWD	
9/10/2017	17,747.00	89.92	354.81	9,974.80	8,049.65	8,048.34	146.49	3.09	Magn MWD	
9/10/2017	17,842.00	88.35	358.08	9,976.22	8,143.34	8,142.13	140.66	3.86	Magn MWD	
9/10/2017	18,012.00	88.04	358.35	9,979.18	8,237.19	8,236.04	137.74	0.44	Magn MWD	
9/10/2017	18,108.00	84.95	358.67	9,985.04	8,332.91	8,331.82	135.25	3.24	Magn MWD	
9/10/2017	18,203.00	83.63	359.55	9,994.50	8,427.39	8,426.33	133.78	1.67	Magn MWD	
9/10/2017	18,298.00	88.35	359.97	10,001.14	8,522.11	8,521.07	133.38	4.99	Magn MWD	
9/10/2017	18,393.00	89.66	0.96	10,002.79	8,617.09	8,616.05	134.15	1.73	Magn MWD	
9/10/2017	18,488.00	88.71	1.40	10,004.14	8,712.08	8,711.02	136.11	1.10	Magn MWD	
9/10/2017	18,583.00	88.09	0.88	10,006.79	8,807.04	8,805.96	138.00	0.85	Magn MWD	
9/10/2017	18,677.00	89.94	1.91	10,008.41	8,901.02	8,899.91	140.29	2.25	Magn MWD	
9/10/2017	18,772.00	91.43	2.71	10,007.27	8,995.98	8,994.83	144.11	1.78	Magn MWD	
9/10/2017	18,867.00	89.47	2.90	10,006.53	9,090.92	9,089.71	148.76	2.07	Magn MWD	
9/10/2017	18,961.00	89.94	2.93	10,007.01	9,184.86	9,183.58	153.54	0.50	Magn MWD	
9/10/2017	19,056.00	89.55	2.67	10,007.43	9,279.81	9,278.47	158.18	0.49	Magn MWD	
9/10/2017	19,151.00	90.00	3.35	10,007.81	9,374.75	9,373.34	163.17	0.86	Magn MWD	
9/10/2017	19,245.00	90.90	3.53	10,007.07	9,468.65	9,467.16	168.81	0.98	Magn MWD	
9/10/2017	19,340.00	90.76	2.76	10,005.69	9,563.57	9,562.01	174.02	0.82	Magn MWD	
9/10/2017	19,434.00	90.70	5.01	10,004.49	9,657.43	9,655.78	180.39	2.39	Magn MWD	
9/10/2017	19,529.00	89.24	1.92	10,004.54	9,752.32	9,750.59	186.13	3.60	Magn MWD	
9/10/2017	19,623.00	90.70	1.88	10,004.59	9,846.31	9,844.54	189.25	1.55	Magn MWD	
9/10/2017	19,718.00	90.20	359.58	10,003.85	9,941.30	9,939.52	190.46	2.48	Magn MWD	
9/10/2017	19,812.00	88.54	357.11	10,004.88	10,035.18	10,033.46	187.75	3.17	Magn MWD	
9/10/2017	19,906.00	92.52	0.24	10,004.01	10,129.08	10,127.40	185.57	5.39	Magn MWD	
9/10/2017	20,001.00	91.01	358.82	10,001.08	10,224.00	10,222.35	184.79	2.18	Magn MWD	
9/10/2017	20,095.00	89.92	356.47	10,000.32	10,317.84	10,316.26	180.93	2.76	Magn MWD	
9/10/2017	20,190.00	89.22	354.60	10,001.03	10,412.41	10,410.96	173.53	2.10	Magn MWD	
9/10/2017	20,285.00	91.37	355.84	10,000.55	10,506.93	10,505.63	165.62	2.61	Magn MWD	
9/10/2017	20,379.00	88.38	354.79	10,000.75	10,600.47	10,599.30	157.94	3.37	Magn MWD	



Wellbore Details

Well Name HH SO 8 P2 14H	Lease HH SO 8 P2	Field Name Purple Sage	Business Unit Mid-Continent	
Ground Elevation (ft) 3,247	Original RKB Elevation (ft) 3,275	Current RKB Elevation 3,275.00, 5/7/2017	Mud Line Elevation (ft)	Water Depth (ft)
Current KB to Ground (ft) 28.00	Current KB to Mud Line (ft)	Current KB to Csg Flange (ft)	Current KB to Tubing Head (ft)	

Survey Data										
Date	MD (ROTH)	Incl (°)	Azm (°)	TVD (ROTH)	VS (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Method	Survey Company
9/10/2017	20,416.00	90.45	356.39	10,001.13	10,637.30	10,636.18	155.10	7.07	Magn MWD	
9/10/2017	20,474.00	90.45	356.39	10,000.67	10,695.12	10,694.07	151.45	0.00	Extrap.	

Zones						
Zone Name	Top (ftOTH)	Btm (ftOTH)	Zone Comp Method	Completion ChevNo	Completion UWI	Completion License No.
Wolfcamp D	10,505	20,291	Proppant Frac	PJ8438-00-01	30015439310001	