



7821 Will Rogers Blvd.
Fort Worth, Texas 76140

817.568.1038 (office)
817.568.1499 (fax)
www.msenergyservices.com

NM OIL CONSERVATION
ARTESIA DISTRICT

State of Texas

County of Tarrant

OCT 31 2016

RECEIVED

I, NESBY CAIN, certify that; I am employed by MS Energy Services;
that I did on the day(s) of 8/10/16 through 8/26/16 conduct or supervise
the taking of MWD survey(s) from a depth of 155 feet to a depth of 13,778
feet; that the data is true, correct, complete and within the limitations of the tool set forth by MS Energy
Services; that I am authorized and qualified to make this report; that this survey(s) was / were
conducted at the request of Mack Energy Corporation
for the CAVERN STATE 16 001H, API No. 30-015-43841
in EDDY County Parish, NEW MEXICO; and that I have
reviewed this report and find that it conforms to the principles and procedures as set forth by
MS Energy Services.

Signature: [Signature]

Title: MWD FIELD SPECIALIST



SURVEY CALCULATION PROGRAM

10/12/16 15:19

Company:	Mack Energy Corporation				
Well Name:	Cavern State 16 001H				
Location:	Eddy County, NM				
Rig:	Orion #10		Magnetic Declination:	7.62	REFERENCED TO GRID NORTH
Job Number:	DDMO-160336				
API #:	30-015-43841				

Vertical Section Azimuth: 89.41 Proposed Direction: 89.41

Survey Calculation Method: Minimum Curvature

PTB:	MD		INC		AZM		TVD		N/S		E/W		VS	
	13,850		89.41		93.92		9110.84		22.72		4882.93		4882.91	
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance	Azm	DLS/ 100	BUR/ 100'			
TIE IN	0	0.00	0.00	0.00	0.00	0.00			0.00					
1	155	0.60	104.90	155.00	-0.21	0.78	0.78	0.81	104.90	0.39	0.39			
2	307	1.30	114.00	306.98	-1.11	3.13	3.12	3.32	109.61	0.47	0.46			
3	404	1.90	107.30	403.94	-2.04	5.67	5.65	6.03	109.79	0.65	0.62			
4	518	2.10	105.00	517.87	-3.14	9.49	9.46	10.00	108.32	0.19	0.18			
5	698	0.60	67.20	697.82	-3.63	13.55	13.51	14.02	105.01	0.93	-0.83			
6	789	0.50	33.80	788.81	-3.12	14.21	14.17	14.54	102.37	0.36	-0.11			
7	879	0.50	43.50	878.81	-2.51	14.69	14.67	14.91	99.68	0.09	0.00			
8	970	0.40	32.70	969.80	-1.95	15.14	15.12	15.26	97.34	0.14	-0.11			
9	1,060	0.40	41.20	1059.80	-1.45	15.52	15.50	15.58	95.34	0.07	0.00			
10	1,150	0.70	84.00	1149.80	-1.16	16.27	16.26	16.31	94.06	0.54	0.33			
11	1,240	2.00	100.50	1239.77	-1.38	18.36	18.35	18.41	94.31	1.49	1.44			
12	1,331	3.00	105.90	1330.68	-2.33	22.21	22.19	22.33	95.98	1.13	1.10			
13	1,420	2.10	126.40	1419.60	-3.93	25.76	25.72	26.06	98.68	1.42	-1.01			
14	1,511	0.70	164.90	1510.57	-5.46	27.25	27.19	27.79	101.33	1.77	-1.54			
15	1,601	0.90	147.80	1600.56	-6.59	27.77	27.70	28.54	103.34	0.34	0.22			
16	1,695	2.20	121.00	1694.53	-8.14	29.71	29.63	30.81	105.32	1.55	1.38			
17	1,790	0.30	103.10	1789.50	-9.14	31.52	31.42	32.81	106.17	2.02	-2.00			
18	1,885	0.20	298.90	1884.50	-9.11	31.61	31.52	32.90	106.08	0.52	-0.11			
19	1,979	0.40	272.30	1978.50	-9.02	31.14	31.05	32.42	106.15	0.25	0.21			
20	2,074	0.40	226.20	2073.49	-9.24	30.57	30.48	31.94	106.81	0.33	0.00			
21	2,106	0.40	231.40	2105.49	-9.38	30.40	30.31	31.82	107.15	0.11	0.00			
22	2,162	0.71	277.13	2161.49	-9.46	29.91	29.81	31.37	107.56	0.92	0.54			
23	2,258	3.39	302.27	2257.42	-7.87	26.92	26.84	28.05	106.30	2.89	2.80			
24	2,353	7.01	294.13	2352.02	-4.00	19.25	19.21	19.66	101.74	3.87	3.80			
25	2,448	10.00	293.54	2445.96	1.67	6.40	6.41	6.61	75.41	3.16	3.15			
26	2,542	11.02	294.09	2538.38	8.59	-9.29	-9.20	12.65	312.77	1.08	1.08			
27	2,638	10.62	283.34	2632.69	14.38	-26.27	-26.12	29.95	298.69	2.14	-0.41			
28	2,733	10.53	271.43	2726.08	16.61	-43.47	-43.30	46.54	290.92	2.30	-0.10			
29	2,828	10.22	268.81	2819.53	16.66	-60.58	-60.40	62.83	285.37	0.59	-0.32			
30	2,923	10.00	268.85	2913.05	16.31	-77.25	-77.08	78.96	281.92	0.24	-0.24			
31	3,018	9.43	268.56	3006.69	15.95	-93.28	-93.11	94.63	279.71	0.61	-0.60			
32	3,113	9.43	260.10	3100.41	14.42	-108.72	-108.56	109.67	277.56	1.46	0.00			

**Energy Services****SURVEY CALCULATION PROGRAM**

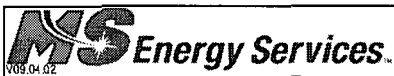
10/12/16 15:19

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Well Name:		Cavern State 16 001H	
Location:		Eddy County, NM	
Rig:		Orion #10	
Job Number:		DDMO-160336	
API #:		30-015-43841	
		Magnetic Declination:	7.62
		REFERENCED TO GRID NORTH	

Vertical Section Azimuth: 89.41 Proposed Direction: 89.41

Survey Calculation Method: Minimum Curvature

PTB:	MD		INC		AZM		TVD		N/S		E/W		VS	
	13,850		89.41		93.92		9110.84		22.72		4882.93		4882.91	
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance Azm		DLS/ 100	BUR/ 100'			
33	3,208	7.62	252.23	3194.36	11.16	-122.38	-122.26	122.89	275.21	2.26	-1.90			
34	3,302	7.40	251.23	3287.56	7.31	-134.05	-133.97	134.25	273.12	0.27	-0.23			
35	3,397	4.71	253.06	3382.02	4.21	-143.58	-143.53	143.64	271.68	2.84	-2.83			
36	3,493	2.51	242.73	3477.82	2.09	-149.22	-149.19	149.24	270.80	2.38	-2.29			
37	3,588	0.40	4.97	3572.79	1.47	-151.04	-151.02	151.05	270.56	2.89	-2.23			
38	3,682	1.01	39.41	3666.79	2.43	-150.49	-150.45	150.51	270.93	0.77	0.66			
39	3,778	0.88	30.97	3762.77	3.72	-149.57	-149.52	149.61	271.43	0.20	-0.14			
40	3,872	0.79	27.37	3856.76	4.92	-148.90	-148.84	148.98	271.89	0.11	-0.09			
41	3,967	0.71	25.97	3951.76	6.03	-148.34	-148.27	148.46	272.33	0.09	-0.09			
42	4,062	0.62	15.55	4046.75	7.05	-147.95	-147.87	148.11	272.73	0.16	-0.09			
43	4,156	0.70	11.33	4140.74	8.10	-147.70	-147.61	147.92	273.14	0.11	0.09			
44	4,250	0.62	347.10	4234.74	9.16	-147.70	-147.59	147.98	273.55	0.31	-0.09			
45	4,346	0.79	339.14	4330.73	10.29	-148.05	-147.93	148.40	273.97	0.21	0.18			
46	4,441	0.88	339.78	4425.72	11.59	-148.53	-148.41	148.99	274.46	0.09	0.09			
47	4,536	1.01	339.89	4520.71	13.06	-149.08	-148.93	149.65	275.01	0.14	0.14			
48	4,630	1.01	339.82	4614.69	14.62	-149.65	-149.49	150.36	275.58	0.00	0.00			
49	4,725	0.79	339.04	4709.68	16.02	-150.17	-150.00	151.03	276.09	0.23	-0.23			
50	4,821	0.88	211.45	4805.68	16.01	-150.80	-150.62	151.64	276.06	1.57	0.09			
51	4,916	1.19	206.73	4900.66	14.51	-151.62	-151.46	152.31	275.47	0.34	0.32			
52	5,010	1.19	212.57	4994.64	12.82	-152.59	-152.45	153.12	274.80	0.13	0.00			
53	5,105	1.32	210.17	5089.62	11.04	-153.67	-153.55	154.06	274.11	0.15	0.14			
54	5,200	1.32	207.48	5184.59	9.12	-154.72	-154.62	154.99	273.37	0.07	0.00			
55	5,295	1.41	207.66	5279.57	7.11	-155.77	-155.69	155.93	272.61	0.09	0.09			
56	5,390	1.32	207.82	5374.54	5.11	-156.83	-156.76	156.91	271.87	0.09	-0.09			
57	5,485	1.19	213.36	5469.52	3.31	-157.88	-157.84	157.91	271.20	0.19	-0.14			
58	5,580	1.01	210.68	5564.50	1.77	-158.85	-158.82	158.86	270.64	0.19	-0.19			
59	5,675	0.70	181.28	5659.49	0.46	-159.29	-159.28	159.29	270.17	0.56	-0.32			
60	5,770	0.62	136.13	5754.48	-0.49	-158.95	-158.95	158.95	269.82	0.54	-0.09			
61	5,865	0.22	240.10	5849.48	-0.95	-158.75	-158.76	158.76	269.66	0.74	-0.42			
62	5,960	0.62	267.41	5944.48	-1.06	-159.42	-159.43	159.43	269.62	0.46	0.42			
63	6,055	1.10	260.74	6039.47	-1.23	-160.83	-160.84	160.84	269.56	0.52	0.51			
64	6,150	1.72	277.44	6134.44	-1.20	-163.15	-163.15	163.15	269.58	0.77	0.65			
65	6,245	1.10	30.74	6229.42	-0.23	-164.09	-164.09	164.09	269.92	2.50	-0.65			
66	6,339	1.10	30.30	6323.40	1.33	-163.18	-163.15	163.18	270.47	0.01	0.00			



SURVEY CALCULATION PROGRAM

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Well Name:	Cavern State 16 001H
Location:	Eddy County, NM
Rig:	Orion #10
Job Number:	DDMO-160336
API #:	30-015-43841

Magnetic Declination: 7.62 REFERENCED TO GRID NORTH

Vertical Section Azimuth: 89.41 Proposed Direction: 89.41

Survey Calculation Method: Minimum Curvature

PTB:	MD		INC		AZM		TVD		N/S		E/W		VS	
	13,850		89.41		93.92		9110.84		22.72		4882.93		4882.91	
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance Azm		DLS/ 100	BUR/ 100'			
67	6,434	0.88	350.42	6418.39	2.84	-162.84	-162.80	162.86	271.00	0.74	-0.23			
68	6,528	1.10	317.43	6512.38	4.21	-163.57	-163.52	163.62	271.48	0.64	0.23			
69	6,624	0.40	73.56	6608.37	4.99	-163.87	-163.81	163.95	271.74	1.38	-0.73			
70	6,718	0.09	212.58	6702.37	5.02	-163.60	-163.54	163.68	271.76	0.50	-0.33			
71	6,813	0.62	247.13	6797.37	4.76	-164.11	-164.05	164.18	271.66	0.58	0.56			
72	6,908	0.62	258.97	6892.36	4.46	-165.08	-165.03	165.14	271.55	0.13	0.00			
73	7,003	0.79	307.93	6987.36	4.77	-166.10	-166.05	166.17	271.64	0.64	0.19			
74	7,097	1.10	309.76	7081.34	5.75	-167.31	-167.24	167.41	271.97	0.33	0.33			
75	7,193	1.19	312.85	7177.32	7.01	-168.75	-168.67	168.90	272.38	0.11	0.09			
76	7,288	0.22	193.18	7272.32	7.51	-169.51	-169.43	169.68	272.54	1.38	-1.02			
77	7,382	0.62	222.24	7366.32	6.96	-169.90	-169.82	170.04	272.34	0.47	0.42			
78	7,477	0.48	247.46	7461.31	6.42	-170.61	-170.54	170.73	272.16	0.29	-0.14			
79	7,572	1.01	261.09	7556.30	6.14	-171.81	-171.74	171.92	272.05	0.58	0.56			
80	7,667	1.32	261.41	7651.28	5.85	-173.72	-173.65	173.82	271.93	0.32	0.32			
81	7,761	1.01	181.13	7745.27	4.85	-174.81	-174.75	174.88	271.59	1.62	-0.33			
82	7,856	1.19	121.99	7840.25	3.49	-173.99	-173.95	174.03	271.15	1.15	0.19			
83	7,951	0.31	139.88	7935.24	2.77	-172.99	-172.95	173.01	270.92	0.95	-0.93			
84	8,046	0.62	215.66	8030.24	2.16	-173.12	-173.09	173.14	270.72	0.65	0.32			
85	8,141	0.62	254.55	8125.24	1.61	-173.92	-173.89	173.92	270.53	0.43	0.00			
86	8,236	0.70	323.21	8220.23	1.94	-174.76	-174.73	174.77	270.64	0.79	0.09			
87	8,331	0.88	329.99	8315.22	3.04	-175.47	-175.43	175.50	270.99	0.21	0.19			
88	8,385	0.88	312.83	8369.22	3.68	-175.98	-175.94	176.02	271.20	0.49	0.00			
89	8,453	0.62	330.02	8437.21	4.36	-176.55	-176.50	176.60	271.41	0.51	-0.39			
90	8,547	8.88	94.33	8530.85	4.24	-169.55	-169.50	169.61	271.43	9.83	8.79			
91	8,642	18.68	93.19	8623.00	2.84	-147.00	-146.96	147.03	271.11	10.32	10.32			
92	8,736	30.41	92.64	8708.36	0.90	-108.07	-108.05	108.07	270.48	12.49	12.48			
93	8,831	41.04	95.72	8785.38	-3.33	-52.85	-52.88	52.96	266.40	11.34	11.19			
94	8,925	49.18	95.86	8851.66	-10.05	13.35	13.24	16.71	126.97	8.66	8.66			
95	9,020	57.33	91.67	8908.46	-14.90	89.23	89.07	90.46	99.48	9.28	8.58			
96	9,115	61.50	82.25	8956.87	-10.42	170.73	170.61	171.05	93.49	9.59	4.39			
97	9,210	64.77	84.45	8999.80	-0.64	254.89	254.87	254.89	90.14	4.02	3.44			
98	9,305	74.28	86.98	9032.99	5.94	343.53	343.58	343.58	89.01	10.32	10.02			
99	9,400	84.21	88.02	9050.69	9.98	436.66	436.74	436.77	88.69	10.51	10.45			

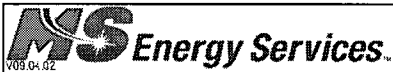


MS Energy Services

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	13,850		89.41		93.92		9110.84		22.72		4882.93		4882.91	
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance Azm		DLS/ 100	BUR/ 100'			
100	9,478	87.29	88.28	9056.47	12.49	514.40	514.50	514.55	88.61	3.96	3.94			
101	9,524	86.89	87.14	9058.80	14.32	560.30	560.42	560.48	88.54	2.64	-0.87			
102	9,614	88.00	87.61	9062.82	18.44	650.11	650.27	650.37	88.38	1.34	1.23			
103	9,706	89.01	90.05	9065.22	20.32	742.05	742.22	742.33	88.43	2.86	1.10			
104	9,797	89.01	90.48	9066.80	19.90	833.04	833.20	833.28	88.63	0.48	0.00			
105	9,887	87.69	90.23	9069.40	19.34	923.00	923.15	923.20	88.80	1.49	-1.47			
106	9,978	87.69	90.04	9073.07	19.13	1013.92	1014.07	1014.10	88.92	0.20	0.00			
107	10,069	86.41	89.35	9077.76	19.61	1104.80	1104.94	1104.97	88.98	1.60	-1.41			
108	10,160	87.51	89.34	9082.59	20.65	1195.66	1195.81	1195.84	89.01	1.21	1.21			
109	10,250	91.70	90.67	9083.22	20.64	1285.64	1285.78	1285.81	89.08	4.88	4.65			
110	10,341	88.21	88.90	9083.29	20.98	1376.62	1376.76	1376.78	89.13	4.29	-3.83			
111	10,432	87.60	88.91	9086.61	22.73	1467.54	1467.70	1467.72	89.11	0.68	-0.68			
112	10,523	89.32	90.67	9089.06	23.07	1558.50	1558.66	1558.67	89.15	2.70	1.89			
113	10,614	90.42	90.40	9089.27	22.22	1649.50	1649.64	1649.65	89.23	1.24	1.21			
114	10,705	90.29	89.88	9088.71	22.00	1740.49	1740.63	1740.63	89.28	0.59	-0.15			
115	10,796	88.22	89.61	9089.90	22.40	1831.48	1831.61	1831.62	89.30	2.29	-2.27			
116	10,887	88.39	89.52	9092.59	23.10	1922.44	1922.57	1922.58	89.31	0.21	0.19			
117	10,978	91.61	90.22	9092.59	23.30	2013.43	2013.56	2013.56	89.34	3.62	3.54			
118	11,069	89.80	89.61	9091.47	23.44	2104.41	2104.54	2104.55	89.36	2.10	-1.98			
119	11,160	91.12	89.53	9090.74	24.13	2195.41	2195.54	2195.54	89.37	1.45	1.45			
120	11,251	87.38	86.98	9091.93	26.90	2286.33	2286.49	2286.49	89.33	4.98	-4.12			
121	11,342	89.89	88.11	9094.10	30.80	2377.22	2377.41	2377.41	89.26	3.02	2.76			
122	11,433	91.12	88.98	9093.30	33.11	2468.18	2468.39	2468.40	89.23	1.66	1.36			
123	11,524	91.30	90.40	9091.37	33.60	2559.16	2559.37	2559.38	89.25	1.57	0.19			
124	11,615	92.09	90.68	9088.68	32.75	2650.11	2650.31	2650.31	89.29	0.92	0.87			
125	11,707	91.52	89.88	9085.78	32.30	2742.06	2742.25	2742.25	89.33	1.07	-0.62			
126	11,798	90.60	89.07	9084.10	33.13	2833.04	2833.23	2833.24	89.33	1.35	-1.02			
127	11,889	88.79	88.38	9084.59	35.16	2924.01	2924.22	2924.23	89.31	2.13	-1.99			
128	11,980	88.22	88.72	9086.97	37.46	3014.95	3015.18	3015.19	89.29	0.73	-0.63			
129	12,071	91.12	89.98	9087.49	38.49	3105.93	3106.17	3106.17	89.29	3.48	3.19			
130	12,162	87.91	88.19	9088.26	39.93	3196.90	3197.15	3197.15	89.28	4.04	-3.53			
131	12,252	88.48	88.72	9091.10	42.36	3286.83	3287.09	3287.10	89.26	0.86	0.64			
132	12,343	89.49	88.98	9092.70	44.18	3377.79	3378.07	3378.08	89.25	1.15	1.11			



SURVEY CALCULATION PROGRAM

10/12/16 15:19

Company:		Mack Energy Corporation												
Well Name:		Cavern State 16 001H												
Location:		Eddy County, NM												
Rig:		Orion #10					Magnetic Declination:		7.62		REFERENCED TO GRID NORTH			
Job Number:		DDMO-160336												
API #:		30-015-43841												
Vertical Section Azimuth:				89.41			Proposed Direction:		89.41					
Survey Calculation Method:				Minimum Curvature										
PTB:	MD		INC		AZM		TVD		N/S		E/W		VS	
	13,850		89.41		93.92		9110.84		22.72		4882.93		4882.91	
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure		DLS/ 100'	BUR/ 100'			
								Distance	Azm					
133	12,434	88.30	87.51	9094.45	46.96	3468.73	3469.03	3469.05	89.22	2.08	-1.31			
134	12,525	89.58	87.39	9096.13	51.01	3559.62	3559.96	3559.99	89.18	1.41	1.40			
135	12,616	90.29	87.14	9096.24	55.35	3650.52	3650.89	3650.94	89.13	0.82	0.77			
136	12,707	88.00	86.78	9097.60	60.18	3741.37	3741.79	3741.86	89.08	2.55	-2.52			
137	12,798	88.30	87.67	9100.54	64.58	3832.22	3832.68	3832.76	89.03	1.04	0.34			
138	12,889	89.01	90.93	9102.68	65.68	3923.17	3923.64	3923.72	89.04	3.66	0.77			
139	12,980	87.11	90.06	9105.76	64.90	4014.11	4014.57	4014.64	89.07	2.29	-2.08			
140	13,071	90.29	92.51	9107.82	62.85	4105.05	4105.48	4105.53	89.12	4.41	3.49			
141	13,162	90.99	92.25	9106.81	59.07	4195.96	4196.35	4196.38	89.19	0.83	0.77			
142	13,254	89.89	92.24	9106.10	55.47	4287.89	4288.23	4288.25	89.26	1.20	-1.20			
143	13,344	89.19	92.43	9106.83	51.80	4377.81	4378.11	4378.12	89.32	0.81	-0.78			
144	13,435	89.10	92.77	9108.19	47.68	4468.71	4468.96	4468.96	89.39	0.39	-0.10			
145	13,526	90.20	93.31	9108.75	42.85	4559.57	4559.77	4559.77	89.46	1.35	1.21			
146	13,617	89.19	92.95	9109.24	37.88	4650.44	4650.58	4650.59	89.53	1.18	-1.11			
147	13,708	90.11	93.92	9109.80	32.43	4741.27	4741.35	4741.38	89.61	1.47	1.02			
148	13,778	89.41	93.92	9110.09	27.64	4811.10	4811.13	4811.18	89.67	1.01	-1.01			