Final MWD Survey Certification

Lea County, New Mexico

Client: Devon Energy

Well Name: Alley Cat 17-20 Fed Com 524H

Total Job No: 2019-523-103

API No: 30-025-46023

Start Date: 9/20/2019

End Date: 10/12/2019

Measured Start Depth: 0 feet

Measured End Depth with PTB: 19813 feet

I, Michael Smitham, MWD Operator, hereby certify that; I am employed by Total Directional Services, LLC and we conducted or supervised the taking of these open hole MWD surveys at the request of this client. This data is true, correct, complete and within the limitations of the tool as set forth by Total Directional Services, LLC. I am authorized and qualified to make this report and have reviewed this report and find that it conforms to the principals and procedures as set forth by Total Directional Services, LLC.

Date: 10/12/2019

Signed: Michael Smitham

svy	depth	inc	azm	tvd	ns	ew	vs	dls
Tiein	0	0	0	0	0	0	0	0
1	138	0.6	126.6	138	-0.43	0.58	0.43	0.43
2	266	0.7	114.2	265.99	-1.15	1.83	1.16	0.13
3	361	0.7	114.5	360.98	-1.63	2.89	1.65	0
4	456	0.7	115.2	455.98	-2.12	3.94	2.14	0.01
5	551	0.6	112.6	550.97	-2.56	4.93	2.59	0.11
6	646	0.5	127.1	645.96	-3	5.72	3.03	0.18
7	741	0.4	147.3	740.96	-3.53	6.23	3.57	0.2
8	836	0.3	169.6	835.96	-4.05	6.45	4.09	0.18
9	931	0.3	182.7	930.96	-4.54	6.48	4.58	0.07
10	1027	0.5	195.7	1026.96	-5.2	6.36	5.24	0.23
11	1080	0.6	195.7	1079.95	-5.69	6.22	5.73	0.19
12	1275	0.3	161.9	1274.95	-7.15	6.1	7.19	0.2
13	1370	1.5	247.5	1369.94	-7.87	5.03	7.9	1.59
14	1465	3.5	258.2	1464.84	-8.94	1.04	8.94	2.15
15	1561	5.2	259.5	1560.56	-10.33	-6.1	10.29	1.77
16	1656	6.8	256.6	1655.04	-12.42	-15.81	12.31	1.71
17	1751	8.7	254.5	1749.17	-15.64	-28.2	15.46	2.02
18	1846	10.6	260.4	1842.82	-19.02	-43.74	18.73	2.25
19	1941	10.9	264.1	1936.15	-21.4	-61.29	21	0.79
20	2036	10.6	263.5	2029.49	-23.31	-78.91	22.8	0.34
21	2132	10.4	263.8	2123.88	-25.25	-96.3	24.62	0.22
22	2227	10.2	263.4	2217.35	-27.14	-113.18	26.41	0.22
23	2322	10.3	265.7	2310.83	-28.74	-130	27.9	0.44
24	2417	10.4	268.6	2404.29	-29.59	-147.04	28.64	0.56
25	2513	10.1	267.5	2498.76	-30.17	-164.12	29.11	0.37
26	2608	9.7	267.7	2592.34	-30.85	-180.44	29.69	0.42
27	2703	9.2	268.5	2686.05	-31.37	-196.02	30.11	0.54
28	2798	9.4	267.4	2779.8	-31.92	-211.37	30.56	0.28
29	2894	10.3	267.3	2874.39	-32.68	-227.77	31.21	0.94
30	2989	10	268.5	2967.9	-33.3	-244.5	31.72	0.39
31	3084	9.6	268.2	3061.51	-33.76	-260.66	32.08	0.42
32	3179	9.9	268	3155.14	-34.3	-276.74	32.51	0.32
33	3274	10.1	269.6	3248.7	-34.64	-293.23	32.75	0.36
34	3370	9.1	268.8	3343.35	-34.86	-309.24	32.86	1.05
35	3465	10.1	266.2	3437.02	-35.57	-325.06	33.47	1.15
36	3560	12	266.4	3530.26	-36.74	-343.23	34.52	2
37	3655	11.4	266.7	3623.28	-37.9	-362.46	35.56	0.63

38	3751	10.6	266.5	3717.52	-38.99	-380.75	36.53	0.83
39	3846	9.4	265.9	3811.07	-40.07	-397.21	37.51	1.27
40	3941	8.8	262	3904.88	-41.64	-412.14	38.98	0.91
41	4036	10.6	259.9	3998.51	-44.18	-427.94	41.42	1.93
42	4132	11.6	261.5	4092.72	-47.16	-446.18	44.28	1.09
43	4227	10.4	260.5	4185.97	-49.99	-464.09	46.99	1.28
44	4322	9.9	260.9	4279.48	-52.69	-480.61	49.59	0.53
45	4417	10.8	264.5	4372.94	-54.84	-497.53	51.62	1.17
46	4513	10.6	264.8	4467.27	-56.5	-515.28	53.17	0.22
47	4608	9.5	264.9	4560.81	-57.99	-531.79	54.55	1.16
48	4703	8.8	265.6	4654.6	-59.24	-546.84	55.71	0.75
49	4798	8	266.2	4748.58	-60.24	-560.68	56.62	0.85
50	4893	8.4	268.6	4842.61	-60.85	-574.22	57.14	0.55
51	4988	9.4	272.3	4936.47	-60.7	-588.91	56.9	1.21
52	5084	10.4	271.7	5031.03	-60.13	-605.4	56.22	1.05
53	5179	10.5	271.2	5124.46	-59.7	-622.63	55.68	0.14
54	5274	9.9	270.1	5217.96	-59.5	-639.45	55.37	0.66
55	5369	8.6	269.2	5311.72	-59.59	-654.72	55.36	1.38
56	5464	9.9	271.5	5405.48	-59.47	-669.98	55.14	1.42
57	5559	9.7	272.9	5499.1	-58.85	-686.14	54.42	0.33
58	5654	8.9	273.2	5592.85	-58.04	-701.47	53.51	0.84
59	5750	9.1	274.8	5687.67	-56.99	-716.45	52.36	0.33
60	5845	10.1	272.8	5781.33	-55.95	-732.26	51.22	1.11
61	5940	10.9	270	5874.74	-55.55	-749.56	50.7	1
62	6035	11	270.5	5968.01	-55.47	-767.61	50.51	0.15
63	6130	10.9	271.8	6061.28	-55.11	-785.65	50.03	0.28
64	6225	10.5	272.4	6154.63	-54.46	-803.27	49.27	0.44
65	6321	10.1	272.7	6249.08	-53.7	-820.42	48.4	0.42
66	6416	9.5	272.5	6342.7	-52.96	-836.57	47.56	0.63
67	6511	8.8	272.3	6436.49	-52.33	-851.67	46.83	0.74
68	6606	8.1	273.2	6530.46	-51.66	-865.61	46.07	0.75
69	6701	7.6	272.8	6624.57	-50.98	-878.57	45.31	0.53
70	6796	6.8	273	6718.82	-50.38	-890.46	44.63	0.84
71	6892	6.1	274.4	6814.21	-49.69	-901.22	43.87	0.75
72	6985	5.7	262.6	6906.72	-49.91	-910.73	44.03	1.37
73	7080	5.5	247.8	7001.27	-52.24	-919.62	46.3	1.53
74	7175	5	249.5	7095.87	-55.41	-927.71	49.42	0.55
75	7269	4.6	253.3	7189.54	-57.93	-935.16	51.89	0.54
76	7365	4.3	253.3	7285.25	-60.07	-942.3	53.98	0.31

77	7460	3.8	248.1	7380.02	-62.26	-948.63	56.14	0.65
78	7554	3.3	243.9	7473.83	-64.62	-953.95	58.45	0.6
79	7649	3	245.5	7568.69	-66.85	-958.67	60.66	0.33
80	7744	2.6	239.9	7663.58	-68.96	-962.79	62.74	0.51
81	7840	2.3	239.4	7759.49	-71.03	-966.33	64.79	0.31
82	7935	2.3	238.8	7854.41	-72.99	-969.61	66.73	0.03
83	8030	1.9	233	7949.35	-74.93	-972.49	68.65	0.48
84	8125	1.9	236.8	8044.3	-76.74	-975.07	70.44	0.13
85	8221	1.5	232.9	8140.25	-78.37	-977.4	72.05	0.43
86	8316	1.5	228.6	8235.22	-79.94	-979.33	73.61	0.12
87	8411	1.4	226.8	8330.19	-81.56	-981.11	75.22	0.12
88	8506	1.6	221.4	8425.16	-83.34	-982.83	77	0.26
89	8601	1.7	225.7	8520.12	-85.32	-984.71	78.96	0.17
90	8621	1.7	224.9	8540.11	-85.74	-985.14	79.38	0.12
91	8713	1.6	223.8	8632.07	-87.63	-986.99	81.26	0.11
92	8809	1.7	224.3	8728.03	-89.62	-988.91	83.23	0.11
93	8904	5.1	175.4	8822.87	-94.84	-989.56	88.45	4.4
94	8999	19.2	168	8915.51	-114.43	-985.95	108.06	14.9
95	9094	30.1	166	9001.72	-152.94	-976.91	146.63	11.51
96	9190	43.8	171.6	9078.28	-209.45	-966.18	203.21	14.68
97	9285	59.4	173.5	9137.11	-283.06	-956.69	276.87	16.49
98	9380	66.9	176	9179.99	-367.39	-949	361.26	8.24
99	9475	71.3	176.7	9213.87	-455.94	-943.36	449.84	4.68
100	9570	72.7	176.4	9243.23	-546.13	-937.93	540.06	1.5
101	9665	72.8	174.4	9271.4	-636.55	-930.65	630.53	2.01
102	9761	78.7	173.3	9295.03	-729.02	-920.67	723.06	6.25
103	9856	83.9	175.5	9309.39	-822.44	-911.53	816.54	5.93
104	9951	86.2	178.7	9317.59	-916.95	-906.74	911.08	4.14
105	10046	87.9	178.6	9322.48	-1011.79	-904.51	1005.93	1.79
106	10142	89.1	178.6	9324.99	-1107.73	-902.16	1101.88	1.25
107	10237	90.4	179.7	9325.41	-1202.72	-900.75	1196.87	1.79
108	10332	90.2	179.1	9324.91	-1297.71	-899.76	1291.87	0.67
109	10428	88.8	177.5	9325.75	-1393.66	-896.91	1387.84	2.21
110	10523	87.7	175.8	9328.65	-1488.45	-891.36	1482.66	2.13
111	10618	87.5	175.8	9332.63	-1583.11	-884.41	1577.36	0.21
112	10714	86.8	175.5	9337.4	-1678.71	-877.14	1673.01	0.79
113	10809	86.9	174.7	9342.62	-1773.22	-869.04	1767.57	0.85
114	10905	87.7	176.1	9347.14	-1868.8	-861.35	1863.2	1.68
115	11000	88.1	176.5	9350.62	-1963.54	-855.22	1957.98	0.6

116	11095	88.3	178.6	9353.61	-2058.4	-851.16	2052.86	2.22
117	11190	86.3	178.6	9358.08	-2153.26	-848.84	2147.74	2.11
118	11286	88.1	179.4	9362.77	-2249.13	-847.17	2243.61	2.05
119	11381	90.9	180	9363.6	-2344.11	-846.67	2338.6	3.01
120	11476	92.7	180.3	9360.62	-2439.06	-846.92	2433.54	1.92
121	11571	91.1	181.4	9357.47	-2534	-848.33	2528.46	2.04
122	11666	90	180.1	9356.56	-2628.98	-849.58	2623.44	1.79
123	11761	90.3	180	9356.31	-2723.98	-849.66	2718.44	0.33
124	11857	90.5	179.9	9355.64	-2819.98	-849.57	2814.43	0.23
125	11952	90.7	179.6	9354.64	-2914.97	-849.16	2909.43	0.38
126	12047	91	179	9353.23	-3009.95	-848	3004.41	0.71
127	12142	88.4	178.9	9353.73	-3104.93	-846.26	3099.4	2.74
128	12238	89.4	179.5	9355.57	-3200.9	-844.92	3195.38	1.21
129	12370	90.2	179.3	9356.03	-3332.89	-843.54	3327.37	0.62
130	12466	90.3	179.3	9355.62	-3428.88	-842.36	3423.37	0.1
131	12561	91.3	180.4	9354.29	-3523.87	-842.12	3518.36	1.56
132	12656	87.6	181.6	9355.2	-3618.83	-843.77	3613.31	4.09
133	12751	87.1	182	9359.59	-3713.68	-846.75	3708.14	0.67
134	12846	87.1	181.9	9364.4	-3808.51	-849.98	3802.94	0.11
135	12941	86.6	181.6	9369.62	-3903.32	-852.88	3897.73	0.61
136	13037	89.3	180.8	9373.05	-3999.23	-854.89	3993.62	2.93
137	13132	89.9	180.2	9373.72	-4094.22	-855.72	4088.61	0.89
138	13227	90.6	180.3	9373.3	-4189.22	-856.13	4183.6	0.74
139	13322	91.5	180.4	9371.56	-4284.2	-856.71	4278.58	0.95
140	13417	89	180.8	9371.15	-4379.18	-857.71	4373.55	2.67
141	13512	89	180.8	9372.81	-4474.16	-859.03	4468.52	0
142	13608	89.1	180.8	9374.4	-4570.14	-860.37	4564.49	0.1
143	13703	89	180.6	9375.97	-4665.12	-861.53	4659.46	0.24
144	13798	90.5	180.5	9376.39	-4760.11	-862.44	4754.44	1.58
145	13893	91.5	180.3	9374.73	-4855.09	-863.11	4849.42	1.07
146	13989	91.3	180.5	9372.38	-4951.06	-863.78	4945.38	0.29
147	14084	91.8	180	9369.81	-5046.02	-864.19	5040.34	0.74
148	14179	93.1	180.1	9365.75	-5140.94	-864.27	5135.25	1.37
149	14275	90.5	179.6	9362.74	-5236.88	-864.02	5231.19	2.76
150	14370	90.1	179.7	9362.24	-5331.88	-863.44	5326.19	0.43
151	14465	93.7	180.6	9359.09	-5426.81	-863.69	5421.12	3.91
152	14560	95.3	181	9351.64	-5521.5	-865.01	5515.8	1.74
153	14655	93.4	180.8	9344.43	-5616.21	-866.5	5610.5	2.01
154	14750	93.7	181.1	9338.55	-5711.02	-868.07	5705.29	0.45

155	14846	92.7	180.5	9333.19	-5806.86	-869.41	5801.12	1.21
156	14941	90.8	179.2	9330.29	-5901.8	-869.16	5896.07	2.42
157	15036	91.8	179.3	9328.13	-5996.77	-867.92	5991.04	1.06
158	15131	89.8	179.5	9326.81	-6091.75	-866.92	6086.03	2.12
159	15227	90.2	179.4	9326.81	-6187.75	-866	6182.02	0.43
160	15322	91.5	179.1	9325.4	-6282.73	-864.76	6277.01	1.4
161	15417	89.9	178.9	9324.24	-6377.7	-863.1	6371.99	1.7
162	15512	90.3	178.5	9324.07	-6472.68	-860.95	6466.98	0.6
163	15607	91.8	178.4	9322.33	-6567.62	-858.38	6561.94	1.58
164	15702	92.7	178.7	9318.6	-6662.52	-855.97	6656.85	1
165	15798	91.9	179.3	9314.75	-6758.42	-854.3	6752.77	1.04
166	15893	89.2	181.1	9313.84	-6853.41	-854.63	6847.75	3.42
167	15988	88.1	181.8	9316.08	-6948.35	-857.03	6942.67	1.37
168	16084	89.4	181.8	9318.17	-7044.28	-860.05	7038.58	1.35
169	16179	90.5	182.1	9318.25	-7139.22	-863.28	7133.5	1.2
170	16274	91.3	182	9316.76	-7234.15	-866.68	7228.4	0.85
171	16369	91.6	181.9	9314.36	-7329.06	-869.91	7323.29	0.33
172	16465	89.8	180.5	9313.18	-7425.03	-871.92	7419.24	2.38
173	16560	90.4	180.1	9313.02	-7520.02	-872.42	7514.23	0.76
174	16653	91.5	178.8	9311.48	-7613	-871.53	7607.22	1.83
175	16748	92.6	178.4	9308.08	-7707.91	-869.21	7702.14	1.23
176	16843	91.3	179.8	9304.84	-7802.84	-867.72	7797.08	2.01
177	16938	91.7	180.3	9302.36	-7897.81	-867.8	7892.04	0.67
178	17033	90.1	179.6	9300.87	-7992.79	-867.72	7987.02	1.84
179	17128	90.7	179.1	9300.2	-8087.78	-866.64	8082.02	0.82
180	17223	91.5	179.3	9298.38	-8182.76	-865.31	8177	0.87
181	17318	90.3	179.3	9296.89	-8277.74	-864.15	8271.98	1.26
182	17414	90.5	179.2	9296.22	-8373.72	-862.9	8367.98	0.23
183	17509	91.8	178.9	9294.31	-8468.69	-861.32	8462.95	1.4
184	17604	93.6	178.2	9289.83	-8563.55	-858.92	8557.83	2.03
185	17699	93.4	178.1	9284.04	-8658.32	-855.86	8652.62	0.24
186	17794	90.9	179.2	9280.47	-8753.22	-853.62	8747.53	2.87
187	17890	91.3	179.4	9278.63	-8849.2	-852.45	8843.51	0.47
188	17989	92.6	180.1	9275.26	-8948.14	-852.02	8942.45	1.49
189	18084	89.5	180.4	9273.52	-9043.11	-852.43	9037.41	3.28
190	18179	89.3	180.7	9274.51	-9138.1	-853.34	9132.4	0.38
191	18274	90.1	180.9	9275.01	-9233.09	-854.67	9227.37	0.87
192	18370	91.3	181.1	9273.84	-9329.06	-856.35	9323.34	1.27
193	18465	89.2	180	9273.42	-9424.05	-857.26	9418.32	2.5

194	18560	89.6	179.5	9274.42	-9519.04	-856.84	9513.31	0.67
195	18656	88.8	178.8	9275.76	-9615.02	-855.42	9609.3	1.11
196	18751	89.1	178.1	9277.5	-9709.97	-852.85	9704.26	0.8
197	18846	89.8	177.9	9278.41	-9804.91	-849.54	9799.22	0.77
198	18941	90.9	178.1	9277.83	-9899.85	-846.22	9894.18	1.18
199	19036	87.6	177.9	9279.07	-9994.77	-842.91	9989.12	3.48
200	19131	87.9	177.7	9282.8	-10089.6	-839.26	10083.99	0.38
201	19226	88.6	177.5	9285.71	-10184.5	-835.28	10178.89	0.77
202	19322	89.2	177.8	9287.55	-10280.4	-831.35	10274.81	0.7
203	19417	90.1	177.9	9288.13	-10375.3	-827.79	10369.77	0.95
204	19512	90	177.7	9288.05	-10470.3	-824.14	10464.72	0.24
205	19607	90.8	177.8	9287.38	-10565.2	-820.41	10559.66	0.85
206	19702	91	177.2	9285.89	-10660.1	-816.27	10654.58	0.67
207	19759	91.2	177.1	9284.8	-10717	-813.43	10711.52	0.39
PTB	19813	91.2	177.1	9283.67	-10770.9	-810.7	10765.46	0