



Total Directional
Services, LLC
USA Operations

Final MWD Survey Certification

Lea County, New Mexico

Client: Devon Energy

Well Name: Thistle Unit 157H

Total Job No: 2019-144-X20

API No: 30-025-43728

Start Date: 03/08/2019

End Date: 03/26/2019

Measured Start Depth: 150 feet

Measured End Depth: 19,851 feet

Vertical Section from well center at TD: 10,201.87 Feet

HOBBS OCD

OCT 15 2019

RECEIVED

I, Cayden Ferguson, 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: 03/26/2019

Signed: *Cayden Ferguson*

DIRECTIONAL SURVEY REPORT

Company name: Devon Energy

Start date: 03/08/2019

Well name: Thistle Unit 157H

End date: 03/26/2019

Field: Delaware Basin Bone Springs Sands

Proposed direction: 359.58

Rig: Nabors X20

Declination: 6.37

API/UWI: 30-025-43728

North Reference: Grid

State/Province: New Mexico

Latitude/Longitude: 32.537502E

County/Parish: Lea

KB: 3692.7

Location Lea County

SVY	Depth	Inc	Azm	CL	TVD	VS	NS	EW	DLS
Tiein	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
1	143.00	0.30	285.80	143.00	143.00	0.10	0.10	-0.36	0.21
2	236.00	0.30	350.50	93.00	236.00	0.41	0.41	-0.63	0.35
3	328.00	0.30	350.50	92.00	328.00	0.89	0.88	-0.71	0.00
4	419.00	0.30	333.40	91.00	419.00	1.34	1.33	-0.86	0.10
5	512.00	0.20	311.60	93.00	511.99	1.66	1.66	-1.09	0.15
6	604.00	0.20	339.60	92.00	603.99	1.92	1.91	-1.27	0.11
7	696.00	0.20	286.10	92.00	695.99	2.12	2.11	-1.48	0.20
8	786.00	0.30	290.50	90.00	785.99	2.25	2.24	-1.85	0.11
9	877.00	0.20	296.10	91.00	876.99	2.40	2.39	-2.21	0.11
10	967.00	0.40	292.20	90.00	966.99	2.60	2.58	-2.65	0.22
11	1057.00	0.30	299.90	90.00	1056.99	2.84	2.81	-3.14	0.12
12	1149.00	0.50	297.10	92.00	1148.99	3.14	3.12	-3.71	0.22
13	1240.00	0.50	284.50	91.00	1239.98	3.43	3.40	-4.45	0.12
14	1331.00	0.50	299.90	91.00	1330.98	3.73	3.69	-5.17	0.15
15	1414.00	0.50	303.60	83.00	1413.98	4.12	4.07	-5.79	0.04
16	1548.00	0.00	322.30	134.00	1547.98	4.44	4.40	-6.28	0.37
17	1639.00	0.20	312.50	91.00	1638.98	4.55	4.50	-6.39	0.22
18	1729.00	0.20	306.70	90.00	1728.97	4.75	4.70	-6.64	0.02
19	1824.00	0.10	300.40	95.00	1823.97	4.90	4.85	-6.84	0.11
20	1918.00	0.10	329.30	94.00	1917.97	5.01	4.96	-6.95	0.05
21	2021.00	0.30	330.00	103.00	2020.97	5.32	5.27	-7.13	0.19
22	2106.00	0.20	289.00	85.00	2105.97	5.56	5.51	-7.38	0.23
23	2200.00	0.30	357.80	94.00	2199.97	5.86	5.81	-7.55	0.31
24	2293.00	0.30	343.30	93.00	2292.97	6.34	6.29	-7.63	0.08
25	2388.00	0.20	284.50	95.00	2387.97	6.62	6.57	-7.86	0.27
26	2482.00	0.20	197.10	94.00	2481.97	6.51	6.45	-8.07	0.29
27	2576.00	1.00	142.50	94.00	2575.96	5.70	5.64	-7.62	0.96
28	2680.00	1.50	130.80	104.00	2679.94	4.08	4.03	-6.03	0.54
29	2775.00	3.40	125.10	95.00	2774.85	1.62	1.60	-2.79	2.01
30	2869.00	4.80	119.40	94.00	2868.61	-1.96	-1.93	2.92	1.55
31	2963.00	5.80	113.80	94.00	2962.20	-5.86	-5.78	10.69	1.20
32	3058.00	6.20	110.80	95.00	3056.68	-9.69	-9.54	19.88	0.53
33	3152.00	6.70	108.90	94.00	3150.09	-13.34	-13.12	29.81	0.58
34	3247.00	7.60	105.30	95.00	3244.35	-16.87	-16.57	41.12	1.06
35	3342.00	9.00	102.30	95.00	3338.35	-20.21	-19.81	54.44	1.54
36	3436.00	9.80	99.40	94.00	3431.09	-23.19	-22.69	69.51	0.99

37	3530.00	10.30	96.10	94.00	3523.65	-25.51	-24.88	85.76	0.81
38	3625.00	10.40	92.80	95.00	3617.10	-26.96	-26.21	102.77	0.63
39	3719.00	10.10	95.50	94.00	3709.60	-28.29	-27.41	119.45	0.60
40	3813.00	9.40	99.40	94.00	3802.24	-30.45	-29.45	135.23	1.02
41	3907.00	9.10	100.10	94.00	3895.02	-33.11	-32.01	150.12	0.34
42	4001.00	9.40	99.80	94.00	3987.80	-35.83	-34.62	165.00	0.32
43	4095.00	10.30	99.30	94.00	4080.41	-38.61	-37.29	180.86	0.96
44	4189.00	10.20	99.40	94.00	4172.91	-41.45	-40.00	197.36	0.11
45	4283.00	9.40	100.40	94.00	4265.54	-44.31	-42.75	213.13	0.87
46	4378.00	9.60	99.80	95.00	4359.24	-47.17	-45.50	228.56	0.23
47	4472.00	10.40	100.70	94.00	4451.81	-50.20	-48.41	244.62	0.87
48	4566.00	10.60	103.80	94.00	4544.24	-53.96	-52.05	261.36	0.64
49	4660.00	9.30	102.20	94.00	4636.82	-57.74	-55.71	277.18	1.41
50	4754.00	9.30	104.30	94.00	4729.59	-61.33	-59.19	291.96	0.36
51	4848.00	9.40	104.70	94.00	4822.34	-65.26	-63.02	306.75	0.13
52	4943.00	9.80	105.50	95.00	4916.01	-69.51	-67.15	322.04	0.44
53	5037.00	8.90	104.90	94.00	5008.76	-73.62	-71.15	336.78	0.96
54	5061.00	8.50	104.70	24.00	5032.48	-74.57	-72.08	340.29	1.67
55	5224.00	7.60	100.70	163.00	5193.87	-79.80	-77.14	362.53	0.65
56	5317.00	8.60	94.30	93.00	5285.95	-81.55	-78.80	375.51	1.45
57	5410.00	10.90	91.60	93.00	5377.60	-82.44	-79.57	391.23	2.52
58	5505.00	11.70	91.40	95.00	5470.75	-83.06	-80.06	409.84	0.84
59	5599.00	11.60	91.20	94.00	5562.82	-83.63	-80.49	428.82	0.11
60	5693.00	11.60	90.30	94.00	5654.90	-84.01	-80.74	447.72	0.19
61	5788.00	12.00	93.70	95.00	5747.89	-84.84	-81.42	467.12	0.84
62	5882.00	12.40	95.60	94.00	5839.77	-86.61	-83.04	486.92	0.60
63	5975.00	11.40	94.60	93.00	5930.77	-88.46	-84.75	506.02	1.10
64	6070.00	10.70	93.70	95.00	6024.01	-89.91	-86.07	524.18	0.76
65	6165.00	10.20	93.80	95.00	6117.43	-91.16	-87.20	541.37	0.53
66	6259.00	10.10	93.30	94.00	6209.96	-92.31	-88.22	557.91	0.14
67	6353.00	10.20	92.70	94.00	6302.49	-93.30	-89.09	574.45	0.15
68	6447.00	10.10	97.70	94.00	6395.02	-94.92	-90.59	590.93	0.94
69	6541.00	10.50	99.30	94.00	6487.51	-97.53	-93.08	607.55	0.52
70	6635.00	10.70	98.20	94.00	6579.90	-100.28	-95.70	624.64	0.30
71	6729.00	10.90	97.40	94.00	6672.24	-102.80	-98.09	642.09	0.27
72	6823.00	10.90	97.20	94.00	6764.54	-105.19	-100.35	659.72	0.04
73	6918.00	10.80	96.80	95.00	6857.84	-107.50	-102.53	677.47	0.13
74	7012.00	10.60	96.10	94.00	6950.21	-109.58	-104.49	694.81	0.25
75	7106.00	9.90	94.90	94.00	7042.71	-111.31	-106.10	711.46	0.78
76	7200.00	10.00	94.90	94.00	7135.29	-112.82	-107.49	727.64	0.11
77	7294.00	10.10	95.30	94.00	7227.85	-114.40	-108.95	743.98	0.13
78	7388.00	10.00	94.70	94.00	7320.41	-115.95	-110.38	760.32	0.15
79	7482.00	10.10	94.80	94.00	7412.97	-117.43	-111.74	776.67	0.11
80	7576.00	10.00	94.20	94.00	7505.52	-118.83	-113.02	793.02	0.15
81	7670.00	10.50	98.30	94.00	7598.02	-120.79	-114.86	809.64	0.94
82	7765.00	10.30	100.20	95.00	7691.46	-123.67	-117.61	826.56	0.42
83	7860.00	10.10	100.80	95.00	7784.96	-126.85	-120.68	843.11	0.24
84	7954.00	10.10	101.40	94.00	7877.51	-130.15	-123.85	859.28	0.11
85	8048.00	9.80	102.30	94.00	7970.09	-133.60	-127.18	875.18	0.36

86	8143.00	8.90	100.70	95.00	8063.83	-136.79	-130.27	890.30	0.99
87	8237.00	8.10	96.60	94.00	8156.80	-139.01	-132.38	904.02	1.07
88	8331.00	6.80	97.30	94.00	8250.00	-140.56	-133.85	916.12	1.39
89	8424.00	5.80	101.80	93.00	8342.44	-142.30	-135.51	926.18	1.20
90	8519.00	4.80	108.80	95.00	8437.03	-144.62	-137.77	934.64	1.25
91	8614.00	3.30	109.30	95.00	8531.79	-146.85	-139.96	940.99	1.58
92	8707.00	2.10	106.40	93.00	8624.69	-148.25	-141.32	945.15	1.30
93	8801.00	1.20	80.80	94.00	8718.65	-148.60	-141.65	947.77	1.22
94	8894.00	0.80	76.60	93.00	8811.63	-148.30	-141.35	949.37	0.44
95	8988.00	0.40	95.70	94.00	8905.63	-148.19	-141.23	950.33	0.47
96	9083.00	0.20	158.20	95.00	9000.63	-148.38	-141.41	950.72	0.37
97	9145.00	0.80	68.20	62.00	9062.63	-148.32	-141.35	951.16	1.33
98	9239.00	9.20	2.70	94.00	9156.21	-140.56	-133.59	952.13	9.47
99	9334.00	19.00	12.60	95.00	9248.24	-117.86	-110.85	955.87	10.59
100	9381.00	23.80	12.90	47.00	9291.99	-101.16	-94.13	959.66	10.22
101	9429.00	27.90	10.20	48.00	9335.18	-80.69	-73.63	963.81	8.88
102	9476.00	31.40	3.30	47.00	9376.03	-57.65	-50.57	966.46	10.39
103	9522.00	35.50	2.40	46.00	9414.40	-32.34	-25.25	967.71	8.98
104	9569.00	40.50	3.10	47.00	9451.43	-3.46	3.64	969.11	10.68
105	9617.00	45.10	1.90	48.00	9486.64	29.10	36.22	970.52	9.73
106	9664.00	50.20	0.90	47.00	9518.29	63.81	70.93	971.36	10.96
107	9710.00	54.20	359.90	46.00	9546.48	100.14	107.27	971.60	8.86
108	9757.00	61.00	358.60	47.00	9571.65	139.80	146.92	971.06	14.65
109	9805.00	67.30	359.60	48.00	9592.57	182.97	190.09	970.40	13.26
110	9852.00	69.10	359.30	47.00	9610.02	226.61	233.73	969.98	3.88
111	9899.00	69.50	359.70	47.00	9626.63	270.57	277.69	969.59	1.17
112	9946.00	71.30	357.70	47.00	9642.40	314.84	321.95	968.58	5.54
113	9993.00	74.70	356.20	47.00	9656.14	359.73	366.82	966.19	7.85
114	10040.00	79.70	355.30	47.00	9666.55	405.45	412.52	962.79	10.80
115	10087.00	84.20	356.00	47.00	9673.13	451.86	458.91	959.26	9.69
116	10181.00	90.90	357.30	94.00	9677.15	545.60	552.60	953.78	7.26
117	10250.00	92.30	357.00	69.00	9675.22	614.51	621.49	950.35	2.08
118	10344.00	90.40	357.60	94.00	9673.01	708.40	715.36	945.92	2.12
119	10438.00	89.90	0.20	94.00	9672.76	802.39	809.33	944.12	2.82
120	10532.00	90.00	357.40	94.00	9672.84	896.37	903.30	942.15	2.98
121	10627.00	91.10	357.10	95.00	9671.93	991.28	998.18	937.59	1.20
122	10721.00	90.20	358.70	94.00	9670.86	1085.23	1092.11	934.15	1.95
123	10815.00	90.50	358.60	94.00	9670.29	1179.22	1186.08	931.94	0.34
124	10909.00	90.10	357.50	94.00	9669.80	1273.18	1280.03	928.74	1.25
125	11002.00	90.20	356.60	93.00	9669.55	1366.09	1372.90	923.95	0.97
126	11093.00	90.90	358.60	91.00	9668.68	1457.03	1463.81	920.14	2.33
127	11185.00	92.50	359.20	92.00	9665.95	1548.98	1555.75	918.37	1.86
128	11277.00	92.80	0.40	92.00	9661.70	1640.88	1647.65	918.05	1.34
129	11370.00	92.40	1.60	93.00	9657.48	1733.75	1740.54	919.68	1.36
130	11461.00	91.30	0.80	91.00	9654.54	1824.66	1831.47	921.58	1.49
131	11551.00	89.10	0.00	90.00	9654.23	1914.65	1921.46	922.21	2.60
132	11642.00	91.80	1.10	91.00	9653.51	2005.62	2012.44	923.08	3.20
133	11733.00	89.90	2.20	91.00	9652.16	2096.55	2103.39	925.70	2.41
134	11823.00	86.30	2.90	90.00	9655.15	2186.36	2193.24	929.70	4.07

135	11915.00	88.50	4.00	92.00	9659.32	2278.05	2284.97	935.23	2.67
136	12006.00	89.60	5.20	91.00	9660.83	2368.69	2375.66	942.53	1.79
137	12097.00	87.70	2.20	91.00	9662.97	2459.41	2466.43	948.40	3.90
138	12188.00	89.00	359.60	91.00	9665.59	2550.34	2557.37	949.83	3.19
139	12279.00	90.20	357.80	91.00	9666.23	2641.32	2648.34	947.76	2.38
140	12373.00	92.70	358.10	94.00	9663.85	2735.25	2742.24	944.40	2.68
141	12467.00	90.90	357.50	94.00	9660.90	2829.15	2836.12	940.80	2.02
142	12562.00	90.60	357.40	95.00	9659.65	2924.08	2931.02	936.57	0.33
143	12657.00	90.90	357.00	95.00	9658.41	3018.98	3025.90	931.93	0.53
144	12751.00	91.30	357.50	94.00	9656.61	3112.89	3119.77	927.42	0.68
145	12846.00	90.50	358.60	95.00	9655.11	3207.84	3214.70	924.19	1.43
146	12940.00	84.90	357.00	94.00	9658.88	3301.68	3308.52	920.59	6.20
147	13034.00	88.20	356.50	94.00	9664.54	3395.38	3402.18	915.27	3.55
148	13128.00	91.50	356.90	94.00	9664.79	3489.25	3496.01	909.86	3.54
149	13223.00	93.30	359.30	95.00	9660.81	3584.12	3590.87	906.71	3.16
150	13317.00	94.40	0.20	94.00	9654.50	3677.91	3684.65	906.30	1.51
151	13409.00	90.10	0.80	92.00	9650.88	3769.80	3776.56	907.10	4.72
152	13503.00	90.60	1.30	94.00	9650.31	3863.77	3870.54	908.83	0.75
153	13597.00	91.10	0.90	94.00	9648.92	3957.73	3964.51	910.63	0.68
154	13691.00	90.90	2.20	94.00	9647.28	4051.66	4058.46	913.17	1.40
155	13784.00	89.40	2.10	93.00	9647.03	4144.56	4151.39	916.66	1.62
156	13879.00	90.30	2.50	95.00	9647.28	4239.45	4246.31	920.47	1.04
157	13973.00	90.90	2.60	94.00	9646.30	4333.32	4340.21	924.66	0.65
158	14067.00	91.70	2.20	94.00	9644.16	4427.18	4434.11	928.59	0.95
159	14161.00	92.00	0.30	94.00	9641.13	4521.09	4528.03	930.64	2.05
160	14255.00	91.80	0.00	94.00	9638.01	4615.03	4621.98	930.89	0.38
161	14349.00	92.90	1.40	94.00	9634.16	4708.93	4715.89	932.03	1.89
162	14444.00	91.50	0.80	95.00	9630.51	4803.82	4810.80	933.85	1.60
163	14539.00	89.00	0.70	95.00	9630.10	4898.79	4905.78	935.10	2.63
164	14632.00	89.90	359.50	93.00	9630.99	4991.78	4998.77	935.26	1.61
165	14726.00	89.50	359.20	94.00	9631.48	5085.78	5092.77	934.19	0.53
166	14821.00	89.20	356.00	95.00	9632.56	5180.71	5187.66	930.22	3.38
167	14916.00	86.00	354.20	95.00	9636.54	5275.32	5282.22	922.11	3.86
168	15010.00	87.70	354.30	94.00	9641.70	5368.77	5375.60	912.71	1.81
169	15104.00	90.60	355.60	94.00	9643.10	5462.44	5469.21	904.44	3.38
170	15198.00	91.90	359.80	94.00	9641.05	5556.34	5563.09	900.67	4.68
171	15292.00	92.70	0.30	94.00	9637.27	5650.26	5657.01	900.75	1.00
172	15386.00	92.60	1.10	94.00	9632.93	5744.14	5750.91	901.90	0.86
173	15481.00	90.60	0.90	95.00	9630.27	5839.07	5845.85	903.55	2.12
174	15575.00	91.40	1.00	94.00	9628.63	5933.03	5939.82	905.11	0.86
175	15670.00	89.80	0.40	95.00	9627.64	6028.00	6034.81	906.27	1.80
176	15764.00	90.80	0.00	94.00	9627.15	6121.99	6128.80	906.60	1.15
177	15858.00	91.40	0.30	94.00	9625.34	6215.97	6222.79	906.85	0.71
178	15952.00	90.30	0.20	94.00	9623.95	6309.95	6316.77	907.26	1.18
179	16046.00	89.20	0.10	94.00	9624.36	6403.95	6410.77	907.50	1.18
180	16140.00	89.60	0.10	94.00	9625.34	6497.94	6504.76	907.67	0.43
181	16234.00	90.80	359.90	94.00	9625.01	6591.93	6598.76	907.67	1.29
182	16328.00	89.10	359.90	94.00	9625.10	6685.93	6692.76	907.50	1.81
183	16422.00	88.70	0.20	94.00	9626.90	6779.91	6786.74	907.58	0.53

184	16517.00	88.60	0.80	95.00	9629.14	6874.87	6881.71	908.41	0.64
185	16611.00	88.20	1.10	94.00	9631.76	6968.80	6975.66	909.97	0.53
186	16706.00	89.20	0.60	95.00	9633.92	7063.75	7070.62	911.38	1.18
187	16800.00	90.20	0.80	94.00	9634.41	7157.73	7164.61	912.53	1.08
188	16895.00	91.70	1.20	95.00	9632.84	7252.69	7259.58	914.18	1.63
189	16989.00	90.30	0.50	94.00	9631.20	7346.65	7353.56	915.58	1.67
190	17083.00	89.50	359.60	94.00	9631.36	7440.64	7447.55	915.66	1.28
191	17177.00	89.90	359.70	94.00	9631.85	7534.64	7541.55	915.09	0.44
192	17272.00	89.70	358.90	95.00	9632.18	7629.64	7636.54	913.93	0.87
193	17366.00	88.50	358.50	94.00	9633.66	7723.61	7730.50	911.79	1.35
194	17460.00	89.10	358.80	94.00	9635.63	7817.58	7824.46	909.58	0.71
195	17554.00	90.90	358.60	94.00	9635.63	7911.56	7918.43	907.45	1.93
196	17648.00	88.90	358.30	94.00	9635.79	8005.54	8012.39	904.90	2.15
197	17743.00	89.60	358.50	95.00	9637.04	8100.51	8107.34	902.25	0.77
198	17836.00	88.00	358.50	93.00	9638.98	8193.47	8200.29	899.82	1.72
199	17930.00	88.20	358.50	94.00	9642.10	8287.40	8294.21	897.36	0.21
200	18024.00	88.80	358.50	94.00	9644.56	8381.36	8388.14	894.90	0.64
201	18119.00	88.10	357.20	95.00	9647.13	8476.27	8483.04	891.34	1.55
202	18212.00	88.00	357.20	93.00	9650.30	8569.14	8575.87	886.80	0.11
203	18307.00	90.70	357.90	95.00	9651.37	8664.07	8670.77	882.74	2.94
204	18401.00	90.90	358.40	94.00	9650.06	8758.03	8764.71	879.70	0.57
205	18494.00	91.30	358.20	93.00	9648.28	8850.99	8857.65	876.94	0.48
206	18589.00	88.80	358.40	95.00	9648.19	8945.95	8952.60	874.13	2.64
207	18683.00	90.50	358.70	94.00	9648.77	9039.93	9046.57	871.75	1.84
208	18777.00	91.20	1.10	94.00	9647.37	9133.91	9140.55	871.58	2.66
209	18872.00	91.60	3.90	95.00	9645.05	9228.75	9235.42	875.73	2.98
210	18966.00	90.90	5.70	94.00	9643.00	9322.34	9329.06	883.59	2.05
211	19061.00	90.90	5.80	95.00	9641.51	9416.77	9423.57	893.11	0.11
212	19155.00	90.90	6.00	94.00	9640.03	9510.19	9517.07	902.77	0.21
213	19249.00	90.90	5.80	94.00	9638.55	9603.61	9610.56	912.43	0.21
214	19343.00	91.10	5.80	94.00	9636.91	9697.04	9704.06	921.93	0.21
215	19437.00	90.90	5.60	94.00	9635.27	9790.49	9797.58	931.26	0.30
216	19532.00	91.10	5.60	95.00	9633.62	9884.95	9892.11	940.53	0.21
217	19626.00	91.30	5.80	94.00	9631.65	9978.40	9985.63	949.86	0.30
218	19720.00	91.80	6.10	94.00	9629.10	10071.78	10079.09	959.60	0.62
219	19795.00	91.80	6.10	75.00	9626.75	10146.26	10153.63	967.57	0.00
PTB	19851.00	91.80	6.10	56.00	9624.99	10201.87	10209.28	973.52	0.00

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