



PHOENIX
TECHNOLOGY SERVICES

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DISTRICT/ARTESIA O.C.D.

Caza Operating, LLC

Lea County, New Mexico (NAD83)

Lennox 34 State

1H

ST01 / 65247

HOBBS OCD

NOV 25 2019

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Design: Surveys (Nabors M51)

Standard Survey Report

02 October, 2019



Caza
Petroleum



Survey Report



Company: Caza Operating, LLC
Project: Lea County, New Mexico (NAD83)
Site: Lennox 34 State
Well: 1H
Wellbore: ST01 / 65247
Design: Surveys (Nabors M51)

Local Co-ordinate Reference: Well 1H
TVD Reference: RKB @ 3545.00usft (Nabors M51)
MD Reference: RKB @ 3545.00usft (Nabors M51)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Project	Lea County, New Mexico (NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Lennox 34 State			
Site Position:		Northing:	489,378.10 usft	Latitude: 32° 20' 29.841246 N
From:	Map	Easting:	841,700.90 usft	Longitude: 103° 21' 38.802964 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence: 0.52 °

Well	1H			
Well Position	+N/-S	0.00 usft	Northing:	489,378.10 usft
	+E/-W	0.00 usft	Easting:	841,700.90 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level: 3,523.00 usft

Wellbore	ST01 / 65247				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	MVHD	10/7/2019	6.69	60.02	47,982.16432143

Design	Surveys (Nabors M51)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	9,150.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.00	0.00	0.00	352.45	

Survey Program	Date 10/2/2019				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
182.00	9,150.00	Phoenix MWD Surveys (OH / 65247)	MWD+HDGM	OWSG Rev.2 MWD + HDGM	
9,262.00	14,726.00	Phoenix MWD Surveys (ST01 / 65247)	MWD+HDGM	OWSG Rev.2 MWD + HDGM	

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
182.00	1.10	297.68	181.99	0.81	-1.55	1.01	0.60	0.60	0.00
305.00	1.17	297.68	304.96	1.94	-3.70	2.41	0.06	0.06	0.00
396.00	1.01	291.82	395.95	2.67	-5.27	3.34	0.21	-0.18	-6.44
486.00	1.07	296.37	485.93	3.34	-6.76	4.20	0.11	0.07	5.06
576.00	1.05	302.48	575.92	4.16	-8.21	5.20	0.13	-0.02	6.79
673.00	1.12	301.98	672.90	5.14	-9.76	6.37	0.07	0.07	-0.52
768.00	1.01	299.00	767.88	6.03	-11.28	7.46	0.13	-0.12	-3.14
862.00	1.07	295.26	861.87	6.81	-12.80	8.43	0.10	0.06	-3.98
956.00	1.01	293.36	955.85	7.51	-14.36	9.33	0.07	-0.06	-2.02

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,051.00	0.99	285.39	1,050.84	8.06	-15.92	10.08	0.15	-0.02	-8.39
1,145.00	0.99	288.91	1,144.82	8.54	-17.47	10.76	0.06	0.00	3.74
1,239.00	1.06	280.98	1,238.81	8.97	-19.09	11.40	0.17	0.07	-8.44
1,333.00	1.11	287.54	1,332.79	9.41	-20.81	12.06	0.14	0.05	6.98
1,427.00	1.15	302.08	1,426.77	10.19	-22.48	13.05	0.31	0.04	15.47
1,522.00	0.75	326.22	1,521.76	11.21	-23.63	14.22	0.59	-0.42	25.41
1,616.00	0.51	321.51	1,615.76	12.05	-24.23	15.13	0.26	-0.26	-5.01
1,711.00	0.67	309.89	1,710.75	12.74	-24.92	15.90	0.21	0.17	-12.23
1,805.00	0.68	321.04	1,804.74	13.52	-25.70	16.78	0.14	0.01	11.86
1,862.00	0.72	321.98	1,861.74	14.07	-26.13	17.38	0.07	0.07	1.65
2,049.00	0.56	334.86	2,048.73	15.82	-27.24	19.26	0.11	-0.09	6.89
2,144.00	0.20	53.92	2,143.73	16.34	-27.30	19.78	0.59	-0.38	83.22
2,238.00	0.87	172.68	2,237.72	15.73	-27.08	19.15	1.04	0.71	126.34
2,333.00	0.70	180.18	2,332.71	14.43	-26.99	17.85	0.21	-0.18	7.89
2,427.00	1.22	228.51	2,426.70	13.19	-27.74	16.72	0.98	0.55	51.41
2,521.00	4.84	242.66	2,520.56	10.71	-32.02	14.82	3.90	3.85	15.05
2,615.00	7.45	248.60	2,614.01	6.66	-41.21	12.02	2.85	2.78	6.32
2,709.00	7.31	249.50	2,707.23	2.34	-52.49	9.22	0.19	-0.15	0.96
2,804.00	7.08	249.94	2,801.48	-1.78	-63.65	6.60	0.25	-0.24	0.46
2,898.00	6.69	249.95	2,894.80	-5.64	-74.23	4.16	0.41	-0.41	0.01
2,992.00	6.45	250.36	2,988.19	-9.30	-84.35	1.87	0.26	-0.26	0.44
3,087.00	6.42	249.88	3,082.59	-12.92	-94.36	-0.41	0.06	-0.03	-0.51
3,181.00	6.41	252.05	3,176.00	-16.34	-104.29	-2.50	0.26	-0.01	2.31
3,276.00	6.10	253.28	3,270.43	-19.43	-114.17	-4.26	0.36	-0.33	1.29
3,371.00	5.67	254.01	3,364.93	-22.17	-123.51	-5.75	0.46	-0.45	0.77
3,465.00	5.36	250.83	3,458.50	-24.89	-132.13	-7.32	0.46	-0.33	-3.38
3,560.00	5.48	242.12	3,553.08	-28.47	-140.33	-9.79	0.87	0.13	-9.17
3,653.00	4.85	242.49	3,645.70	-32.36	-147.74	-12.67	0.68	-0.68	0.40
3,747.00	4.27	244.61	3,739.40	-35.70	-154.42	-15.10	0.64	-0.62	2.26
3,841.00	4.74	242.76	3,833.11	-38.98	-161.04	-17.48	0.52	0.50	-1.97
3,936.00	4.62	236.16	3,927.79	-42.91	-167.71	-20.50	0.58	-0.13	-6.95
4,030.00	4.93	227.47	4,021.47	-47.74	-173.83	-24.49	0.84	0.33	-9.24
4,125.00	4.60	226.49	4,116.14	-53.13	-179.60	-29.07	0.36	-0.35	-1.03
4,219.00	4.79	227.92	4,209.82	-58.35	-185.25	-33.51	0.24	0.20	1.52
4,314.00	4.70	230.11	4,304.50	-63.51	-191.18	-37.84	0.21	-0.09	2.31
4,408.00	5.06	230.70	4,398.16	-68.60	-197.34	-42.08	0.39	0.38	0.63
4,503.00	4.97	233.82	4,492.79	-73.68	-203.90	-46.25	0.30	-0.09	3.28
4,597.00	5.77	237.65	4,586.38	-78.62	-211.18	-50.19	0.93	0.85	4.07
4,691.00	5.76	240.48	4,679.91	-83.47	-219.28	-53.93	0.30	-0.01	3.01
4,785.00	6.52	246.88	4,773.37	-87.89	-228.29	-57.13	1.09	0.81	6.81
4,880.00	6.02	247.57	4,867.80	-91.91	-237.86	-59.86	0.53	-0.53	0.73
4,975.00	5.63	249.32	4,962.31	-95.45	-246.82	-62.20	0.45	-0.41	1.84
5,069.00	5.81	251.05	5,055.84	-98.63	-255.63	-64.18	0.27	0.19	1.84

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,164.00	6.55	251.20	5,150.29	-101.94	-265.31	-66.19	0.78	0.78	0.16
5,259.00	6.24	250.91	5,244.70	-105.37	-275.32	-68.28	0.33	-0.33	-0.31
5,353.00	5.78	250.42	5,338.18	-108.63	-284.61	-70.29	0.49	-0.49	-0.52
5,448.00	5.36	249.76	5,432.73	-111.77	-293.28	-72.26	0.45	-0.44	-0.69
5,543.00	5.22	247.26	5,527.33	-114.97	-301.43	-74.37	0.28	-0.15	-2.63
5,637.00	5.54	246.77	5,620.91	-118.41	-309.54	-76.72	0.34	0.34	-0.52
5,731.00	5.05	246.09	5,714.51	-121.88	-317.49	-79.11	0.53	-0.52	-0.72
5,814.00	4.58	247.08	5,797.22	-124.65	-323.88	-81.01	0.58	-0.57	1.19
5,950.00	5.33	244.88	5,932.71	-129.45	-334.60	-84.36	0.57	0.55	-1.62
6,045.00	7.17	246.63	6,027.14	-133.67	-344.04	-87.31	1.95	1.94	1.84
6,139.00	7.65	248.46	6,120.35	-138.30	-355.25	-90.42	0.57	0.51	1.95
6,234.00	7.37	249.25	6,214.54	-142.78	-366.83	-93.34	0.31	-0.29	0.83
6,327.00	7.01	250.73	6,306.81	-146.76	-377.76	-95.86	0.44	-0.39	1.59
6,422.00	6.94	250.73	6,401.10	-150.57	-388.65	-98.20	0.07	-0.07	0.00
6,515.00	6.99	249.98	6,493.42	-154.36	-399.27	-100.56	0.11	0.05	-0.81
6,609.00	6.93	250.26	6,586.73	-158.24	-409.98	-103.00	0.07	-0.06	0.30
6,703.00	6.60	249.96	6,680.07	-162.00	-420.40	-105.36	0.35	-0.35	-0.32
6,797.00	6.19	249.18	6,773.49	-165.65	-430.21	-107.69	0.45	-0.44	-0.83
6,891.00	6.01	249.43	6,866.95	-169.18	-439.55	-109.96	0.19	-0.19	0.27
6,986.00	5.81	250.26	6,961.45	-172.56	-448.73	-112.10	0.23	-0.21	0.87
7,080.00	5.56	250.57	7,054.99	-175.68	-457.51	-114.04	0.27	-0.27	0.33
7,175.00	5.31	251.06	7,149.56	-178.64	-466.00	-115.86	0.27	-0.26	0.52
7,269.00	5.30	250.21	7,243.16	-181.52	-474.20	-117.64	0.08	-0.01	-0.90
7,363.00	5.92	251.46	7,336.71	-184.53	-482.88	-119.48	0.67	0.66	1.33
7,457.00	5.54	252.87	7,430.24	-187.41	-491.82	-121.16	0.43	-0.40	1.50
7,551.00	5.20	253.18	7,523.82	-189.98	-500.23	-122.60	0.36	-0.36	0.33
7,645.00	4.87	253.95	7,617.46	-192.31	-508.14	-123.88	0.36	-0.35	0.82
7,739.00	5.13	251.47	7,711.10	-194.75	-515.96	-125.27	0.36	0.28	-2.64
7,833.00	5.64	246.78	7,804.69	-197.91	-524.19	-127.32	0.72	0.54	-4.99
7,927.00	5.90	247.38	7,898.21	-201.59	-532.90	-129.82	0.28	0.28	0.64
8,021.00	5.09	246.58	7,991.78	-205.10	-541.18	-132.22	0.87	-0.86	-0.85
8,116.00	5.10	246.06	8,086.40	-208.49	-548.91	-134.56	0.05	0.01	-0.55
8,209.00	5.48	247.27	8,179.01	-211.88	-556.78	-136.89	0.43	0.41	1.30
8,304.00	4.73	248.35	8,273.63	-215.08	-564.61	-139.03	0.80	-0.79	1.14
8,398.00	4.00	246.86	8,367.36	-217.80	-571.22	-140.86	0.79	-0.78	-1.59
8,493.00	3.48	250.75	8,462.15	-220.05	-576.99	-142.33	0.61	-0.55	4.09
8,588.00	2.85	251.84	8,557.01	-221.74	-581.96	-143.35	0.67	-0.66	1.15
8,681.00	2.25	255.08	8,649.92	-222.93	-585.92	-144.01	0.66	-0.65	3.48
8,775.00	1.85	261.81	8,743.86	-223.62	-589.20	-144.27	0.50	-0.43	7.16
8,869.00	1.61	271.32	8,837.81	-223.81	-592.03	-144.08	0.40	-0.26	10.12
8,962.00	1.43	276.14	8,930.78	-223.65	-594.49	-143.60	0.24	-0.19	5.18
9,056.00	0.72	252.35	9,024.76	-223.71	-596.22	-143.43	0.88	-0.76	-25.31
9,150.00	0.61	241.44	9,118.76	-224.12	-597.22	-143.71	0.18	-0.12	-11.61



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Tie In - ST01									
9,262.00	8.47	354.55	9,230.36	-216.18	-598.53	-135.67	7.79	7.02	100.99
First Phoenix MWD Survey - ST01									
9,309.00	14.15	352.89	9,276.43	-207.03	-599.57	-126.46	12.10	12.09	-3.53
9,357.00	21.34	354.31	9,322.11	-192.50	-601.16	-111.84	15.01	14.98	2.96
9,406.00	27.95	354.65	9,366.63	-172.17	-603.12	-91.43	13.49	13.49	0.69
9,454.00	33.28	356.32	9,407.92	-147.81	-605.01	-67.03	11.24	11.10	3.48
9,501.00	36.39	355.07	9,446.49	-121.04	-607.04	-40.23	6.79	6.62	-2.66
9,548.00	39.66	355.21	9,483.51	-92.20	-609.49	-11.32	6.96	6.96	0.30
9,594.00	42.91	356.47	9,518.08	-61.93	-611.68	18.97	7.29	7.07	2.74
9,642.00	46.75	358.28	9,552.11	-28.14	-613.21	52.68	8.43	8.00	3.77
9,689.00	50.77	358.79	9,583.09	7.19	-614.11	87.81	8.59	8.55	1.09
9,734.00	54.91	358.18	9,610.27	43.03	-615.07	123.47	9.26	9.20	-1.36
9,781.00	61.10	356.97	9,635.16	82.83	-616.77	163.15	13.35	13.17	-2.57
9,829.00	68.70	354.77	9,655.51	126.15	-619.92	206.51	16.37	15.83	-4.58
9,876.00	77.48	354.02	9,669.16	170.86	-624.31	251.41	18.74	18.68	-1.60
9,924.00	82.37	354.36	9,677.56	217.86	-629.10	298.63	10.21	10.19	0.71
9,971.00	84.68	355.59	9,682.86	264.38	-633.18	345.28	5.56	4.91	2.62
10,017.00	87.90	356.60	9,685.83	310.17	-636.31	391.08	7.33	7.00	2.20
10,112.00	90.76	356.56	9,686.94	404.98	-641.98	485.82	3.01	3.01	-0.04
10,206.00	90.84	358.35	9,685.63	498.88	-646.15	579.45	1.91	0.09	1.90
10,301.00	89.75	358.01	9,685.14	593.83	-649.17	673.97	1.20	-1.15	-0.36
10,390.00	91.71	359.31	9,684.01	682.79	-651.25	762.44	2.64	2.20	1.46
10,484.00	92.68	0.72	9,680.41	776.72	-651.22	855.55	1.82	1.03	1.50
10,578.00	93.91	0.81	9,675.01	870.55	-649.97	948.40	1.31	1.31	0.10
10,673.00	93.30	1.69	9,669.03	965.34	-647.90	1,042.10	1.13	-0.64	0.93
10,766.00	91.98	1.07	9,664.75	1,058.21	-645.67	1,133.87	1.57	-1.42	-0.67
10,860.00	90.40	1.16	9,662.80	1,152.17	-643.84	1,226.77	1.68	-1.68	0.10
10,954.00	91.54	1.51	9,661.21	1,246.13	-641.65	1,319.63	1.27	1.21	0.37
11,048.00	90.31	0.98	9,659.69	1,340.09	-639.60	1,412.51	1.42	-1.31	-0.56
11,143.00	91.63	1.16	9,658.08	1,435.06	-637.83	1,506.42	1.40	1.39	0.19
11,237.00	90.66	0.55	9,656.20	1,529.03	-636.43	1,599.39	1.22	-1.03	-0.65
11,332.00	91.54	0.19	9,654.38	1,624.01	-635.82	1,693.47	1.00	0.93	-0.38
11,426.00	90.48	0.11	9,652.72	1,717.99	-635.57	1,786.61	1.13	-1.13	-0.09
11,520.00	91.63	359.93	9,650.99	1,811.97	-635.54	1,879.77	1.24	1.22	-0.19
11,614.00	91.19	359.49	9,648.68	1,905.94	-636.01	1,972.99	0.66	-0.47	-0.47
11,708.00	92.68	359.84	9,645.50	1,999.89	-636.56	2,066.19	1.63	1.59	0.37
11,802.00	91.63	359.75	9,641.97	2,093.82	-636.90	2,159.35	1.12	-1.12	-0.10
11,896.00	91.01	359.23	9,639.80	2,187.79	-637.73	2,252.61	0.86	-0.66	-0.55
11,990.00	92.33	359.31	9,637.06	2,281.74	-638.93	2,345.91	1.41	1.40	0.09
12,084.00	90.13	358.44	9,635.05	2,375.69	-640.78	2,439.29	2.52	-2.34	-0.93
12,178.00	91.10	358.35	9,634.04	2,469.65	-643.41	2,532.78	1.04	1.03	-0.10
12,272.00	89.52	358.35	9,633.53	2,563.61	-646.12	2,626.27	1.68	-1.68	0.00
12,366.00	90.31	357.91	9,633.67	2,657.55	-649.18	2,719.81	0.96	0.84	-0.47

Company: Caza Operating, LLC
Project: Lea County, New Mexico (NAD83)
Site: Lennox 34 State
Well: 1H
Wellbore: ST01 / 65247
Design: Surveys (Nabors M51)

Local Co-ordinate Reference: Well 1H
TVD Reference: RKB @ 3545.00usft (Nabors M51)
MD Reference: RKB @ 3545.00usft (Nabors M51)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,461.00	89.69	358.52	9,633.67	2,752.51	-652.14	2,814.33	0.92	-0.65	0.64
12,554.00	90.40	359.05	9,633.59	2,845.49	-654.11	2,906.76	0.95	0.76	0.57
12,648.00	90.40	359.14	9,632.94	2,939.47	-655.60	3,000.13	0.10	0.00	0.10
12,743.00	90.31	359.23	9,632.35	3,034.46	-656.95	3,094.47	0.13	-0.09	0.09
12,837.00	91.63	358.52	9,630.76	3,128.43	-658.80	3,187.86	1.59	1.40	-0.76
12,932.00	93.03	358.52	9,626.90	3,223.31	-661.25	3,282.25	1.47	1.47	0.00
13,026.00	92.77	359.05	9,622.14	3,317.17	-663.24	3,375.56	0.63	-0.28	0.56
13,120.00	91.80	359.75	9,618.39	3,411.09	-664.22	3,468.79	1.27	-1.03	0.74
13,214.00	93.47	0.02	9,614.07	3,504.99	-664.41	3,561.90	1.80	1.78	0.29
13,308.00	94.62	359.49	9,607.44	3,598.75	-664.81	3,654.90	1.35	1.22	-0.56
13,404.00	94.35	359.84	9,599.93	3,694.45	-665.37	3,749.85	0.46	-0.28	0.36
13,498.00	94.79	0.19	9,592.44	3,788.15	-665.34	3,842.73	0.60	0.47	0.37
13,593.00	93.56	0.37	9,585.53	3,882.90	-664.88	3,936.60	1.31	-1.29	0.19
13,688.00	92.24	0.55	9,580.72	3,977.77	-664.12	4,030.55	1.40	-1.39	0.19
13,781.00	91.63	0.37	9,577.58	4,070.72	-663.37	4,122.59	0.68	-0.66	-0.19
13,875.00	92.07	0.37	9,574.55	4,164.66	-662.77	4,215.64	0.47	0.47	0.00
13,969.00	91.98	0.72	9,571.23	4,258.60	-661.87	4,308.65	0.38	-0.10	0.37
14,063.00	92.77	1.25	9,567.33	4,352.51	-660.26	4,401.52	1.01	0.84	0.56
14,158.00	91.98	0.81	9,563.39	4,447.41	-658.55	4,495.38	0.95	-0.83	-0.46
14,252.00	92.42	0.63	9,559.79	4,541.33	-657.37	4,588.33	0.51	0.47	-0.19
14,345.00	91.71	0.72	9,556.43	4,634.26	-656.28	4,680.32	0.77	-0.76	0.10
14,440.00	89.69	0.98	9,555.27	4,729.24	-654.87	4,774.29	2.14	-2.13	0.27
14,534.00	91.19	0.98	9,554.55	4,823.22	-653.26	4,867.24	1.60	1.60	0.00
14,629.00	92.68	0.90	9,551.34	4,918.15	-651.70	4,961.14	1.57	1.57	-0.08
14,665.00	93.47	0.63	9,549.41	4,954.10	-651.22	4,996.71	2.32	2.19	-0.75
Final Phoenix MWD Survey - ST01									
14,726.00	93.47	0.63	9,545.72	5,014.98	-650.55	5,056.98	0.00	0.00	0.00
Projection to TD - ST01									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
9,150.00	9,118.76	-224.12	-597.22	Tie In - ST01
9,262.00	9,230.36	-216.18	-598.53	First Phoenix MWD Survey - ST01
14,665.00	9,549.41	4,954.10	-651.22	Final Phoenix MWD Survey - ST01
14,726.00	9,545.72	5,014.98	-650.55	Projection to TD - ST01

This survey is true and accurate to the best of my knowledge.

Steve Morris