

NM OIL CONSERVATION
ARTESIA DISTRICT

OCT 24 2018

RECEIVED



Caza Operating LLC

Forehand Ranch 22-21 State Com 4H
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Forehand Ranch 22-21 State Com 4H

30-013-45372

Plan: 181021 Forehand Ranch 22-21 State Com 4H

Morcor Standard Plan

21 October, 2018

**MORCOR
ENGINEERING**

RWP 12-24-18



Morcor Engineering
Morcor Standard Plan

MORCOR
ENGINEERING

Company: Caza Operating LLC
Project: Forehand Ranch 22-21 State Com 4H
Site: Forehand Ranch 22-21 State Com 4H
Well: Forehand Ranch 22-21 State Com 4H
Wellbore: Forehand Ranch 22-21 State Com 4H
Design: 181021 Forehand Ranch 22-21 State Com 4H

Local Co-ordinate Reference: Well Forehand Ranch 22-21 State Com 4H
TVD Reference: WELL @ 3162.0usft (Original Well Elev)
MD Reference: WELL @ 3162.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project Forehand Ranch 22-21 State Com 4H

Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Eastern Zone

System Datum: Mean Sea Level

Site Forehand Ranch 22-21 State Com 4H

Site Position:		Northing:	470,736.13 usft	Latitude:	32° 17' 38.479 N
From:	Lat/Long	Easting:	591,717.99 usft	Longitude:	104° 10' 13.033 W
Position Uncertainty:	1.0 usft	Slot Radius:	17-1/2 "	Grid Convergence:	0.09 "

Well Forehand Ranch 22-21 State Com 4H

Well Position	+N/-S	0.0 usft	Northing:	470,736.13 usft	Latitude:	32° 17' 38.479 N
	+E/-W	0.0 usft	Easting:	591,717.99 usft	Longitude:	104° 10' 13.033 W
Position Uncertainty		1.0 usft	Wellhead Elevation:	usft	Ground Level:	3,140.0 usft

Wellbore Forehand Ranch 22-21 State Com 4H

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/21/2018	6.96	59.97	47,864

Design 181021 Forehand Ranch 22-21 State Com 4H

Audit Notes:

Version: Phase: PLAN Tie On Depth: 0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	268.57

Survey Tool Program Date 10/21/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	19,978.0	181021 Forehand Ranch 22-21 State Com	MWD	MWD - Standard



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0.0	0.00	0.00	0.0	-3,162.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
100.0	0.00	131.60	100.0	-3,062.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
181.0	0.00	131.60	181.0	-2,981.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Rustler										
200.0	0.00	131.60	200.0	-2,962.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
206.0	0.00	131.60	206.0	-2,956.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
20" Conductor										
300.0	0.00	131.60	300.0	-2,862.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
400.0	0.00	131.60	400.0	-2,762.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
472.0	0.00	131.60	472.0	-2,690.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Top of Salt										
500.0	0.00	131.60	500.0	-2,662.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
600.0	0.00	131.60	600.0	-2,562.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
700.0	0.00	131.60	700.0	-2,462.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
765.0	0.00	131.60	765.0	-2,397.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Base of Salt										
800.0	0.00	131.60	800.0	-2,382.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
856.0	0.00	131.60	856.0	-2,306.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Castile										
900.0	0.00	131.60	900.0	-2,262.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,000.0	0.00	131.60	1,000.0	-2,162.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,100.0	0.00	131.60	1,100.0	-2,062.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,200.0	0.00	131.60	1,200.0	-1,962.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,300.0	0.00	131.60	1,300.0	-1,862.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,400.0	0.00	131.60	1,400.0	-1,762.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,500.0	0.00	131.60	1,500.0	-1,662.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,600.0	0.00	131.60	1,600.0	-1,562.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,700.0	0.00	131.60	1,700.0	-1,462.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00



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1,800.0	0.00	131.60	1,800.0	-1,362.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
1,900.0	0.00	131.60	1,900.0	-1,262.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,000.0	0.00	131.60	2,000.0	-1,162.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,100.0	0.00	131.60	2,100.0	-1,062.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,141.0	0.00	131.60	2,141.0	-1,021.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
13 3/8" Surface Casing										
2,166.0	0.00	131.60	2,166.0	-896.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Delaware										
2,200.0	0.00	131.60	2,200.0	-962.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,300.0	0.00	131.60	2,300.0	-862.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,400.0	0.00	131.60	2,400.0	-762.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,500.0	0.00	131.60	2,500.0	-662.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,600.0	0.00	131.60	2,600.0	-562.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,700.0	0.00	131.60	2,700.0	-462.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,800.0	0.00	131.60	2,800.0	-362.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
2,900.0	0.00	131.60	2,900.0	-262.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Cherry Canyon										
3,000.0	0.00	131.60	3,000.0	-162.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,100.0	0.00	131.60	3,100.0	-62.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,200.0	0.00	131.60	3,200.0	38.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,300.0	0.00	131.60	3,300.0	138.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,400.0	0.00	131.60	3,400.0	238.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,500.0	0.00	131.60	3,500.0	338.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,600.0	0.00	131.60	3,600.0	438.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,700.0	0.00	131.60	3,700.0	538.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,800.0	0.00	131.60	3,800.0	638.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
3,900.0	0.00	131.60	3,900.0	738.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00



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MD (usft)	Inc (")	Azi (azimuth) (")	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	Easting (usft)	Northing (usft)	V. Sec (usft)	DLog ("/100usft)
4,000.0	0.00	131.60	4,000.0	838.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,100.0	0.00	131.60	4,100.0	938.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,200.0	0.00	131.60	4,200.0	1,038.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,248.0	0.00	131.60	4,248.0	1,086.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Brushy Canyon										
4,300.0	0.00	131.60	4,300.0	1,138.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,400.0	0.00	131.60	4,400.0	1,238.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,500.0	0.00	131.60	4,500.0	1,338.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,600.0	0.00	131.60	4,600.0	1,438.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,700.0	0.00	131.60	4,700.0	1,538.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,800.0	0.00	131.60	4,800.0	1,638.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
4,900.0	0.00	131.60	4,900.0	1,738.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,000.0	0.00	131.60	5,000.0	1,838.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,100.0	0.00	131.60	5,100.0	1,938.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,200.0	0.00	131.60	5,200.0	2,038.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,300.0	0.00	131.60	5,300.0	2,138.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,400.0	0.00	131.60	5,400.0	2,238.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,500.0	0.00	131.60	5,500.0	2,338.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,600.0	0.00	131.60	5,600.0	2,438.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,611.0	0.00	131.60	5,611.0	2,449.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Bone Spring										
5,700.0	0.00	131.60	5,700.0	2,538.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,800.0	0.00	131.60	5,800.0	2,638.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
5,810.0	0.00	131.60	5,810.0	2,648.0	0.0	0.0	591,717.99	470,736.13	0.00	0.00
Start Build 3.00										
5,900.0	2.70	131.60	5,900.0	2,738.0	-1.4	1.6	591,719.58	470,734.72	-1.55	3.00
6,000.0	5.70	131.60	5,999.7	2,837.7	-6.3	7.1	591,725.06	470,729.86	-6.90	3.00



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6,010.0	6.00	131.60	6,009.6	2,847.6	-6.9	7.8	591,725.82	470,729.18	-7.65	3.00
Start 2990.0 hold at 6010.0 MD										
6,100.0	6.00	131.60	6,099.1	2,937.1	-13.2	14.9	591,732.85	470,722.94	-14.52	0.00
6,200.0	6.00	131.60	6,198.6	3,036.6	-20.1	22.7	591,740.67	470,716.00	-22.17	0.00
6,300.0	6.00	131.60	6,298.0	3,136.0	-27.1	30.5	591,748.49	470,709.06	-29.81	0.00
6,400.0	6.00	131.60	6,397.5	3,235.5	-34.0	38.3	591,756.30	470,702.12	-37.45	0.00
6,500.0	6.00	131.60	6,497.0	3,335.0	-41.0	46.1	591,764.12	470,695.18	-45.09	0.00
6,600.0	6.00	131.60	6,596.4	3,434.4	-47.9	53.9	591,771.94	470,688.24	-52.73	0.00
6,692.1	6.00	131.60	6,688.0	3,526.0	-54.3	61.1	591,779.13	470,681.85	-59.77	0.00
1st Bone Spring Sand										
6,700.0	6.00	131.60	6,695.9	3,533.9	-54.8	61.8	591,779.75	470,681.30	-60.37	0.00
6,800.0	6.00	131.60	6,795.3	3,633.3	-61.8	69.6	591,787.57	470,674.36	-68.01	0.00
6,900.0	6.00	131.60	6,894.8	3,732.8	-68.7	77.4	591,795.39	470,667.42	-75.65	0.00
7,000.0	6.00	131.60	6,994.2	3,832.2	-75.7	85.2	591,803.20	470,660.48	-83.29	0.00
7,100.0	6.00	131.60	7,093.7	3,931.7	-82.6	93.0	591,811.02	470,653.54	-90.93	0.00
7,200.0	6.00	131.60	7,193.1	4,031.1	-89.5	100.8	591,818.83	470,646.60	-98.57	0.00
7,272.3	6.00	131.60	7,265.0	4,103.0	-94.5	106.5	591,824.48	470,641.58	-104.10	0.00
2nd Bone Spring Sand										
7,300.0	6.00	131.60	7,292.6	4,130.6	-96.5	108.7	591,826.65	470,639.66	-106.21	0.00
7,400.0	6.00	131.60	7,392.0	4,230.0	-103.4	116.5	591,834.47	470,632.72	-113.86	0.00
7,411.0	6.00	131.60	7,403.0	4,241.0	-104.2	117.3	591,835.33	470,631.95	-114.70	0.00
2nd Bone Spring Sand Base										
7,461.3	6.00	131.60	7,453.0	4,291.0	-107.7	121.3	591,839.26	470,628.46	-118.54	0.00
9 5/8" Intermediate Casing										
7,500.0	6.00	131.60	7,491.5	4,329.5	-110.4	124.3	591,842.28	470,625.78	-121.50	0.00
7,600.0	6.00	131.60	7,590.9	4,428.9	-117.3	132.1	591,850.10	470,618.84	-129.14	0.00
7,700.0	6.00	131.60	7,690.4	4,528.4	-124.2	139.9	591,857.92	470,611.90	-136.78	0.00
7,800.0	6.00	131.60	7,789.8	4,627.8	-131.2	147.7	591,865.73	470,604.96	-144.42	0.00



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7,900.0	6.00	131.60	7,889.3	4,727.3	-138.1	155.6	591,873.55	470,598.02	-152.06	0.00
8,000.0	6.00	131.60	7,988.7	4,826.7	-145.1	163.4	591,881.37	470,591.08	-159.70	0.00
8,100.0	6.00	131.60	8,088.2	4,926.2	-152.0	171.2	591,889.18	470,584.14	-167.34	0.00
8,113.9	6.00	131.60	8,102.0	4,940.0	-153.0	172.3	591,890.27	470,583.18	-168.40	0.00
Harkey Sand										
8,200.0	6.00	131.60	8,187.6	5,025.6	-158.9	179.0	591,897.00	470,577.20	-174.98	0.00
8,300.0	6.00	131.60	8,287.1	5,125.1	-165.9	186.8	591,904.82	470,570.26	-182.62	0.00
8,400.0	6.00	131.60	8,386.5	5,224.5	-172.8	194.6	591,912.63	470,563.32	-190.26	0.00
8,500.0	6.00	131.60	8,486.0	5,324.0	-178.8	202.5	591,920.45	470,556.38	-197.91	0.00
8,600.0	6.00	131.60	8,585.4	5,423.4	-186.7	210.3	591,928.27	470,549.44	-205.55	0.00
8,700.0	6.00	131.60	8,684.9	5,522.9	-193.6	218.1	591,936.08	470,542.50	-213.19	0.00
8,708.1	6.00	131.60	8,693.0	5,531.0	-194.2	218.7	591,936.72	470,541.93	-213.81	0.00
3rd Bone Spring Sand										
8,800.0	6.00	131.60	8,784.4	5,622.4	-200.6	225.9	591,943.90	470,535.56	-220.83	0.00
8,900.0	6.00	131.60	8,883.8	5,721.8	-207.5	233.7	591,951.72	470,528.62	-228.47	0.00
8,955.5	6.00	131.60	8,939.0	5,777.0	-211.4	238.1	591,956.06	470,524.77	-232.71	0.00
Wolfcamp										
9,000.0	6.00	131.60	8,983.3	5,821.3	-214.4	241.5	591,958.53	470,521.68	-236.11	0.00
Start Drop -3.00										
9,100.0	3.00	131.60	9,082.9	5,920.9	-219.7	247.4	591,965.40	470,516.47	-241.84	3.00
9,200.0	0.00	0.00	9,182.9	6,020.9	-221.4	249.4	591,967.36	470,514.73	-243.76	3.00
Start 61.0 hold at 9200.0 MD										
9,261.0	0.00	270.00	9,243.9	6,081.9	-221.4	249.4	591,967.36	470,514.73	-243.76	0.00
Start Build 11.30										
9,300.0	4.41	270.00	9,282.9	6,120.9	-221.4	247.9	591,965.86	470,514.73	-242.28	11.30
9,400.0	15.71	270.00	9,381.2	6,219.2	-221.4	230.4	591,948.42	470,514.73	-224.83	11.30
9,463.4	22.88	270.00	9,441.0	6,279.0	-221.4	209.5	591,927.47	470,514.73	-203.88	11.30
Wolfcamp B										



Morcor Engineering
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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	Easting (usft)	Northing (usft)	V. Sec (usft)	DLog (°/100usft)
9,500.0	27.01	270.00	9,474.1	6,312.1	-221.4	194.1	591,912.06	470,514.73	-188.48	11.30
9,600.0	38.31	270.00	9,558.2	6,396.2	-221.4	140.2	591,858.18	470,514.73	-134.62	11.30
9,700.0	49.61	270.00	9,630.1	6,468.1	-221.4	70.9	591,788.88	470,514.73	-65.34	11.30
9,800.0	60.91	270.00	9,686.9	6,524.9	-221.4	-11.2	591,706.84	470,514.73	16.68	11.30
9,900.0	72.21	270.00	9,726.7	6,564.7	-221.4	-102.8	591,615.24	470,514.73	108.25	11.30
10,000.0	83.51	270.00	9,747.6	6,585.6	-221.4	-200.4	591,517.63	470,514.73	205.83	11.30
10,062.0	90.52	270.00	9,750.9	6,588.9	-221.4	-262.2	591,455.75	470,514.73	267.69	11.30
Start Turn 0.00										
10,100.0	90.52	270.00	9,750.5	6,588.5	-221.4	-300.2	591,417.76	470,514.73	305.67	0.00
10,200.0	90.52	269.99	9,749.6	6,587.6	-221.4	-400.2	591,317.76	470,514.73	405.64	0.00
10,300.0	90.52	269.99	9,748.7	6,586.7	-221.4	-500.2	591,217.76	470,514.71	505.60	0.00
10,400.0	90.52	269.99	9,747.8	6,585.8	-221.4	-600.2	591,117.77	470,514.70	605.57	0.00
10,500.0	90.52	269.98	9,746.9	6,584.9	-221.5	-700.2	591,017.77	470,514.67	705.53	0.00
10,600.0	90.52	269.98	9,746.0	6,584.0	-221.5	-800.2	590,917.78	470,514.64	805.50	0.00
10,700.0	90.52	269.98	9,745.1	6,583.1	-221.5	-900.2	590,817.78	470,514.60	905.47	0.00
10,800.0	90.52	269.97	9,744.2	6,582.2	-221.6	-1,000.2	590,717.78	470,514.55	1,005.43	0.00
10,900.0	90.52	269.97	9,743.3	6,581.3	-221.6	-1,100.2	590,617.79	470,514.50	1,105.40	0.00
11,000.0	90.52	269.96	9,742.4	6,580.4	-221.7	-1,200.2	590,517.79	470,514.44	1,205.36	0.00
11,100.0	90.52	269.96	9,741.5	6,579.5	-221.8	-1,300.2	590,417.80	470,514.37	1,305.33	0.00
11,200.0	90.52	269.96	9,740.5	6,578.5	-221.8	-1,400.2	590,317.80	470,514.30	1,405.30	0.00
11,300.0	90.52	269.95	9,739.6	6,577.6	-221.9	-1,500.2	590,217.80	470,514.22	1,505.26	0.00
11,400.0	90.52	269.95	9,738.7	6,576.7	-222.0	-1,600.2	590,117.81	470,514.14	1,605.23	0.00
11,500.0	90.52	269.94	9,737.8	6,575.8	-222.1	-1,700.2	590,017.81	470,514.04	1,705.20	0.00
11,600.0	90.52	269.94	9,736.9	6,574.9	-222.2	-1,800.2	589,917.82	470,513.94	1,805.16	0.00
11,700.0	90.52	269.94	9,736.0	6,574.0	-222.3	-1,900.2	589,817.82	470,513.84	1,905.13	0.00
11,800.0	90.52	269.93	9,735.1	6,573.1	-222.4	-2,000.2	589,717.83	470,513.72	2,005.10	0.00
11,900.0	90.52	269.93	9,734.2	6,572.2	-222.5	-2,100.2	589,617.83	470,513.60	2,105.07	0.00



Morcor Engineering
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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	Easting (usft)	Northing (usft)	V. Sec (usft)	DLog (°/100usft)
12,000.0	90.52	269.93	9,733.3	6,571.3	-222.7	-2,200.2	589,517.83	470,513.48	2,205.03	0.00
12,100.0	90.52	269.92	9,732.4	6,570.4	-222.8	-2,300.2	589,417.84	470,513.34	2,305.00	0.00
12,200.0	90.52	269.92	9,731.5	6,569.5	-222.9	-2,400.2	589,317.84	470,513.21	2,404.97	0.00
12,300.0	90.52	269.91	9,730.6	6,568.6	-223.1	-2,500.1	589,217.85	470,513.06	2,504.94	0.00
12,400.0	90.52	269.91	9,729.7	6,567.7	-223.2	-2,600.1	589,117.85	470,512.91	2,604.91	0.00
12,500.0	90.52	269.91	9,728.7	6,566.7	-223.4	-2,700.1	589,017.85	470,512.75	2,704.88	0.00
12,600.0	90.52	269.90	9,727.8	6,565.8	-223.6	-2,800.1	588,917.86	470,512.58	2,804.84	0.00
12,700.0	90.52	269.90	9,726.9	6,564.9	-223.7	-2,900.1	588,817.86	470,512.41	2,904.81	0.00
12,800.0	90.52	269.90	9,726.0	6,564.0	-223.9	-3,000.1	588,717.87	470,512.23	3,004.78	0.00
12,900.0	90.52	269.89	9,725.1	6,563.1	-224.1	-3,100.1	588,617.87	470,512.04	3,104.75	0.00
13,000.0	90.52	269.89	9,724.2	6,562.2	-224.3	-3,200.1	588,517.88	470,511.85	3,204.72	0.00
13,100.0	90.52	269.88	9,723.3	6,561.3	-224.5	-3,300.1	588,417.88	470,511.65	3,304.69	0.00
13,200.0	90.52	269.88	9,722.4	6,560.4	-224.7	-3,400.1	588,317.88	470,511.44	3,404.66	0.00
13,300.0	90.52	269.88	9,721.5	6,559.5	-224.9	-3,500.1	588,217.89	470,511.23	3,504.63	0.00
13,400.0	90.52	269.87	9,720.6	6,558.6	-225.1	-3,600.1	588,117.89	470,511.01	3,604.60	0.00
13,500.0	90.52	269.87	9,719.7	6,557.7	-225.3	-3,700.1	588,017.90	470,510.78	3,704.57	0.00
13,600.0	90.52	269.86	9,718.8	6,556.8	-225.6	-3,800.1	587,917.90	470,510.55	3,804.54	0.00
13,700.0	90.52	269.86	9,717.9	6,555.9	-225.8	-3,900.1	587,817.91	470,510.31	3,904.51	0.00
13,800.0	90.52	269.86	9,716.9	6,554.9	-226.1	-4,000.1	587,717.91	470,510.06	4,004.48	0.00
13,900.0	90.52	269.85	9,716.0	6,554.0	-226.3	-4,100.1	587,617.92	470,509.81	4,104.45	0.00
14,000.0	90.52	269.85	9,715.1	6,553.1	-226.6	-4,200.1	587,517.92	470,509.55	4,204.42	0.00
14,100.0	90.52	269.85	9,714.2	6,552.2	-226.8	-4,300.1	587,417.92	470,509.28	4,304.39	0.00
14,200.0	90.52	269.84	9,713.3	6,551.3	-227.1	-4,400.1	587,317.93	470,509.01	4,404.36	0.00
14,300.0	90.52	269.84	9,712.4	6,550.4	-227.4	-4,500.1	587,217.93	470,508.73	4,504.34	0.00
14,400.0	90.52	269.83	9,711.5	6,549.5	-227.7	-4,600.1	587,117.94	470,508.44	4,604.31	0.00
14,500.0	90.52	269.83	9,710.6	6,548.6	-228.0	-4,700.1	587,017.94	470,508.15	4,704.28	0.00
14,600.0	90.52	269.83	9,709.7	6,547.7	-228.3	-4,800.0	586,917.95	470,507.85	4,804.25	0.00



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14,700.0	90.52	269.82	9,708.8	6,546.8	-228.6	-4,900.0	586,817.95	470,507.54	4,904.22	0.00
14,800.0	90.52	269.82	9,707.9	6,545.9	-228.9	-5,000.0	586,717.96	470,507.23	5,004.19	0.00
14,900.0	90.52	269.81	9,707.0	6,545.0	-229.2	-5,100.0	586,617.96	470,506.91	5,104.17	0.00
15,000.0	90.52	269.81	9,706.1	6,544.1	-229.6	-5,200.0	586,517.97	470,506.58	5,204.14	0.00
15,100.0	90.52	269.81	9,705.1	6,543.1	-229.9	-5,300.0	586,417.97	470,506.25	5,304.11	0.00
15,200.0	90.52	269.80	9,704.2	6,542.2	-230.2	-5,400.0	586,317.98	470,505.91	5,404.08	0.00
15,300.0	90.52	269.80	9,703.3	6,541.3	-230.6	-5,500.0	586,217.98	470,505.56	5,504.06	0.00
15,400.0	90.52	269.80	9,702.4	6,540.4	-230.9	-5,600.0	586,117.98	470,505.21	5,604.03	0.00
15,500.0	90.52	269.79	9,701.5	6,539.5	-231.3	-5,700.0	586,017.99	470,504.84	5,704.00	0.00
15,600.0	90.52	269.79	9,700.6	6,538.6	-231.7	-5,800.0	585,917.99	470,504.48	5,803.98	0.00
15,700.0	90.52	269.78	9,699.7	6,537.7	-232.0	-5,900.0	585,818.00	470,504.10	5,903.95	0.00
15,800.0	90.52	269.78	9,698.8	6,536.8	-232.4	-6,000.0	585,718.00	470,503.72	6,003.92	0.00
15,900.0	90.52	269.78	9,697.9	6,535.9	-232.8	-6,100.0	585,618.01	470,503.34	6,103.90	0.00
16,000.0	90.52	269.77	9,697.0	6,535.0	-233.2	-6,200.0	585,518.01	470,502.94	6,203.87	0.00
16,100.0	90.52	269.77	9,696.1	6,534.1	-233.6	-6,300.0	585,418.02	470,502.54	6,303.84	0.00
16,200.0	90.52	269.76	9,695.2	6,533.2	-234.0	-6,400.0	585,318.02	470,502.14	6,403.82	0.00
16,300.0	90.52	269.76	9,694.3	6,532.3	-234.4	-6,500.0	585,218.03	470,501.72	6,503.79	0.00
16,400.0	90.52	269.76	9,693.4	6,531.4	-234.8	-6,600.0	585,118.03	470,501.30	6,603.77	0.00
16,500.0	90.52	269.75	9,692.4	6,530.4	-235.3	-6,700.0	585,018.04	470,500.87	6,703.74	0.00
16,600.0	90.52	269.75	9,691.5	6,529.5	-235.7	-6,799.9	584,918.04	470,500.44	6,803.72	0.00
16,700.0	90.52	269.75	9,690.6	6,528.6	-236.1	-6,899.9	584,818.05	470,500.00	6,903.69	0.00
16,800.0	90.52	269.74	9,689.7	6,527.7	-236.6	-6,999.9	584,718.05	470,499.55	7,003.66	0.00
16,900.0	90.52	269.74	9,688.8	6,526.8	-237.0	-7,099.9	584,618.06	470,499.10	7,103.64	0.00
17,000.0	90.52	269.73	9,687.9	6,525.9	-237.5	-7,199.9	584,518.06	470,498.64	7,203.61	0.00
17,100.0	90.52	269.73	9,687.0	6,525.0	-238.0	-7,299.9	584,418.07	470,498.17	7,303.59	0.00
17,200.0	90.52	269.73	9,686.1	6,524.1	-238.4	-7,399.9	584,318.07	470,497.70	7,403.57	0.00
17,300.0	90.52	269.72	9,685.2	6,523.2	-238.9	-7,499.9	584,218.08	470,497.21	7,503.54	0.00



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17,400.0	90.52	269.72	9,684.3	6,522.3	-239.4	-7,599.9	584,118.09	470,496.73	7,603.52	0.00
17,500.0	90.52	269.71	9,683.4	6,521.4	-239.9	-7,699.9	584,018.09	470,496.23	7,703.49	0.00
17,600.0	90.52	269.71	9,682.5	6,520.5	-240.4	-7,799.9	583,918.10	470,495.73	7,803.47	0.00
17,700.0	90.52	269.71	9,681.6	6,519.6	-240.9	-7,899.9	583,818.10	470,495.22	7,903.44	0.00
17,800.0	90.52	269.70	9,680.6	6,518.6	-241.4	-7,999.9	583,718.11	470,494.71	8,003.42	0.00
17,900.0	90.52	269.70	9,679.7	6,517.7	-241.9	-8,099.9	583,618.11	470,494.19	8,103.40	0.00
18,000.0	90.52	269.70	9,678.8	6,516.8	-242.5	-8,199.9	583,518.12	470,493.66	8,203.37	0.00
18,100.0	90.52	269.69	9,677.9	6,515.9	-243.0	-8,299.9	583,418.12	470,493.13	8,303.35	0.00
18,200.0	90.52	269.69	9,677.0	6,515.0	-243.5	-8,399.9	583,318.13	470,492.59	8,403.33	0.00
18,300.0	90.52	269.68	9,676.1	6,514.1	-244.1	-8,499.9	583,218.13	470,492.04	8,503.30	0.00
18,400.0	90.52	269.68	9,675.2	6,513.2	-244.6	-8,599.9	583,118.14	470,491.49	8,603.28	0.00
18,500.0	90.52	269.68	9,674.3	6,512.3	-245.2	-8,699.8	583,018.15	470,490.92	8,703.26	0.00
18,600.0	90.52	269.67	9,673.4	6,511.4	-245.8	-8,799.8	582,918.15	470,490.36	8,803.24	0.00
18,700.0	90.52	269.67	9,672.5	6,510.5	-246.3	-8,899.8	582,818.16	470,489.78	8,903.21	0.00
18,800.0	90.52	269.67	9,671.6	6,509.6	-246.9	-8,999.8	582,718.16	470,489.20	9,003.19	0.00
18,900.0	90.52	269.66	9,670.7	6,508.7	-247.5	-9,099.8	582,618.17	470,488.61	9,103.17	0.00
19,000.0	90.52	269.66	9,669.8	6,507.8	-248.1	-9,199.8	582,518.17	470,488.02	9,203.15	0.00
19,100.0	90.52	269.65	9,668.8	6,506.8	-248.7	-9,299.8	582,418.18	470,487.42	9,303.12	0.00
19,200.0	90.52	269.65	9,667.9	6,505.9	-249.3	-9,399.8	582,318.19	470,486.81	9,403.10	0.00
19,300.0	90.52	269.65	9,667.0	6,505.0	-249.9	-9,499.8	582,218.19	470,486.20	9,503.08	0.00
19,400.0	90.52	269.64	9,666.1	6,504.1	-250.6	-9,599.8	582,118.20	470,485.57	9,603.06	0.00
19,500.0	90.52	269.64	9,665.2	6,503.2	-251.2	-9,699.8	582,018.20	470,484.95	9,703.04	0.00
19,600.0	90.52	269.63	9,664.3	6,502.3	-251.8	-9,799.8	581,918.21	470,484.31	9,803.01	0.00
19,700.0	90.52	269.63	9,663.4	6,501.4	-252.5	-9,899.8	581,818.22	470,483.67	9,902.99	0.00
19,800.0	90.52	269.63	9,662.5	6,500.5	-253.1	-9,999.8	581,718.22	470,483.02	10,002.97	0.00
19,900.0	90.52	269.62	9,661.6	6,499.6	-253.8	-10,099.8	581,618.23	470,482.37	10,102.95	0.00



Morcor Engineering
Morcor Standard Plan

MORCOR
ENGINEERING

Company: Caza Operating LLC
Project: Forehand Ranch 22-21 State Com 4H
Site: Forehand Ranch 22-21 State Com 4H
Well: Forehand Ranch 22-21 State Com 4H
Wellbore: Forehand Ranch 22-21 State Com 4H
Design: 181021 Forehand Ranch 22-21 State Com 4H

Local Co-ordinate Reference: Well Forehand Ranch 22-21 State Com 4H
TVD Reference: WELL @ 3162.0usft (Original Well Elev)
MD Reference: WELL @ 3162.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	Easting (usft)	Northing (usft)	V. Sec (usft)	DLeg (°/100usft)
19,978.0	90.52	269.62	9,660.9	6,498.9	-254.3	-10,177.8	581,540.23	470,481.85	10,180.93	0.00
TD at 19978.0 - 5 1/2" Production Casing										

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
206.0	206.0	20" Conductor	20	26
2,141.0	2,141.0	13 3/8" Surface Casing	13-3/8	17-1/2
7,461.3	7,453.0	9 5/8" Intermediate Casing	9-5/8	12-1/4
19,978.0	9,660.9	5 1/2" Production Casing	5-1/2	8-1/2

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
856.0	856.0	Castile		0.00	
7,411.0	7,403.0	2nd Bone Spring Sand Base		0.00	
8,113.9	8,102.0	Harkey Sand		0.00	
765.0	765.0	Base of Salt		0.00	
6,692.1	6,688.0	1st Bone Spring Sand		0.00	
2,166.0	2,166.0	Delaware		0.00	
2,900.0	2,900.0	Cherry Canyon		0.00	
5,611.0	5,611.0	Bone Spring		0.00	
7,272.3	7,265.0	2nd Bone Spring Sand		0.00	
9,463.4	9,441.0	Wolfcamp B		0.00	
8,708.1	8,693.0	3rd Bone Spring Sand		0.00	
4,248.0	4,248.0	Brushy Canyon		0.00	
472.0	472.0	Top of Salt		0.00	
8,955.5	8,939.0	Wolfcamp		0.00	
181.0	181.0	Rustler		0.00	



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,810.0	5,810.0	0.0	0.0	Start Build 3.00
6,010.0	6,009.6	-6.9	7.8	Start 2990.0 hold at 6010.0 MD
9,000.0	8,983.3	-214.4	241.5	Start Drop -3.00
9,200.0	9,182.9	-221.4	249.4	Start 61.0 hold at 9200.0 MD
9,261.0	9,243.9	-221.4	249.4	Start Build 11.30
10,062.0	9,750.9	-221.4	-262.2	Start Turn 0.00
18,978.0	9,660.9	-254.3	-10,177.8	TD at 18978.0

Checked By: _____ Approved By: _____ Date: _____

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Azimuths to Grid North
 True North: -0.09°
 Magnetic North: 6.87°
 Magnetic Field
 Strength: 47864.3snT
 Dip Angle: 59.97°
 Date: 10/21/2018
 Model: IGRF2010

CASING DETAILS					FORMATION TOP DETAILS				
TVD	MD	Name	Size		TVDPath	MDPath	Formation	DipAngle	DipDir
206.0	206.0	20" Conductor	20		181.0	181.0	Rustler	0.00	
2141.0	2141.0	13 3/8" Surface Casing	13-3/8		472.0	472.0	Top of Salt	0.00	
7453.0	7461.3	9 5/8" Intermediate Casing	9-5/8		765.0	765.0	Base of Salt	0.00	
9660.9	19978.0	5 1/2" Production Casing	5-1/2		856.0	856.0	Castile	0.00	
					2166.0	2166.0	Delaware	0.00	
					2900.0	2900.0	Cherry Canyon	0.00	
					4248.0	4248.0	Brushy Canyon	0.00	
					5611.0	5611.0	Bone Spring	0.00	
					6688.0	6692.1	1st Bone Spring Sand	0.00	
					7265.0	7272.3	2nd Bone Spring Sand	0.00	
					7403.0	7411.0	2nd Bone Spring Sand Base	0.00	
					8102.0	8113.9	Harkey Sand	0.00	
					8693.0	8708.1	3rd Bone Spring Sand	0.00	
					8939.0	8955.5	Wolfcamp	0.00	
					9441.0	9463.4	Wolfcamp B	0.00	

