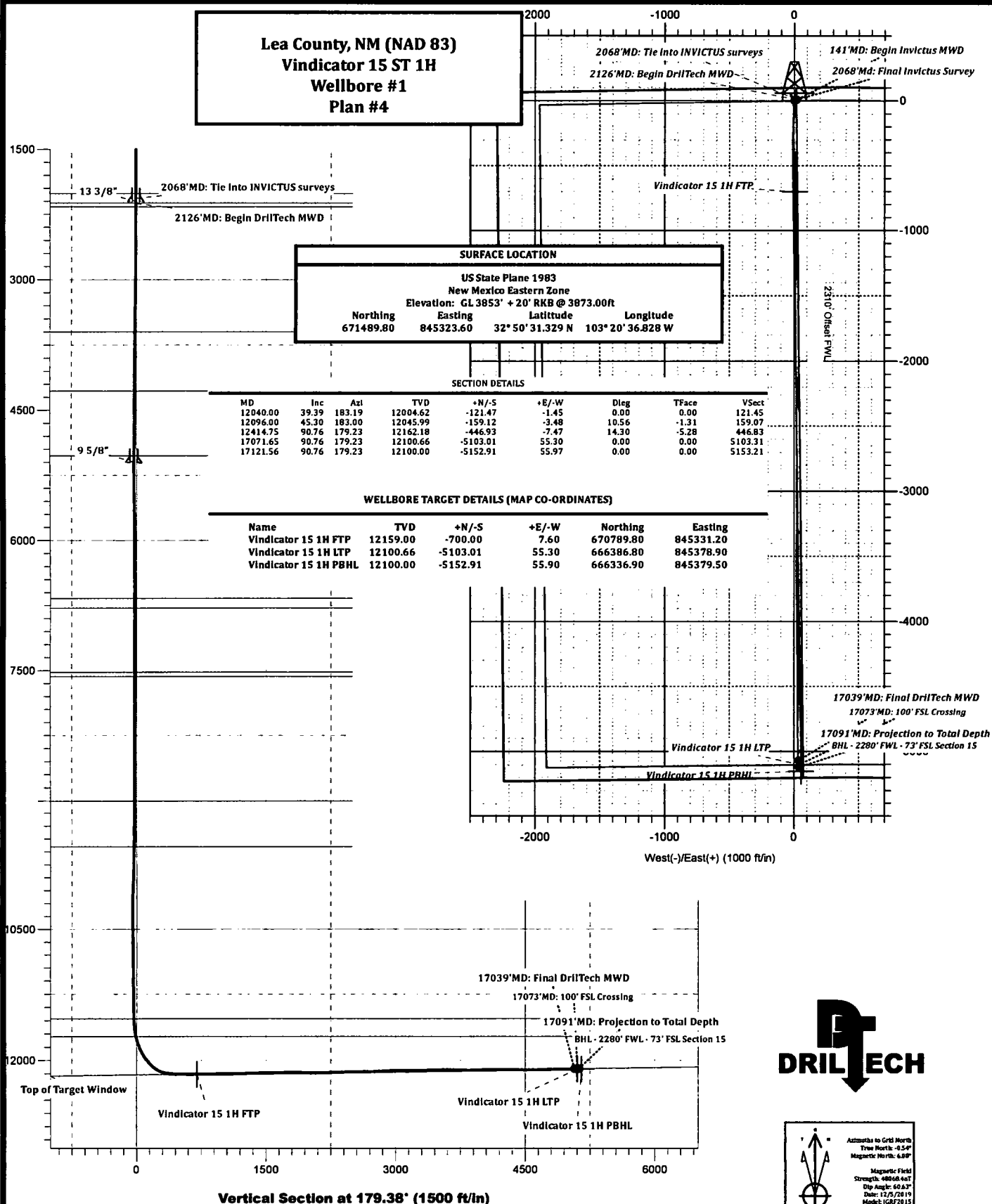


**Lea County, NM (NAD 83)
Vindicator 15 ST 1H
Wellbore #1
Plan #4**



Manzano, LLC

Lea County, NM (NAD 83)

Vindicator 15 State 1H

Vindicator 15 ST 1H

Wellbore #1

Survey: DrilTech MWD

Standard Survey Report

07 January, 2020

Survey Report

Company: Manzano, LLC
Project: Lea County, NM (NAD 83)
Site: Vindicator 15 State 1H
Well: Vindicator 15 ST 1H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Vindicator 15 ST 1H
TVD Reference: GL 3853' + 20' RKB @ 3873.00ft
MD Reference: GL 3853' + 20' RKB @ 3873.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM

Project	Lea County, NM (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Vindicator 15 State 1H		
Site Position:		Northing:	671,489.80 usft
From:	Map	Easting:	845,323.60 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in
		Latitude:	32° 50' 31.329 N
		Longitude:	103° 20' 36.828 W
		Grid Convergence:	0.54 °

Well	Vindicator 15 ST 1H		
Well Position	+N/-S	0.00 ft	Northing: 671,489.80 usft
	+E/-W	0.00 ft	Easting: 845,323.60 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft
		Latitude:	32° 50' 31.329 N
		Longitude:	103° 20' 36.828 W
		Ground Level:	3,853.00 ft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2015	12/5/2019	(°) 6.62
			Dip Angle (°) 60.63
			Field Strength (nT) 48,068.37396895

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
			Direction (°) 179.38

Survey Program	Date 1/7/2020		
From	To	Survey (Wellbore)	Tool Name
(ft)	(ft)		
141.00	2,068.00	Invictus Surveys (Wellbore #1)	MWD
2,126.00	17,091.00	DrillTech MWD (Wellbore #1)	MWD
			Description
			MWD - Standard
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate	
(ft)			(ft)			(ft)	(°/100ft)	(°/100ft)	(°/100ft)	
2,068.00	0.90	59.08	2,067.83	10.52	19.27	-10.31	0.00	0.00	0.00	
2068'MD: Tie into INVICTUS surveys										
2,126.00	0.44	10.40	2,125.83	10.97	19.70	-10.76	1.20	-0.79	-83.93	
2126'MD: Begin DrillTech MWD										
2,189.00	0.62	11.80	2,188.83	11.55	19.81	-11.33	0.29	0.29	2.22	
2,285.00	0.35	258.40	2,284.82	12.00	19.63	-11.78	0.86	-0.28	-118.13	
2,379.00	0.88	249.81	2,378.82	11.69	18.67	-11.49	0.57	0.56	-9.14	
2,473.00	0.70	246.12	2,472.81	11.21	17.47	-11.02	0.20	-0.19	-3.93	
2,568.00	0.44	213.34	2,567.80	10.67	16.74	-10.49	0.43	-0.27	-34.51	

Survey Report

Company: Manzano, LLC
Project: Lea County, NM (NAD 83)
Site: Vindicator 15 State 1H
Well: Vindicator 15 ST 1H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Vindicator 15 ST 1H
TVD Reference: GL 3853' + 20' RKB @ 3873.00ft
MD Reference: GL 3853' + 20' RKB @ 3873.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,662.00	0.44	256.75	2,661.80	10.28	16.19	-10.11	0.35	0.00	46.18
2,756.00	0.09	33.60	2,755.80	10.26	15.88	-10.09	0.54	-0.37	145.59
2,851.00	0.35	333.66	2,850.80	10.58	15.79	-10.41	0.33	0.27	-63.09
2,945.00	0.09	72.18	2,944.80	10.86	15.73	-10.69	0.40	-0.28	104.81
3,039.00	0.53	24.11	3,038.80	11.28	15.98	-11.11	0.50	0.47	-51.14
3,134.00	0.62	33.60	3,133.79	12.11	16.44	-11.93	0.14	0.09	9.99
3,228.00	0.79	38.96	3,227.79	13.04	17.13	-12.85	0.19	0.18	5.70
3,322.00	0.79	31.14	3,321.78	14.10	17.87	-13.90	0.11	0.00	-8.32
3,417.00	0.44	29.56	3,416.77	14.98	18.39	-14.78	0.37	-0.37	-1.66
3,512.00	0.53	348.60	3,511.77	15.72	18.49	-15.52	0.37	0.09	-43.12
3,606.00	0.88	6.18	3,605.76	16.87	18.48	-16.67	0.43	0.37	18.70
3,700.00	0.88	337.00	3,699.75	18.25	18.27	-18.05	0.47	0.00	-31.04
3,794.00	0.70	312.83	3,793.74	19.31	17.57	-19.11	0.40	-0.19	-25.71
3,889.00	0.88	338.93	3,888.73	20.38	16.88	-20.20	0.42	0.19	27.47
3,983.00	0.79	296.04	3,982.72	21.34	16.04	-21.16	0.66	-0.10	-45.63
4,077.00	0.88	296.66	4,076.71	21.95	14.81	-21.79	0.10	0.10	0.66
4,172.00	0.44	272.05	4,171.71	22.29	13.80	-22.14	0.54	-0.46	-25.91
4,266.00	0.35	279.25	4,265.71	22.35	13.15	-22.20	0.11	-0.10	7.66
4,360.00	0.53	248.67	4,359.70	22.23	12.47	-22.10	0.31	0.19	-32.53
4,455.00	0.35	269.85	4,454.70	22.07	11.77	-21.95	0.25	-0.19	22.29
4,549.00	0.53	303.51	4,548.70	22.31	11.12	-22.19	0.33	0.19	35.81
4,644.00	0.44	353.43	4,643.69	22.92	10.71	-22.80	0.44	-0.09	52.55
4,738.00	0.44	344.56	4,737.69	23.62	10.57	-23.51	0.07	0.00	-9.44
4,832.00	1.14	330.76	4,831.68	24.79	10.02	-24.68	0.77	0.74	-14.68
4,927.00	1.23	338.14	4,926.66	26.56	9.18	-26.46	0.19	0.09	7.77
5,025.00	1.06	338.67	5,024.64	28.38	8.46	-28.29	0.17	-0.17	0.54
5,116.00	1.14	330.49	5,115.63	29.95	7.70	-29.87	0.19	0.09	-8.99
5,210.00	0.62	203.76	5,209.62	30.30	7.04	-30.22	1.69	-0.55	-134.82
5,305.00	0.62	203.76	5,304.61	29.36	6.62	-29.29	0.00	0.00	0.00
5,399.00	0.79	214.92	5,398.61	28.36	6.05	-28.30	0.23	0.18	11.87
5,493.00	0.53	200.59	5,492.60	27.42	5.52	-27.36	0.33	-0.28	-15.24
5,587.00	0.70	230.47	5,586.60	26.65	4.93	-26.60	0.38	0.18	31.79
5,682.00	0.53	202.09	5,681.59	25.88	4.32	-25.83	0.36	-0.18	-29.87
5,776.00	0.44	246.56	5,775.59	25.33	3.82	-25.29	0.40	-0.10	47.31
5,870.00	0.44	240.14	5,869.58	25.01	3.18	-24.97	0.05	0.00	-6.83
5,964.00	0.53	230.83	5,963.58	24.55	2.53	-24.52	0.13	0.10	-9.90
6,059.00	0.18	205.95	6,058.58	24.14	2.12	-24.12	0.39	-0.37	-26.19
6,153.00	0.44	243.92	6,152.58	23.85	1.73	-23.83	0.34	0.28	40.39
6,248.00	0.35	262.38	6,247.58	23.65	1.12	-23.64	0.16	-0.09	19.43
6,342.00	0.44	237.42	6,341.57	23.42	0.53	-23.41	0.20	0.10	-26.55
6,436.00	0.44	255.52	6,435.57	23.13	-0.13	-23.13	0.15	0.00	19.26
6,531.00	0.35	213.07	6,530.57	22.80	-0.64	-22.80	0.31	-0.09	-44.68
6,625.00	0.09	203.58	6,624.57	22.49	-0.82	-22.50	0.28	-0.28	-10.10

Survey Report

Company: Manzano, LLC
 Project: Lea County, NM (NAD 83)
 Site: Vindicator 15 State 1H
 Well: Vindicator 15 ST 1H
 Wellbore: Wellbore #1
 Design: Wellbore #1

Local Co-ordinate Reference: Well Vindicator 15 ST 1H
 TVD Reference: GL 3853' + 20' RKB @ 3873.00ft
 MD Reference: GL 3853' + 20' RKB @ 3873.00ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: EDM

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,720.00	0.35	188.55	6,719.57	22.13	-0.90	-22.14	0.28	0.27	-15.82
6,814.00	0.18	172.73	6,813.57	21.70	-0.92	-21.71	0.20	-0.18	-16.83
6,909.00	0.18	200.15	6,908.57	21.42	-0.95	-21.42	0.09	0.00	28.86
7,003.00	0.35	264.75	7,002.56	21.25	-1.29	-21.26	0.34	0.18	68.72
7,097.00	0.35	308.52	7,096.56	21.40	-1.80	-21.42	0.28	0.00	46.56
7,192.00	0.35	312.83	7,191.56	21.78	-2.24	-21.80	0.03	0.00	4.54
7,286.00	0.44	287.08	7,285.56	22.08	-2.80	-22.11	0.21	0.10	-27.39
7,380.00	0.44	309.22	7,379.56	22.42	-3.42	-22.45	0.18	0.00	23.55
7,475.00	0.26	272.13	7,474.55	22.66	-3.92	-22.70	0.30	-0.19	-39.04
7,569.00	0.53	305.09	7,568.55	22.91	-4.49	-22.96	0.36	0.29	35.06
7,663.00	0.62	285.67	7,662.55	23.30	-5.33	-23.36	0.23	0.10	-20.66
7,758.00	0.62	301.40	7,757.54	23.71	-6.27	-23.77	0.18	0.00	16.56
7,852.00	0.35	158.49	7,851.54	23.71	-6.60	-23.78	0.98	-0.29	-152.03
7,947.00	0.53	118.33	7,946.54	23.23	-6.10	-23.29	0.36	0.19	-42.27
8,041.00	0.53	148.91	8,040.53	22.65	-5.50	-22.71	0.30	0.00	32.53
8,136.00	0.70	134.94	8,135.53	21.86	-4.86	-21.91	0.24	0.18	-14.71
8,230.00	0.44	142.58	8,229.52	21.17	-4.23	-21.21	0.29	-0.28	8.13
8,324.00	0.35	67.09	8,323.52	20.99	-3.75	-21.03	0.52	-0.10	-80.31
8,419.00	0.18	93.89	8,418.52	21.10	-3.33	-21.13	0.22	-0.18	28.21
8,514.00	0.09	29.29	8,513.52	21.15	-3.15	-21.19	0.17	-0.09	-68.00
8,608.00	0.26	1.08	8,607.52	21.43	-3.11	-21.46	0.20	0.18	-30.01
8,702.00	0.35	353.26	8,701.52	21.93	-3.14	-21.96	0.11	0.10	-8.32
8,797.00	0.26	307.47	8,796.52	22.35	-3.34	-22.38	0.26	-0.09	-48.20
8,890.00	0.18	335.94	8,889.52	22.61	-3.57	-22.65	0.14	-0.09	30.61
8,984.00	0.79	294.37	8,983.51	23.01	-4.22	-23.06	0.71	0.65	-44.22
9,079.00	1.23	286.02	9,078.50	23.56	-5.80	-23.62	0.49	0.46	-8.79
9,173.00	1.32	277.76	9,172.48	23.99	-7.84	-24.07	0.22	0.10	-8.79
9,268.00	1.41	272.93	9,267.45	24.20	-10.09	-24.30	0.15	0.09	-5.08
9,362.00	1.23	297.10	9,361.42	24.71	-12.14	-24.84	0.62	-0.19	25.71
9,456.00	0.44	339.99	9,455.41	25.51	-13.16	-25.65	1.02	-0.84	45.63
9,551.00	1.23	327.68	9,550.40	26.72	-13.83	-26.87	0.85	0.83	-12.96
9,645.00	2.29	321.97	9,644.36	29.05	-15.53	-29.22	1.14	1.13	-6.07
9,740.00	2.37	313.36	9,739.28	31.89	-18.13	-32.09	0.38	0.08	-9.06
9,834.00	3.08	309.75	9,833.17	34.84	-21.48	-35.07	0.78	0.76	-3.84
9,928.00	2.55	324.87	9,927.06	38.17	-24.63	-38.43	0.97	-0.56	16.09
10,023.00	2.73	345.96	10,021.96	42.09	-26.39	-42.37	1.03	0.19	22.20
10,117.00	2.46	356.51	10,115.87	46.28	-27.06	-46.57	0.58	-0.29	11.22
10,211.00	0.44	82.55	10,209.84	48.34	-26.82	-48.62	2.63	-2.15	91.53
10,305.00	1.14	148.82	10,303.83	47.58	-25.98	-47.86	1.11	0.74	70.50
10,400.00	1.23	149.09	10,398.81	45.90	-24.97	-46.17	0.09	0.09	0.28
10,494.00	0.97	166.14	10,492.79	44.26	-24.26	-44.52	0.44	-0.28	18.14
10,588.00	0.62	160.78	10,586.78	43.01	-23.90	-43.27	0.38	-0.37	-5.70
10,681.00	0.62	140.12	10,679.78	42.15	-23.41	-42.40	0.24	0.00	-22.22
10,775.00	0.88	127.99	10,773.77	41.31	-22.52	-41.55	0.32	0.28	-12.90

Survey Report

Company:	Manzano, LLC	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Project:	Lea County, NM (NAD 83)	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Well:	Vindicator 15 ST 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
10,870.00	0.88	135.46	10,868.76	40.34	-21.43	-40.57	0.12	0.00	7.86
10,964.00	0.79	118.59	10,962.75	39.52	-20.36	-39.74	0.28	-0.10	-17.95
11,059.00	0.70	173.26	11,057.74	38.63	-19.71	-38.84	0.73	-0.09	57.55
11,153.00	0.79	183.01	11,151.73	37.41	-19.68	-37.62	0.17	0.10	10.37
11,247.00	0.70	155.33	11,245.72	36.24	-19.47	-36.45	0.39	-0.10	-29.45
11,341.00	0.97	164.21	11,339.71	34.96	-19.02	-35.16	0.32	0.29	9.45
11,445.00	2.11	144.78	11,443.68	32.55	-17.67	-32.73	1.19	1.10	-18.68
11,540.00	1.93	143.29	11,538.62	29.83	-15.71	-30.00	0.20	-0.19	-1.57
11,601.00	3.52	149.97	11,599.55	27.39	-14.16	-27.54	2.65	2.61	10.95
11,632.00	5.63	155.86	11,630.45	25.18	-13.06	-25.32	6.96	6.81	19.00
11,664.00	8.18	158.40	11,662.21	21.63	-11.58	-21.75	8.02	7.97	7.94
11,695.00	10.90	163.41	11,692.78	16.77	-9.93	-16.87	9.17	8.77	16.16
11,727.00	13.01	168.86	11,724.08	10.33	-8.37	-10.42	7.47	6.59	17.03
11,758.00	15.12	172.03	11,754.15	2.90	-7.14	-2.98	7.24	6.81	10.23
11,789.00	17.32	172.91	11,783.92	-5.68	-6.00	5.61	7.14	7.10	2.84
11,820.00	19.43	173.52	11,813.34	-15.38	-4.85	15.33	6.83	6.81	1.97
11,852.00	21.72	174.84	11,843.29	-26.57	-3.72	26.53	7.30	7.16	4.13
11,883.00	24.45	174.40	11,871.81	-38.67	-2.58	38.64	8.82	8.81	-1.42
11,914.00	27.35	175.63	11,899.69	-52.16	-1.41	52.14	9.51	9.35	3.97
11,946.00	30.69	178.18	11,927.67	-67.66	-0.59	67.65	11.13	10.44	7.97
11,977.00	33.68	179.85	11,953.91	-84.16	-0.32	84.15	10.06	9.65	5.39
12,009.00	36.23	181.87	11,980.13	-102.49	-0.60	102.48	8.75	7.97	6.31
12,040.00	39.39	183.19	12,004.62	-121.47	-1.45	121.45	10.52	10.19	4.26
12,107.00	45.29	183.01	12,054.12	-166.51	-3.88	166.46	8.81	8.81	-0.27
12,140.00	50.39	181.87	12,076.26	-190.94	-4.91	190.88	15.66	15.45	-3.45
12,171.00	54.61	180.46	12,095.13	-215.53	-5.41	215.46	14.08	13.61	-4.55
12,203.00	60.32	178.80	12,112.34	-242.49	-5.22	242.42	18.37	17.84	-5.19
12,234.00	67.36	177.56	12,126.00	-270.28	-4.33	270.22	22.99	22.71	-4.00
12,264.00	73.78	177.04	12,135.97	-298.53	-2.99	298.48	21.46	21.40	-1.73
12,296.00	79.05	176.95	12,143.48	-329.58	-1.36	329.55	16.47	16.47	-0.28
12,328.00	82.57	177.30	12,148.59	-361.12	0.22	361.11	11.05	11.00	1.09
12,359.00	84.50	177.83	12,152.08	-391.90	1.53	391.89	6.45	6.23	1.71
12,391.00	85.47	178.09	12,154.88	-423.75	2.67	423.76	3.14	3.03	0.81
12,423.00	85.67	177.92	12,157.35	-455.64	3.78	455.65	0.82	0.63	-0.53
12,455.00	88.81	178.71	12,158.89	-487.58	4.72	487.61	10.12	9.81	2.47
12,518.00	91.01	178.36	12,158.99	-550.56	6.33	550.60	3.54	3.49	-0.56
12,613.00	90.48	179.50	12,157.76	-645.53	8.10	645.58	1.32	-0.56	1.20
12,708.00	90.66	178.97	12,156.81	-740.52	9.37	740.58	0.59	0.19	-0.56
12,803.00	89.69	180.11	12,156.52	-835.51	10.13	835.57	1.58	-1.02	1.20
12,898.00	90.40	179.41	12,156.45	-930.51	10.53	930.57	1.05	0.75	-0.74
12,993.00	90.84	178.00	12,155.42	-1,025.48	12.68	1,025.56	1.55	0.46	-1.48
13,088.00	90.57	178.97	12,154.25	-1,120.44	15.19	1,120.54	1.06	-0.28	1.02
13,183.00	92.24	180.82	12,151.92	-1,215.40	15.36	1,215.50	2.62	1.76	1.95

Survey Report

Company:	Manzano, LLC	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Project:	Lea County, NM (NAD 83)	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Well:	Vindicator 15 ST 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
13,278.00	92.33	181.96	12,148.13	-1,310.30	13.06	1,310.36	1.20	0.09	1.20
13,373.00	91.80	180.90	12,144.71	-1,405.20	10.69	1,405.24	1.25	-0.56	-1.12
13,468.00	90.75	180.64	12,142.60	-1,500.17	9.41	1,500.18	1.14	-1.11	-0.27
13,563.00	90.92	179.06	12,141.21	-1,595.16	9.66	1,595.17	1.67	0.18	-1.66
13,658.00	90.66	180.03	12,139.90	-1,690.14	10.42	1,690.16	1.06	-0.27	1.02
13,753.00	91.71	179.32	12,137.94	-1,785.12	10.95	1,785.13	1.33	1.11	-0.75
13,848.00	87.85	178.62	12,138.30	-1,880.08	12.66	1,880.11	4.13	-4.06	-0.74
13,943.00	87.85	178.53	12,141.87	-1,974.99	15.02	1,975.04	0.09	0.00	-0.09
14,038.00	89.96	177.30	12,143.68	-2,069.90	18.48	2,069.98	2.57	2.22	-1.29
14,133.00	90.66	178.44	12,143.17	-2,164.83	22.01	2,164.94	1.41	0.74	1.20
14,228.00	92.07	180.03	12,140.90	-2,259.79	23.28	2,259.91	2.24	1.48	1.67
14,323.00	92.51	181.17	12,137.11	-2,354.71	22.28	2,354.81	1.29	0.46	1.20
14,418.00	91.10	180.46	12,134.12	-2,449.65	20.93	2,449.73	1.66	-1.48	-0.75
14,513.00	90.75	178.62	12,132.58	-2,544.63	21.70	2,544.71	1.97	-0.37	-1.94
14,608.00	90.84	179.06	12,131.26	-2,639.60	23.62	2,639.70	0.47	0.09	0.46
14,703.00	91.89	179.94	12,129.00	-2,734.57	24.45	2,734.67	1.44	1.11	0.93
14,797.00	92.95	180.82	12,125.03	-2,828.48	23.83	2,828.57	1.47	1.13	0.94
14,892.00	92.42	180.29	12,120.58	-2,923.37	22.91	2,923.45	0.79	-0.56	-0.56
14,987.00	91.19	179.76	12,117.59	-3,018.32	22.87	3,018.39	1.41	-1.29	-0.56
15,082.00	88.90	179.67	12,117.51	-3,113.31	23.34	3,113.38	2.41	-2.41	-0.09
15,177.00	89.08	180.29	12,119.19	-3,208.30	23.37	3,208.36	0.68	0.19	0.65
15,272.00	91.89	180.46	12,118.39	-3,303.28	22.75	3,303.34	2.96	2.96	0.18
15,367.00	92.77	181.26	12,114.52	-3,398.19	21.32	3,398.22	1.25	0.93	0.84
15,462.00	91.28	181.26	12,111.17	-3,493.11	19.24	3,493.11	1.57	-1.57	0.00
15,557.00	89.96	180.82	12,110.14	-3,588.08	17.51	3,588.06	1.46	-1.39	-0.46
15,652.00	88.81	178.80	12,111.16	-3,683.07	17.83	3,683.05	2.45	-1.21	-2.13
15,747.00	89.34	177.21	12,112.69	-3,778.00	21.13	3,778.00	1.76	0.56	-1.67
15,842.00	90.48	178.18	12,112.84	-3,872.92	24.96	3,872.96	1.58	1.20	1.02
15,937.00	91.19	179.67	12,111.46	-3,967.89	26.74	3,967.94	1.74	0.75	1.57
16,032.00	90.22	179.67	12,110.29	-4,062.88	27.28	4,062.93	1.02	-1.02	0.00
16,127.00	90.84	179.67	12,109.41	-4,157.87	27.83	4,157.93	0.65	0.65	0.00
16,222.00	91.63	180.03	12,107.36	-4,252.85	28.08	4,252.90	0.91	0.83	0.38
16,317.00	89.16	178.44	12,106.71	-4,347.83	29.35	4,347.89	3.09	-2.60	-1.67
16,412.00	87.67	178.97	12,109.33	-4,442.76	31.50	4,442.84	1.66	-1.57	0.56
16,507.00	91.10	179.94	12,110.35	-4,537.74	32.40	4,537.82	3.75	3.61	1.02
16,602.00	91.45	181.26	12,108.24	-4,632.71	31.40	4,632.78	1.44	0.37	1.39
16,697.00	91.01	180.20	12,106.20	-4,727.68	30.19	4,727.73	1.21	-0.46	-1.12
16,793.00	90.84	179.41	12,104.65	-4,823.66	30.52	4,823.71	0.84	-0.18	-0.82
16,888.00	90.84	178.71	12,103.26	-4,918.64	32.08	4,918.70	0.74	0.00	-0.74
16,983.00	92.07	178.09	12,100.85	-5,013.57	34.73	5,013.65	1.45	1.29	-0.65
17,039.00	91.71	177.83	12,099.00	-5,069.50	36.72	5,069.60	0.79	-0.64	-0.46
17039'MD: Final DrilTech MWD									
17,072.54	91.71	177.83	12,098.00	-5,103.00	37.99	5,103.12	0.00	0.00	0.00
17073'MD: 100' FSL Crossing									

Survey Report

Company:	Manzano, LLC	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Project:	Lea County, NM (NAD 83)	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Well:	Vindicator 15 ST 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
17,091.00	91.71	177.83	12,097.45	-5,121.44	38.69	5,121.56	0.00	0.00	0.00
17091'MD: Projection to Total Depth - BHL - 2280' FWL - 73' FSL Section 15									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,068.00	2,067.83	10.52	19.27	2068'MD: Tie into INVICTUS surveys
2,126.00	2,125.83	10.97	19.70	2126'MD: Begin DriTech MWD
17,039.00	12,099.00	-5,069.50	36.72	17039'MD: Final DriTech MWD
17,072.54	12,098.00	-5,103.00	37.99	17073'MD: 100' FSL Crossing
17,091.00	12,097.45	-5,121.44	38.69	17091'MD: Projection to Total Depth
17,091.00	12,097.45	-5,121.44	38.69	BHL - 2280' FWL - 73' FSL Section 15

Checked By: _____	Approved By: _____	Date: _____
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Manzano, LLC

Lea County, NM (NAD 83)

Vindicator 15 State 1H

Vindicator 15 ST 1H

Wellbore #1

Survey: DrillTech MWD

Survey Report - Geographic

07 January, 2020

Survey Report - Geographic

Company:	Manzano, LLC	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Project:	Lea County, NM (NAD 83)	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Well:	Vindicator 15 ST 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM

Project	Lea County, NM (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Vindicator 15 State 1H				
Site Position:		Northing:	671,489.80 usft	Latitude:	32° 50' 31.329 N
From:	Map	Easting:	845,323.60 usft	Longitude:	103° 20' 36.828 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.54 °

Well	Vindicator 15 ST 1H					
Well Position	+N/-S	0.00 ft	Northing:	671,489.80 usf	Latitude:	32° 50' 31.329 N
	+E/-W	0.00 ft	Easting:	845,323.60 usf	Longitude:	103° 20' 36.828 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,853.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2015	12/5/2019	6.62	60.63	48,068.37396895

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	179.38	

Survey Program	Date 1/7/2020			
From	To	Survey (Wellbore)	Tool Name	Description
(ft)	(ft)			
141.00	2,068.00	Invictus Surveys (Wellbore #1)	MWD	MWD - Standard
2,126.00	17,091.00	DrilTech MWD (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured	Depth	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude
	(ft)	(°)	(°)	Depth	(ft)	(ft)	Northing	Easting		
				(ft)			(usft)	(usft)		
	2,068.00	0.90	59.08	2,067.83	10.52	19.27	671,500.32	845,342.86	32° 50' 31.432 N	103° 20' 36.601 W
2068'MD: Tie into INVICTUS surveys										
	2,126.00	0.44	10.40	2,125.83	10.97	19.70	671,500.77	845,343.30	32° 50' 31.436 N	103° 20' 36.596 W
2126'MD: Begin DrilTech MWD										
	2,189.00	0.62	11.80	2,188.83	11.55	19.81	671,501.34	845,343.41	32° 50' 31.442 N	103° 20' 36.595 W
	2,285.00	0.35	258.40	2,284.82	12.00	19.63	671,501.79	845,343.23	32° 50' 31.446 N	103° 20' 36.597 W
	2,379.00	0.88	249.81	2,378.82	11.69	18.67	671,501.48	845,342.27	32° 50' 31.443 N	103° 20' 36.608 W
	2,473.00	0.70	246.12	2,472.81	11.21	17.47	671,501.00	845,341.07	32° 50' 31.439 N	103° 20' 36.622 W
	2,568.00	0.44	213.34	2,567.80	10.67	16.74	671,500.46	845,340.34	32° 50' 31.433 N	103° 20' 36.631 W
	2,662.00	0.44	256.75	2,661.80	10.28	16.19	671,500.08	845,339.79	32° 50' 31.430 N	103° 20' 36.637 W
	2,756.00	0.09	33.60	2,755.80	10.26	15.88	671,500.06	845,339.48	32° 50' 31.429 N	103° 20' 36.641 W

Survey Report - Geographic

Company: Manzano, LLC
 Project: Lea County, NM (NAD 83)
 Site: Vindicator 15 State 1H
 Well: Vindicator 15 ST 1H
 Wellbore: Wellbore #1
 Design: Wellbore #1

Local Co-ordinate Reference: Well Vindicator 15 ST 1H
 TVD Reference: GL 3853' + 20' RKB @ 3873.00ft
 MD Reference: GL 3853' + 20' RKB @ 3873.00ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: EDM

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
2,851.00	0.35	333.66	2,850.80	10.58	15.79	671,500.38	845,339.39	32° 50' 31.433 N	103° 20' 36.642 W
2,945.00	0.09	72.18	2,944.80	10.86	15.73	671,500.66	845,339.33	32° 50' 31.435 N	103° 20' 36.643 W
3,039.00	0.53	24.11	3,038.80	11.28	15.98	671,501.08	845,339.58	32° 50' 31.439 N	103° 20' 36.640 W
3,134.00	0.62	33.60	3,133.79	12.11	16.44	671,501.91	845,340.04	32° 50' 31.448 N	103° 20' 36.634 W
3,228.00	0.79	38.96	3,227.79	13.04	17.13	671,502.84	845,340.73	32° 50' 31.457 N	103° 20' 36.626 W
3,322.00	0.79	31.14	3,321.78	14.10	17.87	671,503.89	845,341.47	32° 50' 31.467 N	103° 20' 36.617 W
3,417.00	0.44	29.56	3,416.77	14.98	18.39	671,504.77	845,341.99	32° 50' 31.476 N	103° 20' 36.611 W
3,512.00	0.53	348.60	3,511.77	15.72	18.49	671,505.52	845,342.09	32° 50' 31.483 N	103° 20' 36.610 W
3,606.00	0.88	6.18	3,605.76	16.87	18.48	671,506.66	845,342.08	32° 50' 31.495 N	103° 20' 36.610 W
3,700.00	0.88	337.00	3,699.75	18.25	18.27	671,508.05	845,341.87	32° 50' 31.508 N	103° 20' 36.612 W
3,794.00	0.70	312.83	3,793.74	19.31	17.57	671,509.10	845,341.17	32° 50' 31.519 N	103° 20' 36.620 W
3,889.00	0.88	338.93	3,888.73	20.38	16.88	671,510.18	845,340.48	32° 50' 31.529 N	103° 20' 36.628 W
3,983.00	0.79	296.04	3,982.72	21.34	16.04	671,511.13	845,339.64	32° 50' 31.539 N	103° 20' 36.638 W
4,077.00	0.88	296.66	4,076.71	21.95	14.81	671,511.74	845,338.41	32° 50' 31.545 N	103° 20' 36.652 W
4,172.00	0.44	272.05	4,171.71	22.29	13.80	671,512.08	845,337.40	32° 50' 31.549 N	103° 20' 36.664 W
4,266.00	0.35	279.25	4,265.71	22.35	13.15	671,512.14	845,336.75	32° 50' 31.549 N	103° 20' 36.672 W
4,360.00	0.53	248.67	4,359.70	22.23	12.47	671,512.03	845,336.06	32° 50' 31.548 N	103° 20' 36.680 W
4,455.00	0.35	269.85	4,454.70	22.07	11.77	671,511.87	845,335.36	32° 50' 31.547 N	103° 20' 36.688 W
4,549.00	0.53	303.51	4,548.70	22.31	11.12	671,512.11	845,334.71	32° 50' 31.549 N	103° 20' 36.695 W
4,644.00	0.44	353.43	4,643.69	22.92	10.71	671,512.71	845,334.31	32° 50' 31.555 N	103° 20' 36.700 W
4,738.00	0.44	344.56	4,737.69	23.62	10.57	671,513.42	845,334.17	32° 50' 31.562 N	103° 20' 36.702 W
4,832.00	1.14	330.76	4,831.68	24.79	10.02	671,514.58	845,333.62	32° 50' 31.574 N	103° 20' 36.708 W
4,927.00	1.23	338.14	4,926.66	26.56	9.18	671,516.35	845,332.78	32° 50' 31.591 N	103° 20' 36.718 W
5,025.00	1.06	338.67	5,024.64	28.38	8.46	671,518.17	845,332.05	32° 50' 31.609 N	103° 20' 36.726 W
5,116.00	1.14	330.49	5,115.63	29.95	7.70	671,519.75	845,331.30	32° 50' 31.625 N	103° 20' 36.735 W
5,210.00	0.62	203.76	5,209.62	30.30	7.04	671,520.10	845,330.64	32° 50' 31.628 N	103° 20' 36.742 W
5,305.00	0.62	203.76	5,304.61	29.36	6.62	671,519.15	845,330.22	32° 50' 31.619 N	103° 20' 36.747 W
5,399.00	0.79	214.92	5,398.61	28.36	6.05	671,518.16	845,329.65	32° 50' 31.609 N	103° 20' 36.754 W
5,493.00	0.53	200.59	5,492.60	27.42	5.52	671,517.22	845,329.12	32° 50' 31.600 N	103° 20' 36.760 W
5,587.00	0.70	230.47	5,586.60	26.65	4.93	671,516.45	845,328.53	32° 50' 31.593 N	103° 20' 36.767 W
5,682.00	0.53	202.09	5,681.59	25.88	4.32	671,515.67	845,327.91	32° 50' 31.585 N	103° 20' 36.775 W
5,776.00	0.44	246.56	5,775.59	25.33	3.82	671,515.12	845,327.42	32° 50' 31.580 N	103° 20' 36.781 W
5,870.00	0.44	240.14	5,869.58	25.01	3.18	671,514.80	845,326.78	32° 50' 31.576 N	103° 20' 36.788 W
5,964.00	0.53	230.83	5,963.58	24.55	2.53	671,514.35	845,326.13	32° 50' 31.572 N	103° 20' 36.796 W
6,059.00	0.18	205.95	6,058.58	24.14	2.12	671,513.93	845,325.72	32° 50' 31.568 N	103° 20' 36.801 W
6,153.00	0.44	243.92	6,152.58	23.85	1.73	671,513.64	845,325.33	32° 50' 31.565 N	103° 20' 36.805 W
6,248.00	0.35	262.38	6,247.58	23.65	1.12	671,513.44	845,324.72	32° 50' 31.563 N	103° 20' 36.812 W
6,342.00	0.44	237.42	6,341.57	23.42	0.53	671,513.21	845,324.13	32° 50' 31.561 N	103° 20' 36.819 W
6,436.00	0.44	255.52	6,435.57	23.13	-0.13	671,512.93	845,323.47	32° 50' 31.558 N	103° 20' 36.827 W
6,531.00	0.35	213.07	6,530.57	22.80	-0.64	671,512.59	845,322.96	32° 50' 31.555 N	103° 20' 36.833 W
6,625.00	0.09	203.58	6,624.57	22.49	-0.82	671,512.28	845,322.78	32° 50' 31.552 N	103° 20' 36.835 W
6,720.00	0.35	188.55	6,719.57	22.13	-0.90	671,511.93	845,322.70	32° 50' 31.548 N	103° 20' 36.836 W
6,814.00	0.18	172.73	6,813.57	21.70	-0.92	671,511.50	845,322.68	32° 50' 31.544 N	103° 20' 36.837 W
6,909.00	0.18	200.15	6,908.57	21.42	-0.95	671,511.21	845,322.65	32° 50' 31.541 N	103° 20' 36.837 W
7,003.00	0.35	264.75	7,002.56	21.25	-1.29	671,511.05	845,322.31	32° 50' 31.540 N	103° 20' 36.841 W
7,097.00	0.35	308.52	7,096.56	21.40	-1.80	671,511.20	845,321.80	32° 50' 31.541 N	103° 20' 36.847 W
7,192.00	0.35	312.83	7,191.56	21.78	-2.24	671,511.58	845,321.36	32° 50' 31.545 N	103° 20' 36.852 W
7,286.00	0.44	287.08	7,285.56	22.08	-2.80	671,511.88	845,320.80	32° 50' 31.548 N	103° 20' 36.858 W
7,380.00	0.44	309.22	7,379.56	22.42	-3.42	671,512.21	845,320.18	32° 50' 31.551 N	103° 20' 36.866 W
7,475.00	0.26	272.13	7,474.55	22.66	-3.92	671,512.45	845,319.68	32° 50' 31.554 N	103° 20' 36.872 W
7,569.00	0.53	305.09	7,568.55	22.91	-4.49	671,512.71	845,319.11	32° 50' 31.556 N	103° 20' 36.878 W
7,663.00	0.62	285.67	7,662.55	23.30	-5.33	671,513.10	845,318.27	32° 50' 31.560 N	103° 20' 36.888 W
7,758.00	0.62	301.40	7,757.54	23.71	-6.27	671,513.50	845,317.33	32° 50' 31.564 N	103° 20' 36.899 W
7,852.00	0.35	158.49	7,851.54	23.71	-6.60	671,513.50	845,317.00	32° 50' 31.564 N	103° 20' 36.903 W
7,947.00	0.53	118.33	7,946.54	23.23	-6.10	671,513.02	845,317.50	32° 50' 31.560 N	103° 20' 36.897 W

Survey Report - Geographic

Company: Manzano, LLC
 Project: Lea County, NM (NAD 83)
 Site: Vindicator 15 State 1H
 Well: Vindicator 15 ST 1H
 Wellbore: Wellbore #1
 Design: Wellbore #1

Local Co-ordinate Reference: Well Vindicator 15 ST 1H
 TVD Reference: GL 3853' + 20' RKB @ 3873.00ft
 MD Reference: GL 3853' + 20' RKB @ 3873.00ft
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Database: EDM

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,041.00	0.53	148.91	8,040.53	22.65	-5.50	671,512.44	845,318.10	32° 50' 31.554 N	103° 20' 36.890 W
8,136.00	0.70	134.94	8,135.53	21.86	-4.86	671,511.66	845,318.74	32° 50' 31.546 N	103° 20' 36.883 W
8,230.00	0.44	142.58	8,229.52	21.17	-4.23	671,510.96	845,319.37	32° 50' 31.539 N	103° 20' 36.875 W
8,324.00	0.35	67.09	8,323.52	20.99	-3.75	671,510.79	845,319.85	32° 50' 31.537 N	103° 20' 36.870 W
8,419.00	0.18	93.89	8,418.52	21.10	-3.33	671,510.89	845,320.27	32° 50' 31.538 N	103° 20' 36.865 W
8,514.00	0.09	29.29	8,513.52	21.15	-3.15	671,510.95	845,320.45	32° 50' 31.539 N	103° 20' 36.863 W
8,608.00	0.26	1.08	8,607.52	21.43	-3.11	671,511.23	845,320.49	32° 50' 31.542 N	103° 20' 36.862 W
8,702.00	0.35	353.26	8,701.52	21.93	-3.14	671,511.72	845,320.46	32° 50' 31.547 N	103° 20' 36.862 W
8,797.00	0.26	307.47	8,796.52	22.35	-3.34	671,512.14	845,320.26	32° 50' 31.551 N	103° 20' 36.865 W
8,890.00	0.18	335.94	8,889.52	22.61	-3.57	671,512.40	845,320.03	32° 50' 31.553 N	103° 20' 36.867 W
8,984.00	0.79	294.37	8,983.51	23.01	-4.22	671,512.81	845,319.38	32° 50' 31.557 N	103° 20' 36.875 W
9,079.00	1.23	286.02	9,078.50	23.56	-5.80	671,513.36	845,317.80	32° 50' 31.563 N	103° 20' 36.893 W
9,173.00	1.32	277.76	9,172.48	23.99	-7.84	671,513.78	845,315.76	32° 50' 31.567 N	103° 20' 36.917 W
9,268.00	1.41	272.93	9,267.45	24.20	-10.09	671,513.99	845,313.51	32° 50' 31.570 N	103° 20' 36.944 W
9,362.00	1.23	297.10	9,361.42	24.71	-12.14	671,514.51	845,311.46	32° 50' 31.575 N	103° 20' 36.968 W
9,456.00	0.44	339.99	9,455.41	25.51	-13.16	671,515.31	845,310.44	32° 50' 31.583 N	103° 20' 36.980 W
9,551.00	1.23	327.68	9,550.40	26.72	-13.83	671,516.51	845,309.77	32° 50' 31.595 N	103° 20' 36.987 W
9,645.00	2.29	321.97	9,644.36	29.05	-15.53	671,518.84	845,308.07	32° 50' 31.618 N	103° 20' 37.007 W
9,740.00	2.37	313.36	9,739.28	31.89	-18.13	671,521.69	845,305.47	32° 50' 31.647 N	103° 20' 37.037 W
9,834.00	3.08	309.75	9,833.17	34.84	-21.48	671,524.64	845,302.12	32° 50' 31.676 N	103° 20' 37.076 W
9,928.00	2.55	324.87	9,927.06	38.17	-24.63	671,527.96	845,298.97	32° 50' 31.709 N	103° 20' 37.113 W
10,023.00	2.73	345.96	10,021.96	42.09	-26.39	671,531.89	845,297.21	32° 50' 31.748 N	103° 20' 37.133 W
10,117.00	2.46	356.51	10,115.87	46.28	-27.06	671,536.07	845,296.54	32° 50' 31.790 N	103° 20' 37.140 W
10,211.00	0.44	82.55	10,209.84	48.34	-26.82	671,538.13	845,296.78	32° 50' 31.810 N	103° 20' 37.137 W
10,305.00	1.14	148.82	10,303.83	47.58	-25.98	671,537.38	845,297.62	32° 50' 31.803 N	103° 20' 37.127 W
10,400.00	1.23	149.09	10,398.81	45.90	-24.97	671,535.70	845,298.63	32° 50' 31.786 N	103° 20' 37.116 W
10,494.00	0.97	166.14	10,492.79	44.26	-24.26	671,534.06	845,299.34	32° 50' 31.769 N	103° 20' 37.108 W
10,588.00	0.62	160.78	10,586.78	43.01	-23.90	671,532.80	845,299.70	32° 50' 31.757 N	103° 20' 37.104 W
10,681.00	0.62	140.12	10,679.78	42.15	-23.41	671,531.94	845,300.19	32° 50' 31.749 N	103° 20' 37.098 W
10,775.00	0.88	127.99	10,773.77	41.31	-22.52	671,531.11	845,301.08	32° 50' 31.740 N	103° 20' 37.088 W
10,870.00	0.88	135.46	10,868.76	40.34	-21.43	671,530.14	845,302.17	32° 50' 31.730 N	103° 20' 37.075 W
10,964.00	0.79	118.59	10,962.75	39.52	-20.36	671,529.31	845,303.24	32° 50' 31.722 N	103° 20' 37.062 W
11,059.00	0.70	173.26	11,057.74	38.63	-19.71	671,528.43	845,303.89	32° 50' 31.713 N	103° 20' 37.055 W
11,153.00	0.79	183.01	11,151.73	37.41	-19.68	671,527.21	845,303.92	32° 50' 31.701 N	103° 20' 37.055 W
11,247.00	0.70	155.33	11,245.72	36.24	-19.47	671,526.04	845,304.13	32° 50' 31.690 N	103° 20' 37.052 W
11,341.00	0.97	164.21	11,339.71	34.96	-19.02	671,524.75	845,304.58	32° 50' 31.677 N	103° 20' 37.047 W
11,445.00	2.11	144.78	11,443.68	32.55	-17.67	671,522.34	845,305.93	32° 50' 31.653 N	103° 20' 37.032 W
11,540.00	1.93	143.29	11,538.62	29.83	-15.71	671,519.63	845,307.89	32° 50' 31.626 N	103° 20' 37.009 W
11,601.00	3.52	149.97	11,599.55	27.39	-14.16	671,517.18	845,309.44	32° 50' 31.602 N	103° 20' 36.991 W
11,632.00	5.63	155.86	11,630.45	25.18	-13.06	671,514.97	845,310.54	32° 50' 31.580 N	103° 20' 36.978 W
11,664.00	8.18	158.40	11,662.21	21.63	-11.58	671,511.42	845,312.02	32° 50' 31.544 N	103° 20' 36.961 W
11,695.00	10.90	163.41	11,692.78	16.77	-9.93	671,506.56	845,313.67	32° 50' 31.496 N	103° 20' 36.943 W
11,727.00	13.01	168.86	11,724.08	10.33	-8.37	671,500.13	845,315.23	32° 50' 31.432 N	103° 20' 36.925 W
11,758.00	15.12	172.03	11,754.15	2.90	-7.14	671,492.70	845,316.46	32° 50' 31.359 N	103° 20' 36.911 W
11,789.00	17.32	172.91	11,783.92	-5.68	-6.00	671,484.11	845,317.59	32° 50' 31.274 N	103° 20' 36.899 W
11,820.00	19.43	173.52	11,813.34	-15.38	-4.85	671,474.41	845,318.75	32° 50' 31.178 N	103° 20' 36.887 W
11,852.00	21.72	174.84	11,843.29	-26.57	-3.72	671,463.22	845,319.88	32° 50' 31.067 N	103° 20' 36.875 W
11,883.00	24.45	174.40	11,871.81	-38.67	-2.58	671,451.12	845,321.02	32° 50' 30.947 N	103° 20' 36.863 W
11,914.00	27.35	175.63	11,899.69	-52.16	-1.41	671,437.64	845,322.19	32° 50' 30.813 N	103° 20' 36.850 W
11,946.00	30.69	178.18	11,927.67	-67.66	-0.59	671,422.14	845,323.01	32° 50' 30.660 N	103° 20' 36.842 W
11,977.00	33.68	179.85	11,953.91	-84.16	-0.32	671,405.63	845,323.28	32° 50' 30.497 N	103° 20' 36.841 W
12,009.00	36.23	181.87	11,980.13	-102.49	-0.60	671,387.30	845,323.00	32° 50' 30.315 N	103° 20' 36.846 W
12,040.00	39.39	183.19	12,004.62	-121.47	-1.45	671,368.32	845,322.15	32° 50' 30.128 N	103° 20' 36.858 W
12,107.00	45.29	183.01	12,054.12	-166.51	-3.88	671,323.28	845,319.72	32° 50' 29.682 N	103° 20' 36.892 W
12,140.00	50.39	181.87	12,076.26	-190.94	-4.91	671,298.85	845,318.69	32° 50' 29.441 N	103° 20' 36.907 W

Survey Report - Geographic

Company: Manzano, LLC
Project: Lea County, NM (NAD 83)
Site: Vindicator 15 State 1H
Well: Vindicator 15 ST 1H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Vindicator 15 ST 1H
TVD Reference: GL 3853' + 20' RKB @ 3873.00ft
MD Reference: GL 3853' + 20' RKB @ 3873.00ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
12,171.00	54.61	180.46	12,095.13	-215.53	-5.41	671,274.27	845,318.19	32° 50' 29.198 N	103° 20' 36.915 W
12,203.00	60.32	178.80	12,112.34	-242.49	-5.22	671,247.30	845,318.38	32° 50' 28.931 N	103° 20' 36.916 W
12,234.00	67.36	177.56	12,126.00	-270.28	-4.33	671,219.51	845,319.27	32° 50' 28.656 N	103° 20' 36.909 W
12,264.00	73.78	177.04	12,135.97	-298.53	-2.99	671,191.27	845,320.61	32° 50' 28.376 N	103° 20' 36.896 W
12,296.00	79.05	176.95	12,143.48	-329.58	-1.36	671,160.22	845,322.24	32° 50' 28.069 N	103° 20' 36.880 W
12,328.00	82.57	177.30	12,148.59	-361.12	0.22	671,128.67	845,323.82	32° 50' 27.757 N	103° 20' 36.865 W
12,359.00	84.50	177.83	12,152.08	-391.90	1.53	671,097.90	845,325.13	32° 50' 27.452 N	103° 20' 36.853 W
12,391.00	85.47	178.09	12,154.88	-423.75	2.67	671,066.05	845,326.26	32° 50' 27.137 N	103° 20' 36.843 W
12,423.00	85.67	177.92	12,157.35	-455.64	3.78	671,034.17	845,327.37	32° 50' 26.821 N	103° 20' 36.834 W
12,455.00	88.81	178.71	12,158.89	-487.58	4.72	671,002.22	845,328.31	32° 50' 26.505 N	103° 20' 36.826 W
12,518.00	91.01	178.36	12,158.99	-550.56	6.33	670,939.25	845,329.92	32° 50' 25.882 N	103° 20' 36.814 W
12,613.00	90.48	179.50	12,157.76	-645.53	8.10	670,844.27	845,331.70	32° 50' 24.942 N	103° 20' 36.804 W
12,708.00	90.66	178.97	12,156.81	-740.52	9.37	670,749.29	845,332.97	32° 50' 24.002 N	103° 20' 36.800 W
12,803.00	89.69	180.11	12,156.52	-835.51	10.13	670,654.29	845,333.73	32° 50' 23.062 N	103° 20' 36.801 W
12,898.00	90.40	179.41	12,156.45	-930.51	10.53	670,559.30	845,334.13	32° 50' 22.122 N	103° 20' 36.807 W
12,993.00	90.84	178.00	12,155.42	-1,025.48	12.68	670,464.33	845,336.27	32° 50' 21.182 N	103° 20' 36.792 W
13,088.00	90.57	178.97	12,154.25	-1,120.44	15.19	670,369.37	845,338.79	32° 50' 20.243 N	103° 20' 36.773 W
13,183.00	92.24	180.82	12,151.92	-1,215.40	15.36	670,274.41	845,338.96	32° 50' 19.303 N	103° 20' 36.782 W
13,278.00	92.33	181.96	12,148.13	-1,310.30	13.06	670,179.51	845,336.66	32° 50' 18.365 N	103° 20' 36.819 W
13,373.00	91.80	180.90	12,144.71	-1,405.20	10.69	670,084.60	845,334.29	32° 50' 17.426 N	103° 20' 36.857 W
13,468.00	90.75	180.64	12,142.60	-1,500.17	9.41	669,989.64	845,333.01	32° 50' 16.486 N	103° 20' 36.883 W
13,563.00	90.92	179.06	12,141.21	-1,595.16	9.66	669,894.65	845,333.26	32° 50' 15.547 N	103° 20' 36.890 W
13,658.00	90.66	180.03	12,139.90	-1,690.14	10.42	669,799.67	845,334.02	32° 50' 14.607 N	103° 20' 36.892 W
13,753.00	91.71	179.32	12,137.94	-1,785.12	10.95	669,704.69	845,334.55	32° 50' 13.667 N	103° 20' 36.896 W
13,848.00	87.85	178.62	12,138.30	-1,880.08	12.66	669,609.72	845,336.26	32° 50' 12.727 N	103° 20' 36.886 W
13,943.00	87.85	178.53	12,141.87	-1,974.99	15.02	669,514.82	845,338.62	32° 50' 11.788 N	103° 20' 36.869 W
14,038.00	89.96	177.30	12,143.68	-2,069.90	18.48	669,419.91	845,342.08	32° 50' 10.849 N	103° 20' 36.839 W
14,133.00	90.66	178.44	12,143.17	-2,164.83	22.01	669,324.98	845,345.61	32° 50' 9.909 N	103° 20' 36.808 W
14,228.00	92.07	180.03	12,140.90	-2,259.79	23.28	669,230.02	845,346.88	32° 50' 8.970 N	103° 20' 36.803 W
14,323.00	92.51	181.17	12,137.11	-2,354.71	22.28	669,135.10	845,345.88	32° 50' 8.031 N	103° 20' 36.826 W
14,418.00	91.10	180.46	12,134.12	-2,449.65	20.93	669,040.16	845,344.53	32° 50' 7.092 N	103° 20' 36.852 W
14,513.00	90.75	178.62	12,132.58	-2,544.63	21.70	668,945.18	845,345.30	32° 50' 6.152 N	103° 20' 36.853 W
14,608.00	90.84	179.06	12,131.26	-2,639.60	23.62	668,850.21	845,347.22	32° 50' 5.212 N	103° 20' 36.841 W
14,703.00	91.89	179.94	12,129.00	-2,734.57	24.45	668,755.24	845,348.05	32° 50' 4.272 N	103° 20' 36.842 W
14,797.00	92.95	180.82	12,125.03	-2,828.48	23.83	668,661.33	845,347.42	32° 50' 3.343 N	103° 20' 36.859 W
14,892.00	92.42	180.29	12,120.58	-2,923.37	22.91	668,566.44	845,346.51	32° 50' 2.405 N	103° 20' 36.881 W
14,987.00	91.19	179.76	12,117.59	-3,018.32	22.87	668,471.49	845,346.46	32° 50' 1.465 N	103° 20' 36.892 W
15,082.00	88.90	179.67	12,117.51	-3,113.31	23.34	668,376.50	845,346.94	32° 50' 0.525 N	103° 20' 36.896 W
15,177.00	89.08	180.29	12,119.19	-3,208.30	23.37	668,281.51	845,346.97	32° 49' 59.586 N	103° 20' 36.906 W
15,272.00	91.89	180.46	12,118.39	-3,303.28	22.75	668,186.53	845,346.35	32° 49' 58.646 N	103° 20' 36.924 W
15,367.00	92.77	181.26	12,114.52	-3,398.19	21.32	668,091.62	845,344.92	32° 49' 57.707 N	103° 20' 36.951 W
15,462.00	91.28	181.26	12,111.17	-3,493.11	19.24	667,996.71	845,342.84	32° 49' 56.768 N	103° 20' 36.986 W
15,557.00	89.96	180.82	12,110.14	-3,588.08	17.51	667,901.73	845,341.11	32° 49' 55.829 N	103° 20' 37.017 W
15,652.00	88.81	178.80	12,111.16	-3,683.07	17.83	667,806.74	845,341.43	32° 49' 54.889 N	103° 20' 37.024 W
15,747.00	89.34	177.21	12,112.69	-3,778.00	21.13	667,711.82	845,344.73	32° 49' 53.949 N	103° 20' 36.995 W
15,842.00	90.48	178.18	12,112.84	-3,872.92	24.96	667,616.90	845,348.55	32° 49' 53.010 N	103° 20' 36.961 W
15,937.00	91.19	179.67	12,111.46	-3,967.89	26.74	667,521.93	845,350.34	32° 49' 52.070 N	103° 20' 36.950 W
16,032.00	90.22	179.67	12,110.29	-4,062.88	27.28	667,426.94	845,350.88	32° 49' 51.130 N	103° 20' 36.954 W
16,127.00	90.84	179.67	12,109.41	-4,157.87	27.83	667,331.94	845,351.43	32° 49' 50.190 N	103° 20' 36.958 W
16,222.00	91.63	180.03	12,107.36	-4,252.85	28.08	667,236.97	845,351.68	32° 49' 49.251 N	103° 20' 36.966 W
16,317.00	89.16	178.44	12,106.71	-4,347.83	29.35	667,141.99	845,352.95	32° 49' 48.311 N	103° 20' 36.962 W
16,412.00	87.67	178.97	12,109.33	-4,442.76	31.50	667,047.05	845,355.09	32° 49' 47.372 N	103° 20' 36.947 W
16,507.00	91.10	179.94	12,110.35	-4,537.74	32.40	666,952.08	845,356.00	32° 49' 46.432 N	103° 20' 36.947 W
16,602.00	91.45	181.26	12,108.24	-4,632.71	31.40	666,857.11	845,355.00	32° 49' 45.492 N	103° 20' 36.969 W
16,697.00	91.01	180.20	12,106.20	-4,727.68	30.19	666,762.14	845,353.79	32° 49' 44.553 N	103° 20' 36.993 W

Survey Report - Geographic

Company:	Manzano, LLC	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Project:	Lea County, NM (NAD 83)	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Well:	Vindicator 15 ST 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude Longitude		
16,793.00	90.84	179.41	12,104.65	-4,823.66	30.52	666,666.15	845,354.12	32° 49' 43.603 N	103° 20' 37.000 W	
16,888.00	90.84	178.71	12,103.26	-4,918.64	32.08	666,571.18	845,355.68	32° 49' 42.663 N	103° 20' 36.992 W	
16,983.00	92.07	178.09	12,100.85	-5,013.57	34.73	666,476.25	845,358.33	32° 49' 41.724 N	103° 20' 36.972 W	
17,039.00	91.71	177.83	12,099.00	-5,069.50	36.72	666,420.31	845,360.32	32° 49' 41.170 N	103° 20' 36.954 W	
17039'MD: Final DriTech MWD										
17,072.54	91.71	177.83	12,098.00	-5,103.00	37.99	666,386.81	845,361.59	32° 49' 40.839 N	103° 20' 36.943 W	
17073'MD: 100' FSL Crossing										
17,091.00	91.71	177.83	12,097.45	-5,121.44	38.69	666,368.37	845,362.29	32° 49' 40.656 N	103° 20' 36.937 W	
17091'MD: Projection to Total Depth - BHL - 2280' FWL - 73' FSL Section 15										

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
2,068.00	2,067.83	10.52	19.27	2068'MD: Tie into INVICTUS surveys	
2,126.00	2,125.83	10.97	19.70	2126'MD: Begin DriTech MWD	
17,039.00	12,099.00	-5,069.50	36.72	17039'MD: Final DriTech MWD	
17,072.54	12,098.00	-5,103.00	37.99	17073'MD: 100' FSL Crossing	
17,091.00	12,097.45	-5,121.44	38.69	17091'MD: Projection to Total Depth	
17,091.00	12,097.45	-5,121.44	38.69	BHL - 2280' FWL - 73' FSL Section 15	

Checked By: _____ Approved By: _____ Date: _____