



Project: Lea Co., NM (NAD 83)
Site: Sec 34-T12S-R38E
Rig: Norton #2
Well: Trinity 27 FEE #2H
Wellbore: HZ [440337]
Design: Final

HOBBS OCD

FEB - 6 2019

RECEIVED



CATHEDRAL



Total Azimuth to Grid North
+ 5.90°
Gravity = 0.9986°

Magnetic Field
Strength: 48321.9nT
Dip Angle: 60.90°
Date: 11/12/2018
Model: HDGM_FILE

TARGET LINE

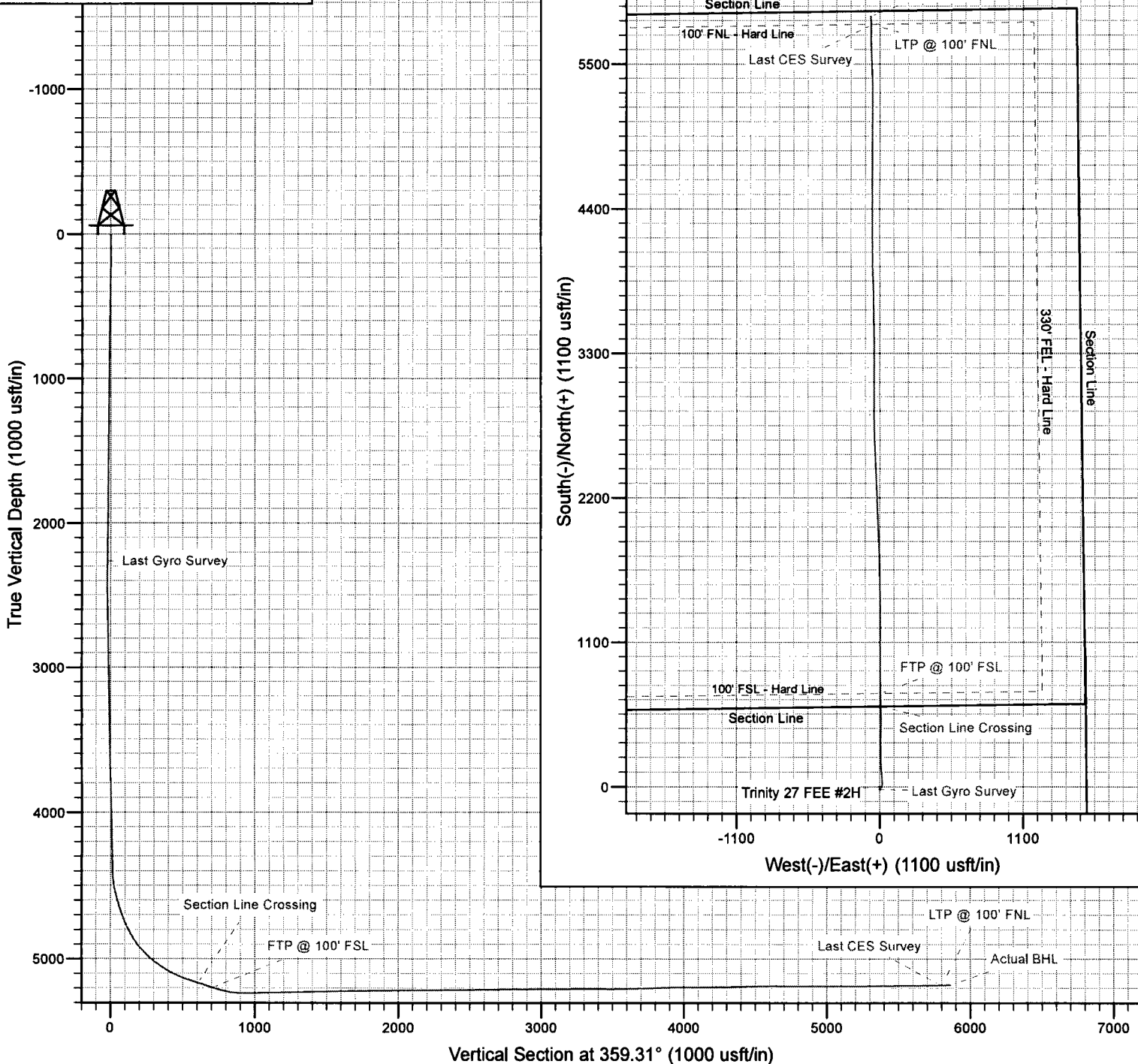
90.41° INC @ 5223' TVD @ 846.5' VS
10' Up / 10' Down
30' Left / 30' Right

Actual Bottom Hole Location
40' FNL / 1578' FEL (Sec 27)
X:924043.94 Y:823280.26

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	817417.90	924114.40	33.240739	-103.081410

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Annotation
2260.00	0.40	251.66	2259.80	-21.22	-5.94	-21.15	Last Gyro Survey
5443.00	72.87	358.49	5164.86	607.71	5.71	607.59	Section Line Crossing
5548.00	72.43	357.82	5196.45	707.79	2.44	707.71	FTP @ 100' FSL
10642.00	91.34	358.35	5180.54	5795.40	-68.53	5795.81	Last CES Survey
10648.00	91.34	358.35	5180.40	5801.40	-68.71	5801.81	LTP @ 100' FNL
10709.00	91.34	358.35	5178.97	5862.36	-70.46	5862.78	Actual BHL



Survey Report

Company:	Manzano LLC	Local Co-ordinate Reference:	Well Trinity 27 FEE #2H
Project:	Lea Co., NM (NAD 83)	TVD Reference:	15' KB @ 3820.00usft (Norton #2)
Site:	Sec 34-T12S-R38E	MD Reference:	15' KB @ 3820.00usft (Norton #2)
Well:	Trinity 27 FEE #2H	North Reference:	Grid
Wellbore:	HZ [440337]	Survey Calculation Method:	Minimum Curvature
Design:	Final	Database:	USA EDM 5000 Multi Users DB

Project	Lea Co., 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		Sec 34-T12S-R38E, 0.9986g			
Site Position:		Northing:	815,374.08 usft	Latitude:	33.235157
From:	Map	Easting:	923,086.42 usft	Longitude:	-103.084851
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.68 °

Well	Trinity 27 FEE #2H					
Well Position	+N/-S	0.00 usft	Northing:	817,417.90 usft	Latitude:	33.240739
	+E/-W	0.00 usft	Easting:	924,114.40 usft	Longitude:	-103.081410
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,805.00 usft

Wellbore	HZ [440337]				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	HDGM_FILE	11/12/2018	6.58	60.90	48,321.90000000

Design	Final			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	359.31

Survey Program	Date 11/26/2018				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
147.00	2,260.00	Gyro Surveys (HZ [440337])	GyroFlex		
2,437.00	10,709.00	CES MWD (HZ [440337])	MWD+HDGM	OWSG MWD + HDGM	

Survey										
Measured	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Formations /			
Depth	Depth	(usft)	(usft)	Section	Rate	Rate	Comments			
(usft)	(usft)	(usft)	(usft)	(usft)	(°/100usf)	(°/100u)				
0.00	0.00	0.00	0.00	0.00	0.00	0.00				
147.00	0.20	43.66	147.00	0.19	0.18	0.14				
187.00	0.40	165.66	187.00	0.10	0.26	1.33				
363.00	0.80	163.66	362.99	-1.67	0.76	0.23				
454.00	1.30	167.66	453.97	-3.29	1.16	0.55				
539.00	1.00	163.66	538.96	-4.95	1.57	-0.37				
627.00	1.20	211.66	626.94	-6.47	1.30	0.23				
724.00	1.00	160.66	723.93	-8.13	1.05	-0.21				
914.00	0.80	177.66	913.90	-11.02	1.65	-0.11				
1,008.00	0.70	148.66	1,007.90	-12.17	1.98	-0.11				
1,103.00	0.30	190.66	1,102.89	-12.91	2.24	-0.42				
1,197.00	0.30	243.66	1,196.89	-13.26	1.97	0.00				

Survey Report

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Site: Sec 34-T12S-R38E
Well: Trinity 27 FEE #2H
Wellbore: HZ [440337]
Design: Final

Local Co-ordinate Reference: Well Trinity 27 FEE #2H
TVD Reference: 15' KB @ 3820.00usft (Norton #2)
MD Reference: 15' KB @ 3820.00usft (Norton #2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA EDM 5000 Multi Users DB

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
1,292.00	1.00	257.66	1,291.88	-13.54	0.94	-13.55	0.75	0.74	
1,386.00	1.10	239.66	1,385.87	-14.18	-0.64	-14.17	0.36	0.11	
1,482.00	0.90	234.66	1,481.85	-15.08	-2.05	-15.05	0.23	-0.21	
1,575.00	0.60	292.66	1,574.85	-15.31	-3.10	-15.27	0.83	-0.32	
1,671.00	1.00	211.66	1,670.84	-15.83	-4.00	-15.78	1.13	0.42	
1,764.00	0.90	196.66	1,763.83	-17.22	-4.64	-17.16	0.29	-0.11	
1,859.00	0.40	205.66	1,858.82	-18.24	-4.99	-18.17	0.54	-0.53	
1,954.00	0.90	192.66	1,953.81	-19.26	-5.30	-19.20	0.55	0.53	
2,048.00	0.50	203.66	2,047.81	-20.36	-5.63	-20.29	0.45	-0.43	
2,143.00	0.10	201.66	2,142.81	-20.81	-5.83	-20.74	0.42	-0.42	
2,240.00	0.30	183.66	2,239.81	-21.15	-5.87	-21.07	0.21	0.21	
2,260.00	0.40	251.66	2,259.80	-21.22	-5.94	-21.15	2.00	0.50	Last Gyro Survey
2,437.00	0.57	264.92	2,436.80	-21.49	-7.41	-21.40	0.11	0.10	
2,531.00	0.62	9.69	2,530.80	-21.03	-7.79	-20.94	1.00	0.05	
2,626.00	1.23	28.59	2,625.78	-19.63	-7.21	-19.54	0.71	0.64	
2,721.00	1.54	42.30	2,720.76	-17.79	-5.86	-17.72	0.48	0.33	
2,815.00	1.49	43.79	2,814.72	-15.98	-4.17	-15.92	0.07	-0.05	
2,909.00	1.19	44.67	2,908.70	-14.40	-2.64	-14.37	0.32	-0.32	
3,004.00	1.45	17.78	3,003.67	-12.55	-1.58	-12.53	0.70	0.27	
3,098.00	1.41	14.35	3,097.64	-10.30	-0.93	-10.29	0.10	-0.04	
3,193.00	0.70	22.08	3,192.63	-8.63	-0.42	-8.62	0.76	-0.75	
3,287.00	1.14	44.49	3,286.61	-7.43	0.45	-7.44	0.60	0.47	
3,381.00	1.54	67.17	3,380.59	-6.27	2.27	-6.30	0.70	0.43	
3,475.00	1.58	63.83	3,474.55	-5.21	4.60	-5.27	0.11	0.04	
3,568.00	1.54	63.57	3,567.52	-4.09	6.87	-4.17	0.04	-0.04	
3,663.00	1.98	72.53	3,662.47	-3.03	9.58	-3.14	0.54	0.46	
3,756.00	1.89	78.60	3,755.42	-2.24	12.61	-2.40	0.24	-0.10	
3,849.00	2.02	20.41	3,848.38	-0.40	14.69	-0.58	2.05	0.14	
3,944.00	1.71	18.48	3,943.33	2.51	15.72	2.32	0.33	-0.33	
4,038.00	1.80	13.03	4,037.28	5.28	16.50	5.08	0.20	0.10	
4,132.00	1.71	12.68	4,131.24	8.08	17.14	7.88	0.10	-0.10	
4,227.00	1.45	7.32	4,226.20	10.66	17.60	10.45	0.31	-0.27	
4,322.00	1.19	3.45	4,321.18	12.84	17.82	12.62	0.29	-0.27	
4,416.00	1.93	351.58	4,415.14	15.38	17.64	15.16	0.85	0.79	
4,448.00	4.62	350.53	4,447.09	17.18	17.35	16.97	8.41	8.41	
4,479.00	7.87	349.56	4,477.90	20.50	16.76	20.30	10.49	10.48	
4,510.00	10.95	351.58	4,508.48	25.50	15.95	25.31	9.99	9.94	
4,541.00	13.93	352.90	4,538.75	32.12	15.05	31.93	9.66	9.61	
4,572.00	15.60	354.31	4,568.72	39.97	14.18	39.80	5.51	5.39	
4,604.00	16.35	356.24	4,599.49	48.75	13.46	48.58	2.87	2.34	
4,636.00	16.92	357.65	4,630.15	57.89	12.97	57.73	2.18	1.78	
4,667.00	18.33	357.82	4,659.69	67.27	12.60	67.11	4.55	4.55	
4,699.00	19.96	358.44	4,689.92	77.76	12.26	77.61	5.13	5.09	
4,730.00	21.93	357.91	4,718.87	88.84	11.91	88.69	6.38	6.35	
4,762.00	23.87	357.21	4,748.35	101.27	11.37	101.13	6.12	6.06	
4,793.00	26.02	355.63	4,776.45	114.32	10.55	114.19	7.26	6.94	
4,825.00	28.18	358.44	4,804.94	128.88	9.81	128.75	7.84	6.75	
4,857.00	28.92	357.74	4,833.05	144.16	9.30	144.04	2.54	2.31	
4,888.00	32.22	357.12	4,859.74	159.91	8.59	159.79	10.69	10.65	
4,920.00	34.90	356.77	4,886.40	177.57	7.64	177.47	8.40	8.37	
4,951.00	37.71	357.38	4,911.38	195.90	6.71	195.80	9.14	9.06	
4,983.00	40.57	357.03	4,936.20	216.07	5.72	215.99	8.96	8.94	
5,015.00	44.18	358.88	4,959.83	237.62	4.96	237.54	11.93	11.28	

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
5,046.00	47.69	359.05	4,981.39	259.89	4.56	259.82	11.33	11.32	
5,078.00	49.93	359.23	5,002.46	283.97	4.20	283.89	7.01	7.00	
5,109.00	52.40	0.20	5,021.90	308.11	4.09	308.04	8.33	7.97	
5,140.00	55.34	0.28	5,040.18	333.15	4.19	333.07	9.49	9.48	
5,171.00	58.02	1.34	5,057.20	359.04	4.56	358.96	9.10	8.65	
5,203.00	60.09	1.60	5,073.66	386.48	5.27	386.39	6.51	6.47	
5,234.00	61.98	0.90	5,088.67	413.59	5.86	413.49	6.41	6.10	
5,266.00	63.74	1.52	5,103.27	442.06	6.46	441.95	5.76	5.50	
5,298.00	66.02	0.72	5,116.85	471.03	7.02	470.91	7.48	7.12	
5,329.00	68.48	0.02	5,128.84	499.61	7.21	499.49	8.20	7.94	
5,361.00	70.20	0.02	5,140.13	529.55	7.22	529.43	5.37	5.37	
5,392.00	72.92	359.05	5,149.93	558.96	6.98	558.83	9.26	8.77	
5,424.00	73.05	358.18	5,159.30	589.55	6.24	589.43	2.63	0.41	
5,443.00	72.87	358.49	5,164.86	607.71	5.71	607.59	1.81	-0.94	Section Line Crossing
5,456.00	72.75	358.70	5,168.71	620.12	5.40	620.01	1.81	-0.94	
5,488.00	72.40	358.09	5,178.29	650.64	4.55	650.54	2.12	-1.09	
5,519.00	72.35	357.82	5,187.67	680.17	3.49	680.08	0.85	-0.16	
5,548.00	72.43	357.82	5,196.45	707.79	2.44	707.71	0.29	0.29	FTP @ 100' FSL
5,550.00	72.44	357.82	5,197.05	709.69	2.37	709.61	0.29	0.29	
5,581.00	74.02	358.62	5,206.00	739.36	1.45	739.29	5.66	5.10	
5,613.00	75.60	359.41	5,214.38	770.24	0.92	770.17	5.48	4.94	
5,644.00	77.45	359.23	5,221.60	800.38	0.56	800.31	5.99	5.97	
5,675.00	80.88	359.67	5,227.43	830.82	0.27	830.76	11.15	11.06	
5,707.00	84.35	0.28	5,231.54	862.55	0.26	862.49	11.01	10.84	
5,738.00	87.56	0.02	5,233.73	893.47	0.34	893.40	10.39	10.35	
5,770.00	89.80	0.64	5,234.47	925.46	0.52	925.38	7.26	7.00	
5,832.00	90.33	0.90	5,234.40	987.45	1.35	987.36	0.95	0.85	
5,864.00	91.56	0.81	5,233.87	1,019.44	1.83	1,019.35	3.85	3.84	
5,927.00	91.60	0.55	5,232.13	1,082.41	2.58	1,082.31	0.42	0.06	
6,021.00	91.60	0.11	5,229.51	1,176.38	3.12	1,176.25	0.47	0.00	
6,116.00	91.34	359.93	5,227.07	1,271.35	3.15	1,271.22	0.33	-0.27	
6,210.00	91.74	359.85	5,224.54	1,365.31	2.97	1,365.18	0.43	0.43	
6,304.00	91.52	359.14	5,221.87	1,459.27	2.14	1,459.14	0.79	-0.23	
6,398.00	90.73	359.49	5,220.02	1,553.24	1.02	1,553.12	0.92	-0.84	
6,491.00	90.81	358.97	5,218.77	1,646.23	-0.23	1,646.11	0.57	0.09	
6,585.00	90.55	358.18	5,217.66	1,740.19	-2.57	1,740.09	0.88	-0.28	
6,679.00	90.42	357.82	5,216.86	1,834.13	-5.85	1,834.07	0.41	-0.14	
6,771.00	90.29	358.44	5,216.29	1,926.08	-8.85	1,926.04	0.69	-0.14	
6,866.00	90.29	357.38	5,215.81	2,021.01	-12.31	2,021.01	1.12	0.00	
6,959.00	90.59	357.30	5,215.10	2,113.91	-16.63	2,113.96	0.33	0.32	
7,051.00	90.77	357.38	5,214.01	2,205.80	-20.90	2,205.89	0.21	0.20	
7,145.00	90.46	356.95	5,213.00	2,299.68	-25.55	2,299.82	0.56	-0.33	
7,239.00	90.64	357.30	5,212.09	2,393.56	-30.26	2,393.75	0.42	0.19	
7,333.00	90.68	357.91	5,211.01	2,487.47	-34.19	2,487.70	0.65	0.04	
7,427.00	89.67	356.42	5,210.72	2,581.35	-38.84	2,581.63	1.91	-1.07	
7,496.00	89.89	357.47	5,210.99	2,650.25	-42.52	2,650.57	1.55	0.32	
7,590.00	90.90	358.88	5,210.34	2,744.20	-45.51	2,744.55	1.85	1.07	
7,685.00	90.73	0.37	5,208.99	2,839.18	-46.13	2,839.53	1.58	-0.18	
7,778.00	90.73	0.28	5,207.80	2,932.17	-45.60	2,932.51	0.10	0.00	
7,873.00	90.64	0.90	5,206.67	3,027.16	-44.63	3,027.48	0.66	-0.09	
7,966.00	90.42	0.55	5,205.81	3,120.15	-43.45	3,120.45	0.44	-0.24	
8,061.00	90.15	359.49	5,205.34	3,215.15	-43.42	3,215.44	1.15	-0.28	
8,155.00	89.80	359.49	5,205.38	3,309.14	-44.25	3,309.44	0.37	-0.37	

Survey Report

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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 (°/100u)	Formations / Comments
8,249.00	89.71	359.32	5,205.78	3,403.14	-45.23	3,403.44	0.20	-0.10	
8,343.00	89.98	359.14	5,206.03	3,497.13	-46.49	3,497.44	0.35	0.29	
8,437.00	91.03	358.88	5,205.20	3,591.11	-48.12	3,591.43	1.15	1.12	
8,531.00	91.25	359.23	5,203.33	3,685.08	-49.67	3,685.41	0.44	0.23	
8,626.00	91.69	358.88	5,200.90	3,780.03	-51.23	3,780.38	0.59	0.46	
8,720.00	91.87	357.47	5,197.98	3,873.94	-54.22	3,874.31	1.51	0.19	
8,814.00	91.78	358.79	5,194.98	3,967.84	-57.29	3,968.24	1.41	-0.10	
8,909.00	90.07	359.76	5,193.45	4,062.81	-58.49	4,063.22	2.07	-1.80	
9,003.00	90.43	0.28	5,193.04	4,156.81	-58.46	4,157.21	0.67	0.38	
9,097.00	90.64	359.41	5,192.16	4,250.81	-58.71	4,251.21	0.95	0.22	
9,192.00	90.73	358.88	5,191.03	4,345.79	-60.13	4,346.20	0.57	0.09	
9,285.00	91.52	0.02	5,189.20	4,438.76	-61.02	4,439.18	1.49	0.85	
9,379.00	91.52	0.11	5,186.71	4,532.73	-60.92	4,533.14	0.10	0.00	
9,474.00	89.54	0.11	5,185.83	4,627.72	-60.73	4,628.12	2.08	-2.08	
9,568.00	89.89	1.08	5,186.30	4,721.72	-59.76	4,722.09	1.10	0.37	
9,662.00	89.85	0.90	5,186.51	4,815.70	-58.13	4,816.05	0.20	-0.04	
9,757.00	90.90	1.08	5,185.89	4,910.68	-56.49	4,911.01	1.12	1.11	
9,850.00	89.14	0.28	5,185.86	5,003.67	-55.39	5,003.98	2.08	-1.89	
9,945.00	89.76	359.76	5,186.77	5,098.67	-55.36	5,098.96	0.85	0.65	
10,039.00	90.51	359.23	5,186.55	5,192.66	-56.18	5,192.96	0.98	0.80	
10,133.00	91.21	358.70	5,185.13	5,286.64	-57.88	5,286.95	0.93	0.74	
10,227.00	89.32	358.97	5,184.70	5,380.61	-59.79	5,380.94	2.03	-2.01	
10,321.00	90.07	357.47	5,185.20	5,474.56	-62.71	5,474.92	1.78	0.80	
10,415.00	91.47	358.35	5,183.94	5,568.49	-66.14	5,568.88	1.76	1.49	
10,510.00	90.24	358.53	5,182.52	5,663.44	-68.73	5,663.86	1.31	-1.29	
10,604.00	91.16	1.69	5,181.37	5,757.42	-68.55	5,757.83	3.50	0.98	
10,642.00	91.34	358.35	5,180.54	5,795.40	-68.53	5,795.81	8.80	0.47	Last CES Survey
10,648.00	91.34	358.35	5,180.40	5,801.40	-68.71	5,801.81	0.00	0.00	LTP @ 100' FNL
10,709.00	91.34	358.35	5,178.97	5,862.36	-70.46	5,862.78	0.00	0.00	Actual BHL

Survey Report

Company: Manzano LLC	Local Co-ordinate Reference: Well Trinity 27 FEE #2H
Project: Lea Co., NM (NAD 83)	TVD Reference: 15' KB @ 3820.00usft (Norton #2)
Site: Sec 34-T12S-R38E	MD Reference: 15' KB @ 3820.00usft (Norton #2)
Well: Trinity 27 FEE #2H	North Reference: Grid
Wellbore: HZ [440337]	Survey Calculation Method: Minimum Curvature
Design: Final	Database: USA EDM 5000 Multi Users DB

Targets

Target Name	Dip Angle	Dip Dir.	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
PBHL - Trinity 27 FEE #:	0.00	0.00	5,196.00	5,853.80	-74.30	823,271.70	924,040.10	33.256827	-103.081424
- actual wellpath misses target center by 17.31usft at 10700.16usft MD (5179.18 TVD, 5853.52 N, -70.21 E)									
- Point									
PBHL P2 - Trinity 27 FEI	0.00	0.00	5,187.00	5,853.80	-74.30	823,271.70	924,040.10	33.256827	-103.081424
- actual wellpath misses target center by 8.83usft at 10700.37usft MD (5179.18 TVD, 5853.73 N, -70.21 E)									
- Point									

Design Annotations

Measured	Vertical	Local Coordinates		Comment
Depth	Depth	+N-S	+E-W	
(usft)	(usft)	(usft)	(usft)	
2,260.00	2,259.80	-21.22	-5.94	Last Gyro Survey
5,443.00	5,164.86	607.71	5.71	Section Line Crossing
5,548.00	5,196.45	707.79	2.44	FTP @ 100' FSL
10,642.00	5,180.54	5,795.40	-68.53	Last CES Survey
10,648.00	5,180.40	5,801.40	-68.71	LTP @ 100' FNL
10,709.00	5,178.97	5,862.36	-70.46	Actual BHL

Checked By: _____	Approved By: _____	Date: _____
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