

MANZANO LLC

Project: Lea Co., NM
 Site: Sec 11-T14S-R38E
 Well: Dog Bar 11 Fee 2H
 Wellbore: HZ
 Design: Plan #4 (10.22.14 GD)

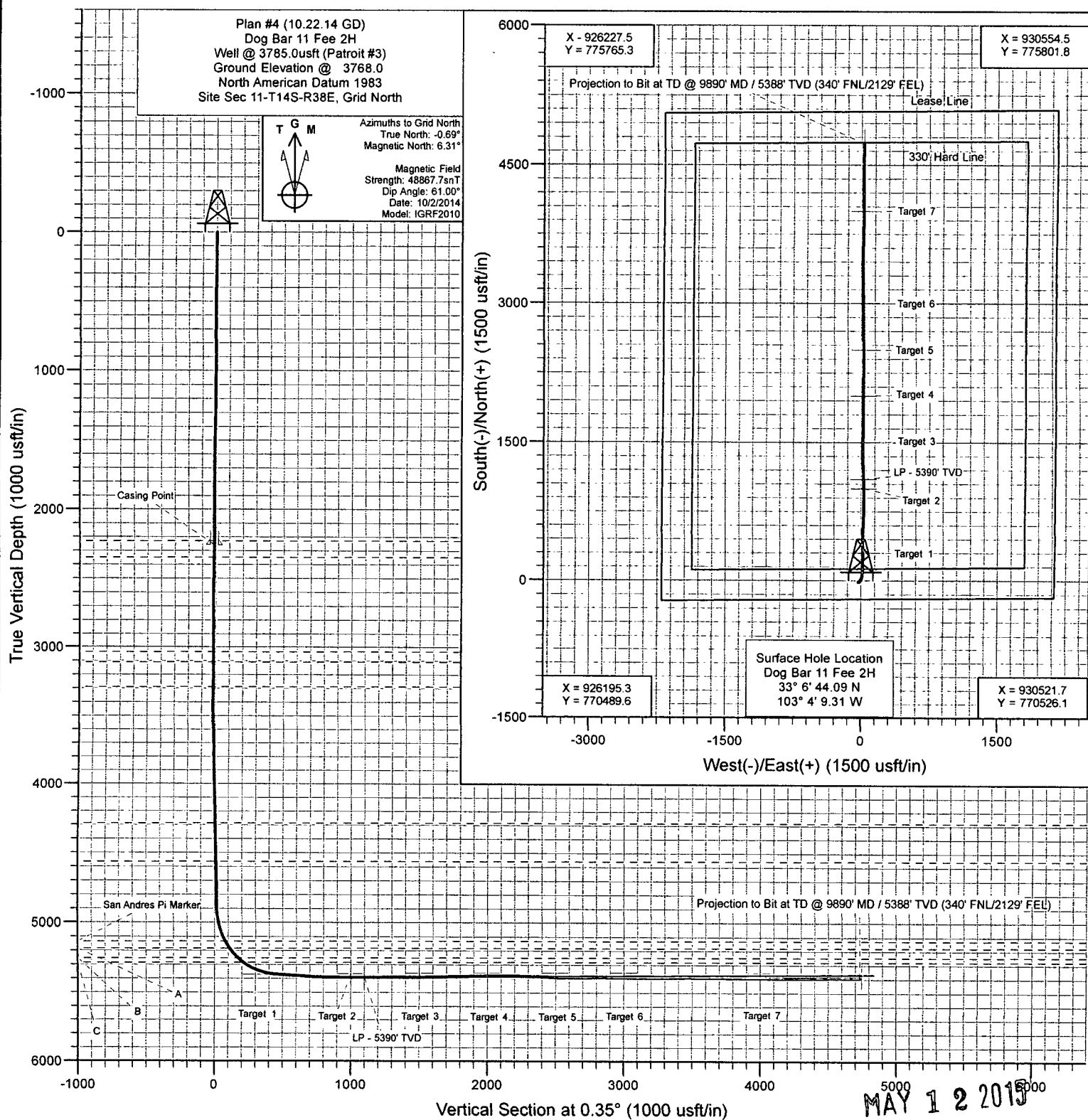


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Survey Report

Company:	Manzano LLC	Local Co-ordinate Reference:	Site Sec 11-T14S-R38E
Project:	Lea Co., NM	TVD Reference:	Well @ 3785.0usft (Patroit #3)
Site:	Sec 11-T14S-R38E	MD Reference:	Well @ 3785.0usft (Patroit #3)
Well:	Dog Bar 11 Fee 2H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	Lea Co., NM		
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 11-T14S-R38E				
Site Position:		Northing:	770,708.00 usft	Latitude:	33° 6' 44.09 N
From:	Map	Easting:	928,396.60 usft	Longitude:	103° 4' 9.31 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.69 °

Well	Dog Bar 11 Fee 2H					
Well Position	+N/-S	0.0 usft	Northing:	770,708.00 usft	Latitude:	33° 6' 44.09 N
	+E/-W	0.0 usft	Easting:	928,396.60 usft	Longitude:	103° 4' 9.31 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,768.0 usft	

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/2/2014	7.00	61.00	48,868

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.0	0.0	0.0	0.35	

Survey Program		Date	10/27/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	4,845.0	VES gyro surveys (HZ)	NS-GYRO-SS	NS Gyro single shots	
4,902.0	9,890.0	ISCWSA MWD (HZ)	ISCWSA MWD	MWD - ISCWSA	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Formations /	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Comments	
(usft)			(usft)			(usft)	(°/100usf	(°/100u		
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
100.0	0.72	280.34	100.0	0.1	-0.6	0.1	0.72	0.72		
200.0	0.75	271.07	200.0	0.2	-1.9	0.2	0.12	0.03		
300.0	0.73	253.14	300.0	0.1	-3.2	0.0	0.23	-0.02		
400.0	0.87	264.22	400.0	-0.2	-4.5	-0.2	0.21	0.14		
500.0	0.76	261.10	500.0	-0.4	-5.9	-0.4	0.12	-0.11		
600.0	0.76	241.90	600.0	-0.8	-7.2	-0.8	0.25	0.00		
700.0	0.82	243.62	699.9	-1.4	-8.4	-1.5	0.06	0.06		
800.0	0.59	211.53	799.9	-2.2	-9.3	-2.2	0.45	-0.23		
900.0	0.65	208.39	899.9	-3.1	-9.8	-3.2	0.07	0.06		
1,000.0	0.53	222.75	999.9	-4.0	-10.4	-4.0	0.19	-0.12		
1,100.0	0.54	248.76	1,099.9	-4.5	-11.2	-4.5	0.24	0.01		

Survey Report

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 Project: Lea Co., NM
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 Well: Dog Bar 11 Fee 2H
 Wellbore: HZ
 Design: FINAL

Local Co-ordinate Reference: Site Sec 11-T14S-R38E
 TVD Reference: Well @ 3785.0usft (Patroit #3)
 MD Reference: Well @ 3785.0usft (Patroit #3)
 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
1,200.0	0.73	227.05	1,199.9	-5.1	-12.1	-5.1	0.30	0.19	
1,300.0	0.62	205.53	1,299.9	-6.0	-12.8	-6.1	0.27	-0.11	
1,400.0	0.37	236.64	1,399.9	-6.7	-13.3	-6.7	0.36	-0.25	
1,500.0	0.44	252.44	1,499.9	-7.0	-13.9	-7.0	0.13	0.07	
1,600.0	0.57	248.32	1,599.9	-7.2	-14.8	-7.3	0.13	0.13	
1,700.0	0.53	197.05	1,699.9	-7.9	-15.4	-8.0	0.48	-0.04	
1,800.0	0.67	211.15	1,799.9	-8.8	-15.8	-8.9	0.20	0.14	
1,900.0	0.75	227.37	1,899.9	-9.8	-16.6	-9.9	0.22	0.08	
2,000.0	0.54	220.90	1,999.9	-10.6	-17.4	-10.7	0.22	-0.21	
2,100.0	0.54	207.02	2,099.9	-11.3	-17.9	-11.4	0.13	0.00	
2,200.0	0.68	205.01	2,199.9	-12.3	-18.4	-12.4	0.14	0.14	
2,300.0	0.80	217.85	2,299.9	-13.4	-19.0	-13.5	0.20	0.12	
2,400.0	0.81	218.72	2,399.8	-14.5	-19.9	-14.6	0.02	0.01	
2,500.0	0.86	242.55	2,499.8	-15.4	-21.0	-15.5	0.35	0.05	
2,600.0	1.08	258.46	2,599.8	-15.9	-22.6	-16.1	0.35	0.22	
2,700.0	1.07	276.51	2,699.8	-16.0	-24.5	-16.2	0.34	-0.01	
2,800.0	1.02	283.47	2,799.8	-15.7	-26.2	-15.8	0.14	-0.05	
2,900.0	0.99	287.17	2,899.8	-15.2	-27.9	-15.4	0.07	-0.03	
3,000.0	0.85	276.54	2,999.8	-14.9	-29.5	-15.1	0.22	-0.14	
3,100.0	0.66	273.07	3,099.8	-14.8	-30.8	-15.0	0.20	-0.19	
3,200.0	0.26	227.84	3,199.7	-14.9	-31.6	-15.1	0.51	-0.40	
3,300.0	0.26	157.76	3,299.7	-15.3	-31.6	-15.4	0.30	0.00	
3,400.0	0.89	57.46	3,399.7	-15.0	-30.9	-15.2	0.97	0.63	
3,500.0	1.55	53.46	3,499.7	-13.8	-29.2	-14.0	0.67	0.66	
3,600.0	2.08	44.26	3,599.7	-11.7	-26.8	-11.9	0.60	0.53	
3,700.0	2.39	49.07	3,699.6	-9.1	-24.0	-9.2	0.36	0.31	
3,800.0	2.06	38.48	3,799.5	-6.3	-21.3	-6.4	0.53	-0.33	
3,900.0	2.39	42.32	3,899.4	-3.3	-18.7	-3.4	0.36	0.33	
4,000.0	1.90	50.47	3,999.4	-0.7	-16.1	-0.8	0.58	-0.49	
4,100.0	1.95	46.19	4,099.3	1.5	-13.6	1.4	0.15	0.05	
4,200.0	2.08	53.12	4,199.3	3.8	-10.9	3.7	0.28	0.13	
4,300.0	2.14	47.71	4,299.2	6.1	-8.0	6.1	0.21	0.06	
4,400.0	1.97	43.04	4,399.1	8.6	-5.5	8.6	0.24	-0.17	
4,500.0	1.66	35.22	4,499.1	11.1	-3.5	11.0	0.40	-0.31	
4,600.0	1.67	47.80	4,599.0	13.2	-1.6	13.2	0.36	0.01	
4,700.0	1.53	34.11	4,699.0	15.3	0.3	15.3	0.41	-0.14	
4,845.0	1.17	36.64	4,844.0	18.1	2.2	18.1	0.25	-0.25	
4,902.0	0.90	31.40	4,900.9	18.9	2.8	19.0	0.50	-0.47	
4,934.0	3.20	31.20	4,932.9	19.9	3.4	19.9	7.19	7.19	
4,965.0	7.70	25.60	4,963.8	22.5	4.8	22.6	14.60	14.52	
4,997.0	11.80	19.50	4,995.3	27.6	6.8	27.6	13.20	12.81	
5,029.0	15.80	16.00	5,026.4	34.8	9.1	34.9	12.76	12.50	
5,060.0	18.50	12.70	5,056.0	43.7	11.3	43.8	9.25	8.71	
5,092.0	22.00	9.60	5,086.0	54.6	13.4	54.6	11.44	10.94	
5,124.0	26.20	8.10	5,115.2	67.5	15.4	67.6	13.26	13.12	
5,156.0	30.90	5.00	5,143.3	82.7	17.1	82.8	15.40	14.69	
5,187.0	34.70	0.90	5,169.4	99.4	18.0	99.5	14.19	12.26	
5,219.0	38.60	0.30	5,195.0	118.5	18.2	118.6	12.24	12.19	
5,250.0	41.50	0.70	5,218.8	138.5	18.3	138.6	9.39	9.35	
5,282.0	44.80	0.90	5,242.1	160.3	18.6	160.4	10.32	10.31	
5,314.0	49.10	1.10	5,264.0	183.7	19.1	183.8	13.45	13.44	
5,346.0	53.00	0.40	5,284.1	208.6	19.4	208.7	12.31	12.19	
5,377.0	57.00	359.50	5,301.8	234.0	19.4	234.1	13.12	12.90	

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Site:	Sec 11-T14S-R38E	MD Reference:	Well @ 3785.0usft (Patroit #3)
Well:	Dog Bar 11 Fee 2H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	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
5,409.0	60.90	359.20	5,318.3	261.4	19.0	261.5	12.21	12.19	
5,441.0	66.00	359.20	5,332.6	290.0	18.6	290.1	15.94	15.94	
5,472.0	70.80	358.70	5,344.1	318.8	18.1	318.9	15.56	15.48	
5,504.0	75.00	359.20	5,353.5	349.4	17.6	349.5	13.21	13.12	
5,536.0	78.70	0.40	5,360.7	380.5	17.4	380.6	12.13	11.56	
5,567.0	82.30	1.50	5,365.9	411.1	18.0	411.2	12.13	11.61	
5,631.0	86.60	2.60	5,372.0	474.7	20.2	474.9	6.93	6.72	
5,726.0	86.20	2.40	5,378.0	569.5	24.4	569.6	0.47	-0.42	
5,821.0	86.70	1.40	5,383.9	664.2	27.5	664.4	1.18	0.53	
5,916.0	87.10	1.60	5,389.0	759.1	30.0	759.2	0.47	0.42	
6,011.0	88.90	359.40	5,392.3	854.0	30.8	854.2	2.99	1.89	
6,106.0	90.50	359.00	5,392.8	949.0	29.5	949.1	1.74	1.68	
6,201.0	90.20	359.20	5,392.3	1,044.0	28.0	1,044.1	0.38	-0.32	
6,296.0	90.20	358.50	5,391.9	1,138.9	26.1	1,139.1	0.74	0.00	
6,418.0	90.00	358.70	5,391.7	1,260.9	23.1	1,261.0	0.23	-0.16	
6,513.0	89.80	358.90	5,391.9	1,355.9	21.1	1,356.0	0.30	-0.21	
6,607.0	90.30	359.20	5,391.8	1,449.9	19.6	1,450.0	0.62	0.53	
6,702.0	91.30	0.30	5,390.5	1,544.9	19.2	1,544.9	1.56	1.05	
6,797.0	91.10	1.00	5,388.5	1,639.8	20.2	1,639.9	0.77	-0.21	
6,892.0	91.50	0.00	5,386.3	1,734.8	21.1	1,734.9	1.13	0.42	
6,987.0	92.20	0.20	5,383.3	1,829.8	21.2	1,829.8	0.77	0.74	
7,082.0	90.20	359.60	5,381.3	1,924.7	21.1	1,924.8	2.20	-2.11	
7,177.0	90.50	0.20	5,380.7	2,019.7	20.9	2,019.8	0.71	0.32	
7,273.0	89.40	0.90	5,380.8	2,115.7	21.8	2,115.8	1.36	-1.15	
7,368.0	89.80	0.60	5,381.4	2,210.7	23.1	2,210.8	0.53	0.42	
7,462.0	88.50	0.40	5,382.8	2,304.7	23.9	2,304.8	1.40	-1.38	
7,557.0	88.40	0.20	5,385.4	2,399.7	24.4	2,399.8	0.24	-0.11	
7,652.0	88.30	359.80	5,388.1	2,494.6	24.4	2,494.7	0.43	-0.11	
7,747.0	89.60	0.30	5,389.9	2,589.6	24.5	2,589.7	1.47	1.37	
7,843.0	91.40	0.30	5,389.0	2,685.6	25.0	2,685.7	1.87	1.87	
7,938.0	90.30	359.00	5,387.6	2,780.6	24.4	2,780.7	1.79	-1.16	
8,033.0	89.00	359.50	5,388.2	2,875.6	23.1	2,875.6	1.47	-1.37	
8,128.0	89.10	359.40	5,389.8	2,970.5	22.2	2,970.6	0.15	0.11	
8,224.0	89.50	358.80	5,391.0	3,066.5	20.7	3,066.6	0.75	0.42	
8,318.0	90.00	359.20	5,391.4	3,160.5	19.1	3,160.6	0.68	0.53	
8,413.0	90.40	359.10	5,391.0	3,255.5	17.7	3,255.5	0.43	0.42	
8,509.0	91.30	359.80	5,389.6	3,351.5	16.7	3,351.5	1.19	0.94	
8,604.0	90.40	359.80	5,388.2	3,446.5	16.4	3,446.5	0.95	-0.95	
8,699.0	89.30	1.10	5,388.5	3,541.5	17.2	3,541.5	1.79	-1.16	
8,794.0	89.40	0.90	5,389.5	3,636.4	18.8	3,636.5	0.24	0.11	
8,889.0	90.10	1.30	5,389.9	3,731.4	20.6	3,731.5	0.85	0.74	
8,985.0	89.90	1.60	5,389.9	3,827.4	23.1	3,827.5	0.38	-0.21	
9,080.0	89.30	358.90	5,390.6	3,922.4	23.5	3,922.4	2.91	-0.63	
9,175.0	88.70	359.30	5,392.3	4,017.3	22.0	4,017.4	0.76	-0.63	
9,270.0	89.20	359.80	5,394.0	4,112.3	21.3	4,112.4	0.74	0.53	
9,366.0	90.10	359.60	5,394.6	4,208.3	20.7	4,208.4	0.96	0.94	
9,461.0	90.40	0.00	5,394.2	4,303.3	20.4	4,303.4	0.53	0.32	
9,556.0	90.40	0.20	5,393.5	4,398.3	20.6	4,398.4	0.21	0.00	
9,651.0	90.30	0.80	5,392.9	4,493.3	21.4	4,493.4	0.64	-0.11	
9,746.0	90.30	1.00	5,392.4	4,588.3	22.9	4,588.4	0.21	0.00	
9,834.0	90.20	1.50	5,392.1	4,676.3	24.8	4,676.3	0.58	-0.11	
9,890.0	90.20	1.50	5,391.9	4,732.3	26.3	4,732.3	0.00	0.00	Projection to Bit at TD @ 9890' MD / 5388' TVD (

Survey Report

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Project:	Lea Co., NM	TVD Reference:	Well @ 3785.0usft (Patroit #3)
Site:	Sec 11-T14S-R38E	MD Reference:	Well @ 3785.0usft (Patroit #3)
Well:	Dog Bar 11 Fee 2H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Target 1 - actual wellpath misses target center by 33.4usft at 5464.3usft MD (5341.4 TVD, 311.5 N, 18.3 E) - Point	0.00	0.00	5,371.0	300.0	28.6	771,008.00	928,425.20	33° 6' 47.05 N	103° 4' 8.93 W
Target 5 - actual wellpath misses target center by 30.6usft at 7656.8usft MD (5388.3 TVD, 2499.4 N, 24.4 E) - Point	0.00	0.00	5,358.0	2,500.0	28.6	773,208.00	928,425.20	33° 7' 8.82 N	103° 4' 8.62 W
PBHL - Dog Bar 11 Fee - actual wellpath misses target center by 30.2usft at 9890.0usft MD (5391.9 TVD, 4732.3 N, 26.3 E) - Point	0.00	0.00	5,365.0	4,745.9	28.6	775,453.90	928,425.20	33° 7' 31.03 N	103° 4' 8.30 W
Target 2 - actual wellpath misses target center by 26.5usft at 6157.2usft MD (5392.5 TVD, 1000.2 N, 28.7 E) - Point	0.00	0.00	5,366.0	1,000.0	28.6	771,708.00	928,425.20	33° 6' 53.98 N	103° 4' 8.83 W
LP - 5390' TVD - actual wellpath misses target center by 2.9usft at 6256.8usft MD (5392.1 TVD, 1099.8 N, 27.0 E) - Point	0.00	0.00	5,390.0	1,099.7	25.0	771,807.72	928,421.56	33° 6' 54.97 N	103° 4' 8.86 W
Target 3 - actual wellpath misses target center by 30.8usft at 6657.5usft MD (5391.3 TVD, 1500.4 N, 19.1 E) - Point	0.00	0.00	5,362.0	1,500.0	28.6	772,208.00	928,425.20	33° 6' 58.93 N	103° 4' 8.76 W
Target 7 - actual wellpath misses target center by 32.5usft at 9157.0usft MD (5391.9 TVD, 3999.3 N, 22.2 E) - Point	0.00	0.00	5,360.0	4,000.0	28.6	774,708.00	928,425.20	33° 7' 23.66 N	103° 4' 8.40 W
PBHL - Dog Bar 11 Fee - actual wellpath misses target center by 25.0usft at 9890.0usft MD (5391.9 TVD, 4732.3 N, 26.3 E) - Point	0.00	0.00	5,371.0	4,745.9	28.6	775,453.90	928,425.20	33° 7' 31.03 N	103° 4' 8.30 W
Target 4 - actual wellpath misses target center by 22.2usft at 7157.4usft MD (5380.9 TVD, 2000.1 N, 20.8 E) - Point	0.00	0.00	5,360.0	2,000.0	28.6	772,708.00	928,425.20	33° 7' 3.87 N	103° 4' 8.69 W
Target 6 - actual wellpath misses target center by 33.9usft at 8157.0usft MD (5390.2 TVD, 2999.5 N, 21.9 E) - Point	0.00	0.00	5,357.0	3,000.0	28.6	773,708.00	928,425.20	33° 7' 13.76 N	103° 4' 8.54 W

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
9,890.0	5,391.9	4,732.3	26.3	Projection to Bit at TD @ 9890' MD / 5388' TVD (340' FNL/2129' FEL)

Checked By: _____	Approved By: _____	Date: _____
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