

Results of Directional Survey

API number:	30-025-41361		
OGRID:		Operator:	CAZA OPERATING, LLC
		Property:	GRAMMA 27 STATE # 1H

surface	ULSTR:	O	27	T 21S	R 34E
				330 FSL	1980 FEL

BH Loc	ULSTR:	B	27	T 21S	R 34E
	15496 MD	11191.6	TVD	353 FNL	2330 FEL
				4927 FSL	

Top Perf/OH	ULSTR:	O	27	T 21S	R 34E
11351 MD	11172.4	TVD	817 FSL	1824 FEL	

Bot Perf/OH	ULSTR:	B	27	T 21S	R 34E
15372 MD	11193.3	TVD	476 FNL	2315 FEL	
			4804 FSL		

	MD	N/S	E/W	VD
	11346	482.29	157.27	11171.39
TOP PERFS/OH	11351	487.08	156.30	11172.44
	11378	512.95	151.06	11178.09
	15302	4404.13	-325.65	11192.51
BOT PERFS/OH	15372	4473.55	-334.60	11193.31
	15397	4498.34	-337.80	11193.59

NEXT TO LAST	15450	4550.93	-344.35	11193.08
LAST READING	15496	4596.58	-349.87	11191.63
TD	15496	4596.58	-349.87	11191.63

Surface Location	330 FS	1980 FE
Projected BHL	4927 FS	2330 FE
Location of		
Top Perfs/OH	817 FS	1824 FE
Bottom Perfs/OH	4804 FS	2315 FE

SUMMARY of Subsurface Locations

Surface Location	O-27-21S-34E	330 FS	1980 FE	Vert. Depth
Top Perfs/OH	O-27-21S-34E	817 FS	1824 FE	11172.44
Bottom Perfs/OH	B-27-21S-34E	4804 FS	2315 FE	11193.31
Projected TD	B-27-21S-34E	4927 FS	2330 FE	11191.63

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Caza Operating, LLC.

Lea County, NM (NAD27 NME)

Gamma 27 State #1H

Gamma 27 State #1H

Wellbore #2

Survey: M3P MWD Survey

Standard Survey Report

30 April, 2014

M3P
DIRECTIONAL
SERVICES

M3P Directional Services
Survey Report



Company:	Caza Operating, LLC.	Local Co-ordinate Reference:	Well Gramma 27 State #1H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB @ 3700.50ft (Patriot #1)
Site:	Gramma 27 State #1H	MD Reference:	KB @ 3700.50ft (Patriot #1)
Well:	Gramma 27 State #1H	North Reference:	Grid
Wellbore:	Wellbore #2	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patriot #1)	Database:	EDM 5000.1 Single User Db

Project	Lea County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Gramma 27 State #1H				
Site Position:		Northing:	526,158.50 ft	Latitude:	32° 26' 36.447 N
From:	Map	Easting:	770,926.00 ft	Longitude:	103° 27' 18.469 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.47 °

Well	Gramma 27 State #1H					
Well Position	+N/-S	0.00 ft	Northing:	526,158.50 ft	Latitude:	32° 26' 36.447 N
	+E/-W	0.00 ft	Easting:	770,926.00 ft	Longitude:	103° 27' 18.469 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,682.00 ft

Wellbore	Wellbore #2				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/17/2014	7.20	60.34	48,475

Design	Surveys (Patriot #1)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	10,500.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	355.61	

Survey Program	Date	4/30/2014		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.00	10,500.00	VES Gyro Survey (Wellbore #1)	MWD	MWD - Standard
10,500.00	15,496.00	M3P MWD Survey (Wellbore #2)	MWD	MWD - Standard

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)	
10,500.00	4.02	113.58	10,495.78	112.38	159.48	99.84	0.00	0.00	0.00	
Tie-on to Gyro Survey										
10,536.00	3.00	116.90	10,531.71	111.45	161.48	98.76	2.89	-2.83	9.22	
First M3P MWD Survey										
10,553.00	2.90	117.90	10,548.69	111.04	162.25	98.30	0.66	-0.59	5.88	
10,648.00	2.70	75.50	10,643.58	110.48	166.54	97.41	2.14	-0.21	-44.63	
10,680.00	3.30	47.40	10,675.54	111.29	167.95	98.11	4.90	1.88	-87.81	
10,712.00	5.10	26.90	10,707.46	113.18	169.27	99.90	7.24	5.63	-64.06	
10,744.00	8.00	20.20	10,739.24	116.54	170.69	103.14	9.36	9.06	-20.94	

M3P Directional Services

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Site:	Gamma 27 State #1H	MD Reference:	KB @ 3700.50ft (Patriot #1)
Well:	Gamma 27 State #1H	North Reference:	Grid
Wellbore:	Wellbore #2	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patriot #1)	Database:	EDM 5000.1 Single User Db

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)	
10,776.00	11.80	19.70	10,770.76	121.72	172.56	108.15	11.88	11.88	-1.56	
10,807.00	15.10	15.80	10,800.91	128.59	174.73	114.84	11.03	10.65	-12.58	
10,839.00	18.00	11.70	10,831.58	137.44	176.87	123.50	9.76	9.06	-12.81	
10,871.00	21.30	13.80	10,861.71	147.93	179.25	133.78	10.54	10.31	6.56	
10,902.00	24.90	11.00	10,890.22	159.81	181.84	145.42	12.14	11.61	-9.03	
10,934.00	28.20	9.80	10,918.84	173.88	184.42	159.25	10.45	10.31	-3.75	
10,966.00	32.70	8.20	10,946.42	189.89	186.94	175.02	14.29	14.06	-5.00	
10,998.00	35.80	6.20	10,972.87	207.76	189.18	192.66	10.31	9.69	-6.25	
11,030.00	38.30	3.30	10,998.41	226.96	190.76	211.70	9.53	7.81	-9.06	
11,061.00	41.90	0.80	11,022.12	246.91	191.46	231.53	12.72	11.61	-8.06	
11,093.00	45.30	357.90	11,045.30	268.97	191.19	253.55	12.32	10.63	-9.06	
11,125.00	48.80	355.10	11,067.10	292.34	189.75	276.96	12.67	10.94	-8.75	
11,157.00	52.90	352.60	11,087.30	317.00	187.08	301.75	14.17	12.81	-7.81	
11,188.00	56.80	350.60	11,105.14	342.07	183.36	327.03	13.64	12.58	-6.45	
11,220.00	59.20	349.80	11,122.10	368.81	178.74	354.05	7.79	7.50	-2.50	
11,252.00	62.80	349.20	11,137.61	396.32	173.64	381.87	11.37	11.25	-1.88	
11,283.00	66.70	349.00	11,150.83	423.85	168.34	409.72	12.59	12.58	-0.65	
11,315.00	70.70	349.70	11,162.45	453.14	162.83	439.35	12.66	12.50	2.19	
11,346.00	75.80	348.70	11,171.39	482.29	157.27	468.84	16.74	16.45	-3.23	
11,378.00	80.00	348.40	11,178.09	512.95	151.06	499.88	13.16	13.13	-0.94	
11,410.00	82.40	349.00	11,182.99	543.96	144.86	531.28	7.73	7.50	1.88	
11,503.00	86.10	351.60	11,192.30	635.15	129.28	623.39	4.85	3.98	2.80	
11,535.00	87.90	351.20	11,193.98	666.74	124.50	655.26	5.76	5.63	-1.25	
11,567.00	88.10	350.80	11,195.10	698.33	119.50	687.13	1.40	0.63	-1.25	
11,662.00	88.00	350.60	11,198.33	792.03	104.16	781.73	0.24	-0.11	-0.21	
11,757.00	90.40	351.50	11,199.65	885.85	89.38	876.41	2.70	2.53	0.95	
11,788.00	89.50	350.40	11,199.68	916.47	84.51	907.31	4.58	-2.90	-3.55	
11,883.00	91.40	350.60	11,198.94	1,010.16	68.83	1,001.92	2.01	2.00	0.21	
11,978.00	90.20	350.00	11,197.61	1,103.79	52.82	1,096.50	1.41	-1.26	-0.63	
12,073.00	90.70	349.10	11,196.86	1,197.21	35.59	1,190.97	1.08	0.53	-0.95	
12,168.00	90.30	351.30	11,196.03	1,290.81	19.42	1,285.54	2.35	-0.42	2.32	
12,263.00	90.70	353.90	11,195.21	1,385.01	7.19	1,380.39	2.77	0.42	2.74	
12,358.00	89.30	355.20	11,195.21	1,479.57	-1.83	1,475.37	2.01	-1.47	1.37	
12,453.00	89.30	357.10	11,196.37	1,574.35	-8.21	1,570.36	2.00	0.00	2.00	
12,548.00	88.10	355.80	11,198.52	1,669.14	-14.09	1,665.32	1.86	-1.26	-1.37	
12,611.00	87.80	355.60	11,200.77	1,731.92	-18.81	1,728.28	0.57	-0.48	-0.32	
12,675.00	89.10	354.70	11,202.51	1,795.67	-24.22	1,792.25	2.47	2.03	-1.41	
12,770.00	91.10	354.50	11,202.34	1,890.24	-33.16	1,887.23	2.12	2.11	-0.21	
12,833.00	90.10	354.10	11,201.68	1,952.92	-39.42	1,950.21	1.71	-1.59	-0.63	
12,928.00	89.90	354.20	11,201.68	2,047.43	-49.10	2,045.18	0.24	-0.21	0.11	
13,023.00	90.40	353.80	11,201.43	2,141.91	-59.03	2,140.14	0.67	0.53	-0.42	
13,118.00	90.10	353.00	11,201.02	2,236.28	-69.95	2,235.07	0.90	-0.32	-0.84	
13,213.00	89.60	352.50	11,201.27	2,330.51	-81.94	2,329.95	0.74	-0.53	-0.53	

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Well:	Gramma 27 State #1H	North Reference:	Grid
Wellbore:	Wellbore #2	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patriot #1)	Database:	EDM 5000.1 Single User Db

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)
13,308.00	89.70	352.30	11,201.85	2,424.68	-94.50	2,424.80	0.24	0.11	-0.21
13,403.00	90.50	352.40	11,201.68	2,518.83	-107.15	2,519.64	0.85	0.84	0.11
13,498.00	89.40	352.80	11,201.76	2,613.04	-119.38	2,614.51	1.23	-1.16	0.42
13,593.00	90.00	352.70	11,202.26	2,707.28	-131.37	2,709.39	0.64	0.63	-0.11
13,688.00	89.10	353.20	11,203.01	2,801.56	-143.03	2,804.28	1.08	-0.95	0.53
13,783.00	89.80	354.20	11,203.92	2,895.98	-153.46	2,899.23	1.28	0.74	1.05
13,878.00	89.40	355.00	11,204.58	2,990.55	-162.40	2,994.21	0.94	-0.42	0.84
13,973.00	89.10	356.40	11,205.83	3,085.27	-169.52	3,089.20	1.51	-0.32	1.47
14,068.00	92.20	357.60	11,204.75	3,180.12	-174.49	3,184.15	3.50	3.26	1.26
14,163.00	90.20	355.10	11,202.76	3,274.90	-180.54	3,279.11	3.37	-2.11	-2.63
14,258.00	91.30	355.30	11,201.51	3,369.55	-188.48	3,374.10	1.18	1.16	0.21
14,352.00	92.20	353.90	11,198.64	3,463.09	-197.33	3,468.03	1.77	0.96	-1.49
14,447.00	90.50	353.00	11,196.41	3,557.44	-208.16	3,562.94	2.02	-1.79	-0.95
14,542.00	90.80	351.60	11,195.33	3,651.57	-220.89	3,657.77	1.51	0.32	-1.47
14,637.00	91.50	350.60	11,193.42	3,745.41	-235.58	3,752.45	1.28	0.74	-1.05
14,732.00	89.80	351.30	11,192.34	3,839.22	-250.52	3,847.13	1.94	-1.79	0.74
14,827.00	90.00	350.60	11,192.51	3,933.03	-265.46	3,941.81	0.77	0.21	-0.74
14,922.00	90.60	352.40	11,192.01	4,026.98	-279.51	4,036.56	2.00	0.63	1.89
15,017.00	88.50	352.40	11,192.76	4,121.14	-292.07	4,131.41	2.21	-2.21	0.00
15,112.00	90.80	354.20	11,193.34	4,215.48	-303.15	4,226.32	3.07	2.42	1.89
15,207.00	90.40	353.00	11,192.34	4,309.88	-313.74	4,321.25	1.33	-0.42	-1.26
15,302.00	89.40	352.60	11,192.51	4,404.13	-325.65	4,416.14	1.13	-1.05	-0.42
15,397.00	89.30	352.70	11,193.59	4,498.34	-337.80	4,511.00	0.15	-0.11	0.11
15,450.00	91.80	353.10	11,193.08	4,550.93	-344.35	4,563.94	4.78	4.72	0.75
15,496.00	91.80	353.10	11,191.63	4,596.58	-349.87	4,609.87	0.00	0.00	0.00

Projection to TD

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,500.00	10,495.78	112.38	159.48	Tie-on to Gyro Survey
10,536.00	10,531.71	111.45	161.48	First M3P MWD Survey
15,496.00	11,191.63	4,596.58	-349.87	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

Caza Operating, LLC

Gamma 27 State #1H

Geodetic System: US State Plane 1927 (Exact solution)
 Zone: New Mexico East 3001
 System Datum: Mean Sea Level
 Reference to North: Grid
 Lat: 32° 26' 36.447 N
 Long: 103° 27' 18.469 W
 Lea County, NM (NAD27 NME)

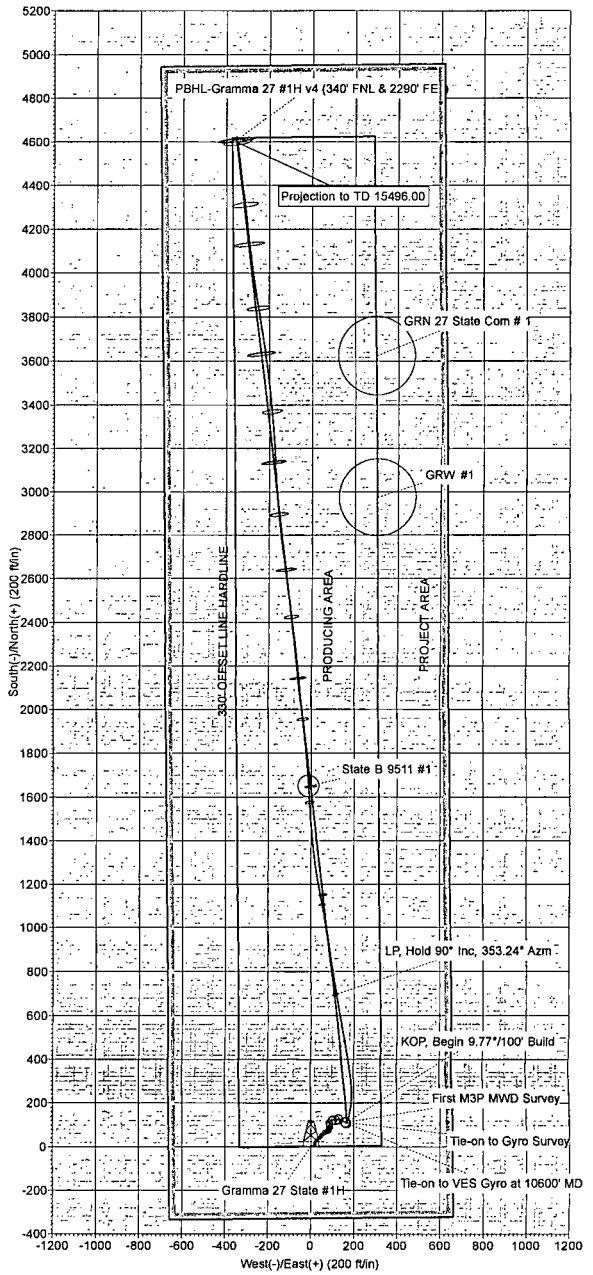
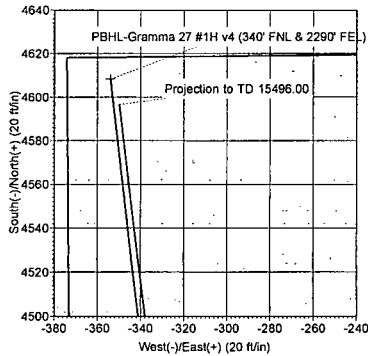
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MAY 20 2014

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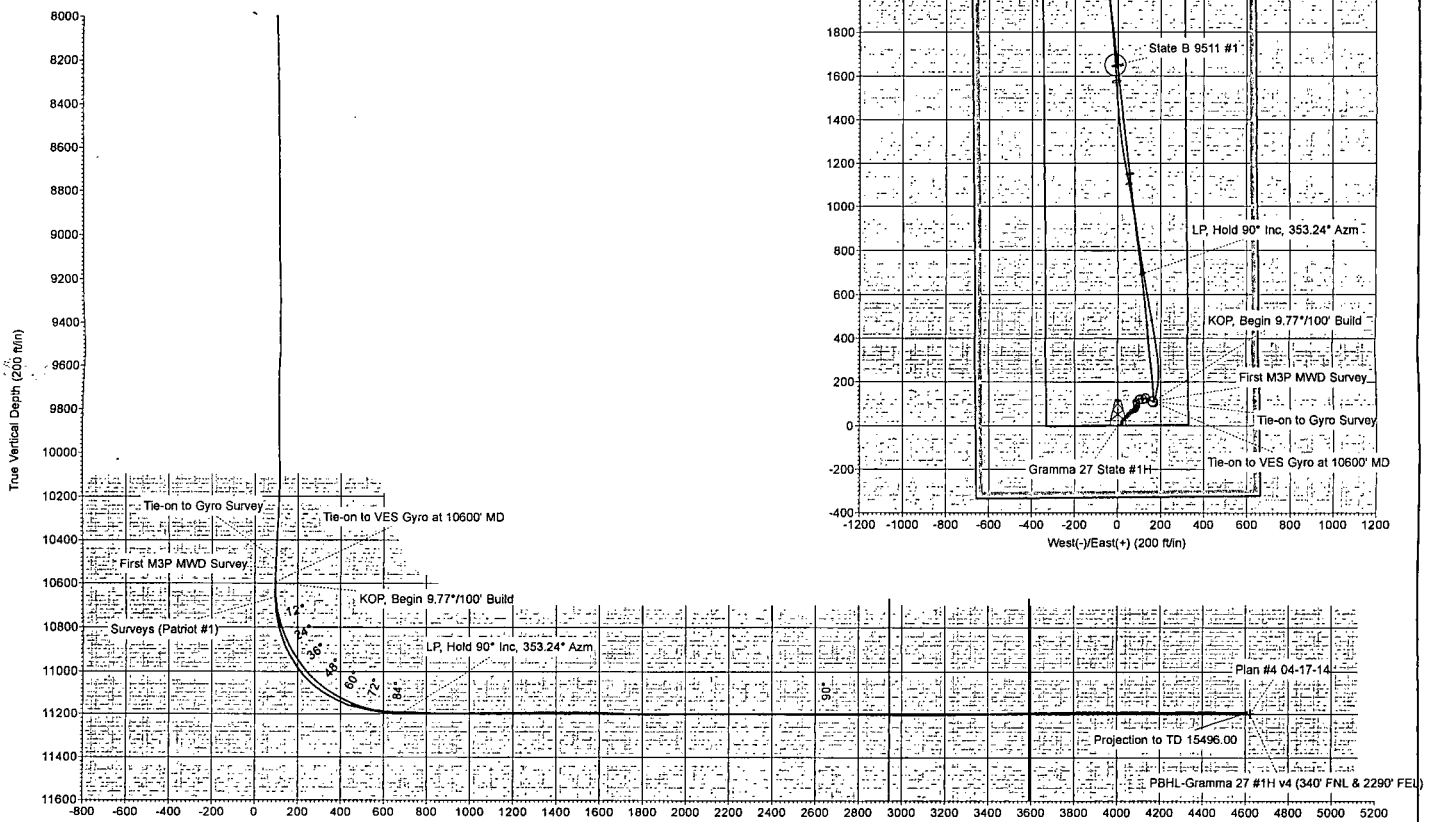


Azimuths to Grid North
 True North: -0.47°
 Magnetic North: 6.73°
 Magnetic Field
 Strength: 4847.75nT
 Dip Angle: 60.34°
 Date: 4/17/2014
 Model: IGRF2010



ANNOTATIONS		
TVD	MD	Annotation
10595.63	10600.00	Tie-on to VES Gyro at 10600' MD
10598.63	10603.00	KOP, Begin 9.77°/100' Build
11200.00	11539.16	LP, Hold 90° Inc, 353.24° Azm
11200.00	15481.27	TD at 15496.00

SECTION DETAILS							
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	Vsect Target
10600.00	2.07	129.71	10595.63	109.84	164.09	0.00	96.95
10603.00	2.04	130.42	10598.63	109.77	164.17	1.31	96.87
11539.16	90.00	353.24	11200.00	693.45	109.69	9.77	683.01
15481.27	90.00	353.24	11200.00	4608.19	-354.03	0.00	4621.77 PBHL-Gamma 27 #1H v4 (340' FNL & 2290' FEL)



Vertical Section at 355.61° (200 ft/in)