



Company: Caza Operating
Lease/Well: West Copperline 29 State Com/4H

Rig Name: Patriot 1
State/County: New Mexico/Lea
Latitude: 32.28, Longitude: -103.50
GRID North is 0.45 Degrees East of True North
VS-Azi: 0.00 Degrees



HOBBS OCD

OCT 30 2014

RECEIVED

FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = 18.5 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...9 state com 4h_gyro survey.ut

Minimum Curvature Method

Report Date/Time: 5/23/2014 / 17:30

Vaughn Energy Services
West Texas
(432) 563-5444
Gene Heiss

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.85	175.03	100.00	-0.74	0.06	-0.74	0.75	175.03	0.85
200.00	1.23	173.98	199.98	-2.55	0.24	-2.55	2.56	174.59	0.38
300.00	1.45	171.01	299.95	-4.87	0.55	-4.87	4.90	173.53	0.23
400.00	1.65	178.32	399.92	-7.56	0.79	-7.56	7.60	174.02	0.28
500.00	1.69	186.98	499.87	-10.45	0.66	-10.45	10.47	176.41	0.25
600.00	2.07	185.22	599.82	-13.71	0.31	-13.71	13.71	178.69	0.39
700.00	2.82	173.16	699.73	-17.95	0.44	-17.95	17.96	178.59	0.91
800.00	3.27	161.85	799.59	-23.11	1.62	-23.11	23.16	175.98	0.75
900.00	4.05	156.05	899.38	-29.04	3.95	-29.04	29.31	172.26	0.86
1000.00	5.59	151.06	999.03	-36.53	7.73	-36.53	37.34	168.04	1.59
1100.00	5.65	147.85	1098.55	-44.95	12.71	-44.95	46.71	164.21	0.32
1200.00	4.87	145.93	1198.13	-52.63	17.70	-52.63	55.53	161.41	0.80
1300.00	3.48	142.83	1297.86	-58.56	21.91	-58.56	62.53	159.49	1.40
1400.00	2.74	143.54	1397.71	-62.91	25.17	-62.91	67.75	158.19	0.74
1500.00	2.17	144.27	1497.62	-66.37	27.69	-66.37	71.91	157.35	0.58
1600.00	1.87	153.22	1597.56	-69.36	29.53	-69.36	75.38	156.94	0.43
1700.00	1.53	157.72	1697.51	-72.05	30.78	-72.05	78.35	156.87	0.37
1800.00	1.23	138.86	1797.48	-74.10	31.99	-74.10	80.71	156.65	0.54
1900.00	0.56	100.95	1897.47	-75.00	33.17	-75.00	82.01	156.14	0.86
2000.00	0.12	32.29	1997.47	-75.00	33.71	-75.00	82.23	155.80	0.52
2100.00	0.49	354.87	2097.47	-74.49	33.73	-74.49	81.77	155.64	0.40
2200.00	0.52	329.96	2197.47	-73.67	33.46	-73.67	80.91	155.57	0.22
2300.00	1.28	320.16	2297.45	-72.43	32.52	-72.43	79.39	155.82	0.77
2400.00	1.58	337.07	2397.42	-70.30	31.27	-70.30	76.94	156.02	0.52
2500.00	1.79	341.41	2497.38	-67.55	30.24	-67.55	74.00	155.89	0.24
2600.00	2.20	343.19	2597.32	-64.23	29.18	-64.23	70.55	155.57	0.42
2700.00	2.80	353.78	2697.22	-59.96	28.36	-59.96	66.33	154.69	0.75
2800.00	3.15	359.16	2797.09	-54.79	28.06	-54.79	61.55	152.88	0.45
2900.00	2.90	357.31	2896.95	-49.51	27.90	-49.51	56.83	150.60	0.27
3000.00	3.44	356.60	2996.79	-43.99	27.60	-43.99	51.93	147.89	0.55
3100.00	3.66	4.13	3096.60	-37.81	27.65	-37.81	46.84	143.82	0.51
3200.00	3.69	4.78	3196.40	-31.42	28.15	-31.42	42.19	138.14	0.05
3300.00	3.72	3.10	3296.19	-24.98	28.59	-24.98	37.97	131.14	0.12
3400.00	3.48	5.60	3395.99	-18.72	29.07	-18.72	34.57	122.78	0.29

OCT 30 2014

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
3500.00	3.43	6.67	3495.81	-12.72	29.71	-12.72	32.32	113.19	0.08
3600.00	3.22	9.32	3595.64	-6.98	30.51	-6.98	31.30	102.89	0.26
3700.00	2.86	8.97	3695.50	-1.75	31.36	-1.75	31.40	93.19	0.36
3800.00	2.76	6.67	3795.38	3.10	32.02	3.10	32.17	84.46	0.15
3900.00	2.52	14.73	3895.27	7.62	32.86	7.62	33.73	76.94	0.44
4000.00	2.37	19.79	3995.18	11.69	34.12	11.69	36.07	71.08	0.26
4100.00	2.26	23.61	4095.10	15.45	35.61	15.45	38.82	66.55	0.19
4200.00	2.16	42.24	4195.03	18.65	37.67	18.65	42.03	63.66	0.72
4300.00	2.51	36.88	4294.95	21.80	40.25	21.80	45.77	61.56	0.41
4400.00	3.01	46.13	4394.83	25.37	43.46	25.37	50.32	59.72	0.67
4500.00	3.69	48.62	4494.66	29.32	47.76	29.32	56.04	58.46	0.69
4600.00	3.70	47.85	4594.45	33.61	52.57	33.61	62.40	57.41	0.05
4700.00	3.18	46.65	4694.27	37.68	56.98	37.68	68.32	56.52	0.52
4800.00	2.39	41.56	4794.15	41.15	60.39	41.15	73.08	55.73	0.83
4900.00	1.43	37.06	4894.09	43.71	62.52	43.71	76.28	55.05	0.98
5000.00	0.54	20.18	4994.08	45.14	63.44	45.14	77.86	54.56	0.92
5100.00	0.32	359.05	5094.08	45.87	63.59	45.87	78.41	54.20	0.27
5200.00	0.16	332.92	5194.07	46.27	63.53	46.27	78.59	53.93	0.19
5300.00	0.06	322.47	5294.07	46.43	63.43	46.43	78.61	53.80	0.10
5400.00	0.06	320.82	5394.07	46.51	63.37	46.51	78.61	53.72	0.00
5500.00	0.09	315.90	5494.07	46.61	63.28	46.61	78.59	53.63	0.03
5600.00	0.09	311.76	5594.07	46.72	63.17	46.72	78.57	53.51	0.01
5700.00	0.08	330.28	5694.07	46.84	63.07	46.84	78.56	53.40	0.03
5800.00	0.08	318.14	5794.07	46.95	62.99	46.95	78.56	53.30	0.02
5900.00	0.08	322.39	5894.07	47.06	62.90	47.06	78.55	53.20	0.01
6000.00	0.13	338.56	5994.07	47.22	62.81	47.22	78.58	53.07	0.06
6100.00	0.17	355.21	6094.07	47.47	62.76	47.47	78.69	52.90	0.06
6200.00	0.15	4.48	6194.07	47.75	62.76	47.75	78.86	52.74	0.04
6300.00	0.13	10.93	6294.07	47.99	62.79	47.99	79.03	52.61	0.02
6400.00	0.14	17.67	6394.07	48.22	62.85	48.22	79.22	52.50	0.02
6500.00	0.15	342.26	6494.07	48.47	62.85	48.47	79.37	52.36	0.09
6600.00	0.14	266.71	6594.07	48.59	62.69	48.59	79.31	52.22	0.18
6700.00	0.06	200.67	6694.07	48.53	62.55	48.53	79.16	52.19	0.13
6800.00	0.14	153.03	6794.07	48.37	62.58	48.37	79.10	52.30	0.11
6900.00	0.13	103.75	6894.07	48.24	62.75	48.24	79.15	52.45	0.11
7000.00	0.10	91.59	6994.07	48.21	62.95	48.21	79.29	52.55	0.04
7100.00	0.09	103.28	7094.07	48.19	63.12	48.19	79.41	52.64	0.02
7200.00	0.08	111.75	7194.07	48.15	63.26	48.15	79.50	52.73	0.02
7300.00	0.09	199.83	7294.07	48.04	63.29	48.04	79.46	52.80	0.12
7400.00	0.08	203.86	7394.07	47.90	63.24	47.90	79.33	52.86	0.01
7500.00	0.09	318.77	7494.07	47.90	63.16	47.90	79.26	52.82	0.15
7600.00	0.09	61.92	7594.07	47.99	63.17	47.99	79.34	52.78	0.14
7700.00	0.10	30.60	7694.07	48.10	63.29	48.10	79.49	52.76	0.05
7800.00	0.10	33.07	7794.07	48.24	63.37	48.24	79.65	52.72	0.00
7900.00	0.10	41.53	7894.07	48.38	63.48	48.38	79.81	52.69	0.02
8000.00	0.13	11.32	7994.07	48.55	63.56	48.55	79.98	52.62	0.06
8100.00	0.10	323.33	8094.07	48.73	63.53	48.73	80.07	52.51	0.10
8200.00	0.10	307.00	8194.07	48.86	63.41	48.86	80.05	52.38	0.03
8300.00	0.13	289.45	8294.07	48.95	63.23	48.95	79.96	52.26	0.04
8400.00	0.10	272.61	8394.07	48.99	63.04	48.99	79.84	52.15	0.04
8500.00	0.09	244.38	8494.07	48.96	62.88	48.96	79.69	52.10	0.05
8600.00	0.11	231.87	8594.07	48.86	62.74	48.86	79.52	52.09	0.03
8700.00	0.12	224.61	8694.07	48.73	62.59	48.73	79.32	52.10	0.02
8800.00	0.11	202.38	8794.07	48.57	62.48	48.57	79.14	52.14	0.04
8900.00	0.12	198.62	8894.07	48.39	62.41	48.39	78.97	52.21	0.01

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9000.00	0.10	210.92	8994.07	48.22	62.34	48.22	78.81	52.28	0.03
9100.00	0.42	222.06	9094.07	47.87	62.05	47.87	78.37	52.35	0.32
9200.00	1.16	238.21	9194.06	47.07	60.95	47.07	77.01	52.32	0.76
9300.00	1.05	230.42	9294.04	45.95	59.38	45.95	75.08	52.26	0.18
9400.00	0.42	212.44	9394.03	45.05	58.47	45.05	73.82	52.38	0.67
9500.00	0.88	211.81	9494.02	44.09	57.87	44.09	72.75	52.70	0.46
9600.00	0.59	222.46	9594.01	43.05	57.11	43.05	71.52	52.99	0.32
9700.00	0.65	224.14	9694.01	42.26	56.37	42.26	70.45	53.14	0.06
9800.00	0.24	200.54	9794.01	41.66	55.90	41.66	69.72	53.30	0.44
9900.00	0.24	253.91	9894.00	41.41	55.63	41.41	69.35	53.34	0.22
10000.00	0.11	70.34	9994.00	41.38	55.51	41.38	69.24	53.30	0.35
10100.00	0.13	307.30	10094.00	41.48	55.51	41.48	69.30	53.23	0.21
10200.00	0.22	74.65	10194.00	41.61	55.61	41.61	69.45	53.19	0.32
10300.00	0.21	83.43	10294.00	41.68	55.98	41.68	69.79	53.33	0.04
10400.00	0.14	180.91	10394.00	41.57	56.16	41.57	69.87	53.49	0.27
10500.00	0.08	232.20	10494.00	41.40	56.10	41.40	69.72	53.57	0.11
10600.00	0.17	171.67	10594.00	41.21	56.06	41.21	69.58	53.68	0.15
10700.00	0.23	89.90	10694.00	41.06	56.28	41.06	69.67	53.89	0.27
10745.00	0.29	33.32	10739.00	41.16	56.44	41.16	69.85	53.90	0.56

HORIZONTAL DISPLACEMENT IS
69.85 FEET AT 53.90 DEGREES



Project: Lea Co. NM

Site: West Copperline 29 State Com

Well: West Copperline 29 State Com #4H

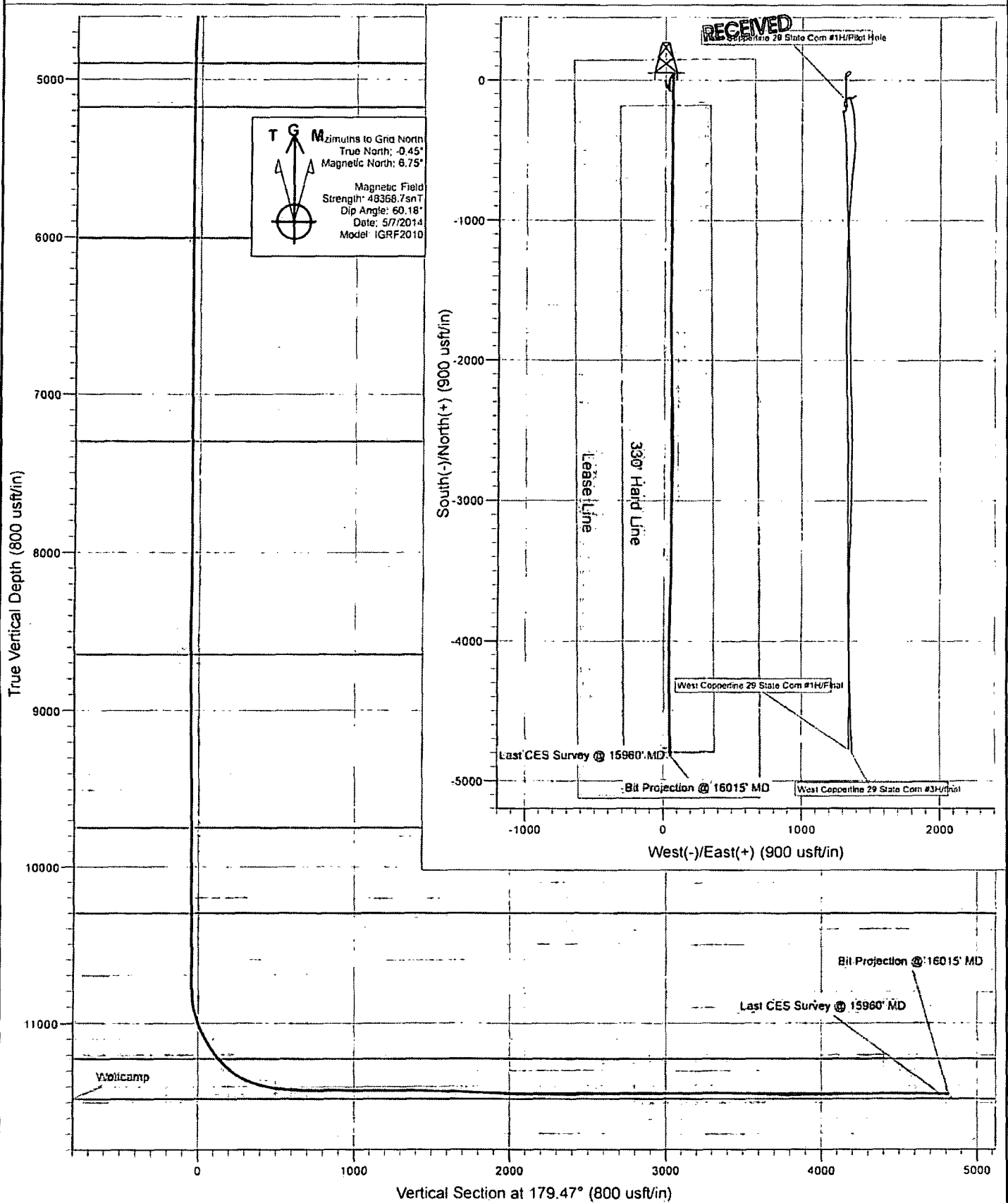
Wellbore: Wellbore #1

Design: Plan #4

Rig: Patriot 1

HOBBS OCD

OCT 30 2014



Survey Report

Company: Caza Operating, LLC
Project: Lea County, NM
Site: West Copperline 29 State Com
Well: West Copperline 29 State Com #4H
Wellbore: Wellbore #1
Design: Final

Local Co-ordinate Reference: Well West Copperline 29 State Com #4H
TVD Reference: WELL @ 3584.0usft (Patriot 1)
MD Reference: WELL @ 3584.0usft (Patriot 1)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA EDM 5000 Multi Users DB

Project	Lea County, NM		
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	West Copperline 29 State Com		
Site Position:		Northing:	467,259.70 usft
From:	Map	Easting:	759,475.60 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	32.281822
		Longitude:	-103.493736
		Grid Convergence:	0.45 °

Well	West Copperline 29 State Com #4H		
Well Position	+N/-S	0.0 usft	Northing: 467,428.90 usft
	+E/-W	0.0 usft	Easting: 758,154.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32.282316
		Longitude:	-103.498006
		Ground Level:	3,563.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	5/7/2014	(°)
			7.20
			Dip Angle
			(°)
			60.18
			Field Strength
			(nT)
			48,369

Design	Final		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			174.97

Survey Program	Date 6/3/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	10,745.0	Gyro (Wellbore #1)	Gyro
10,826.7	16,015.0	Survey #2 (Wellbore #1)	ISCWSA MWD
			Description
			Gyro
			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	0.85	175.03	100.0	-0.7	0.1	0.7	0.85	0.85	
200.0	1.23	173.98	200.0	-2.5	0.2	2.6	0.38	0.38	
300.0	1.45	171.01	300.0	-4.9	0.6	4.9	0.23	0.22	
400.0	1.65	178.32	399.9	-7.6	0.8	7.6	0.28	0.20	
500.0	1.69	186.98	499.9	-10.5	0.7	10.5	0.26	0.04	
600.0	2.07	185.22	599.8	-13.7	0.3	13.7	0.38	0.38	
700.0	2.82	173.16	699.7	-18.0	0.4	17.9	0.91	0.75	
800.0	3.27	161.85	799.6	-23.1	1.6	23.2	0.75	0.45	
900.0	4.05	156.05	899.4	-29.0	3.9	29.3	0.86	0.78	
1,000.0	5.59	151.08	999.0	-36.5	7.7	37.1	1.59	1.54	
1,100.0	5.65	147.85	1,098.5	-45.0	12.7	45.9	0.32	0.08	

Survey Report

Company: Caza Operating, LLC
 Project: Lea County, NM
 Site: West Copperline 29 State Com
 Well: West Copperline 29 State Com 04H
 Wellbore: Wellbore #1
 Design: Final

Local Co-ordinate Reference: Well West Copperline 29 State Com #4H
 TVD Reference: WELL @ 3584.0usft (Patriot 1)
 MD Reference: WELL @ 3584.0usft (Patriot 1)
 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 (°/100usft)	Bulld Rate (°/100u)	Formations / Comments
1,200.0	4.87	145.93	1,198.1	-52.7	17.7	54.0	0.80	-0.78	
1,300.0	3.48	142.83	1,297.9	-58.8	21.9	60.3	1.41	-1.39	
1,400.0	2.74	143.54	1,397.7	-82.9	25.2	64.9	0.74	-0.74	
1,500.0	2.17	144.27	1,497.8	-86.4	27.7	68.8	0.57	-0.57	
1,600.0	1.87	153.22	1,597.8	-89.4	29.5	71.7	0.43	-0.30	
1,700.0	1.53	157.72	1,697.5	-72.1	30.8	74.5	0.37	-0.34	
1,800.0	1.23	138.88	1,797.5	-74.1	32.0	78.6	0.54	-0.30	
1,900.0	0.58	100.85	1,897.5	-75.0	33.2	77.6	0.88	-0.67	
2,000.0	0.12	32.29	1,997.5	-75.0	33.7	77.7	0.53	-0.44	
2,100.0	0.49	354.87	2,097.5	-74.5	33.7	77.2	0.40	0.37	
2,200.0	0.52	329.88	2,197.5	-73.7	33.5	78.3	0.22	0.03	
2,300.0	1.28	320.16	2,297.5	-72.4	32.5	75.0	0.77	0.78	
2,400.0	1.58	337.07	2,397.4	-70.3	31.3	72.8	0.51	0.30	
2,500.0	1.79	341.41	2,497.4	-87.8	30.2	70.0	0.25	0.21	
2,600.0	2.20	343.19	2,597.3	-84.2	29.2	68.6	0.41	0.41	
2,700.0	2.80	353.78	2,697.2	-80.0	28.4	62.2	0.75	0.60	
2,800.0	3.15	359.18	2,797.1	-54.8	28.1	57.1	0.45	0.35	
2,900.0	2.90	357.31	2,896.9	-49.5	27.9	51.8	0.27	-0.25	
3,000.0	3.44	358.60	2,996.8	-44.0	27.6	48.3	0.54	0.54	
3,100.0	3.66	4.13	3,096.8	-37.8	27.7	40.1	0.52	0.22	
3,200.0	3.89	4.78	3,196.4	-31.4	28.2	33.8	0.05	0.03	
3,300.0	3.72	3.10	3,296.2	-25.0	28.6	27.4	0.11	0.03	
3,400.0	3.48	5.60	3,396.0	-18.7	29.1	21.2	0.29	-0.24	
3,500.0	3.43	6.67	3,495.8	-12.7	29.7	15.3	0.08	-0.05	
3,600.0	3.22	9.32	3,595.6	-7.0	30.5	9.6	0.26	-0.21	
3,700.0	2.88	8.97	3,695.5	-1.8	31.4	4.5	0.36	-0.36	
3,800.0	2.76	6.67	3,795.4	3.1	32.0	-0.3	0.15	-0.10	
3,900.0	2.52	14.73	3,895.3	7.8	32.9	-4.7	0.44	-0.24	
4,000.0	2.37	19.79	3,995.2	11.7	34.1	-8.6	0.26	-0.15	
4,100.0	2.26	23.61	4,095.1	15.4	35.6	-12.3	0.19	-0.11	
4,200.0	2.16	42.24	4,195.0	18.8	37.7	-15.3	0.72	-0.10	
4,300.0	2.51	38.88	4,294.9	21.8	40.3	-18.2	0.41	0.35	
4,400.0	3.01	46.13	4,394.8	25.4	43.5	-21.4	0.67	0.50	
4,500.0	3.89	48.62	4,494.7	29.3	47.8	-25.0	0.70	0.68	
4,600.0	3.70	47.85	4,594.4	33.6	52.6	-28.9	0.05	0.01	
4,700.0	3.18	46.65	4,694.3	37.7	57.0	-32.5	0.52	-0.52	
4,800.0	2.39	41.56	4,794.1	41.1	60.4	-35.7	0.83	-0.79	
4,900.0	1.43	37.08	4,894.1	43.7	62.5	-38.0	0.97	-0.98	
5,000.0	0.54	20.18	4,994.1	45.1	63.4	-39.4	0.93	-0.89	
5,100.0	0.32	359.05	5,094.1	45.8	63.6	-40.1	0.27	-0.22	
5,200.0	0.18	332.82	5,194.1	48.2	63.5	-40.5	0.19	-0.16	
5,300.0	0.08	322.47	5,294.1	48.4	63.4	-40.7	0.10	-0.10	
5,400.0	0.08	320.82	5,394.1	48.5	63.4	-40.8	0.00	0.00	
5,500.0	0.09	315.90	5,494.1	48.6	63.3	-40.9	0.03	0.03	
5,600.0	0.09	311.78	5,594.1	48.7	63.2	-41.0	0.01	0.00	
5,700.0	0.08	330.28	5,694.1	48.8	63.1	-41.1	0.03	-0.01	
5,800.0	0.08	318.14	5,794.1	48.9	63.0	-41.2	0.02	0.00	
5,900.0	0.08	322.39	5,894.1	47.0	62.9	-41.3	0.01	0.00	
6,000.0	0.13	338.56	5,994.1	47.2	62.8	-41.5	0.06	0.05	
6,100.0	0.17	355.21	6,094.1	47.4	62.8	-41.8	0.06	0.04	
6,200.0	0.15	4.48	6,194.1	47.7	62.8	-42.0	0.03	-0.02	
6,300.0	0.13	10.93	6,294.1	48.0	62.8	-42.3	0.03	-0.02	
6,400.0	0.14	17.67	6,394.1	48.2	62.8	-42.5	0.02	0.01	

Survey Report

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 Well: West Copperline 29 State Com #4H
 Wellbore: Wellbore #1
 Design: Final

Local Co-ordinate Reference: Well West Copperline 29 State Com #4H
 TVD Reference: WELL @ 3584.0usft (Patriot 1)
 MD Reference: WELL @ 3584.0usft (Patriot 1)
 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
6,500.0	0.15	342.28	6,494.1	48.4	62.8	-42.7	0.09	0.01	
6,600.0	0.14	286.71	6,594.1	48.6	62.7	-42.9	0.18	-0.01	
6,700.0	0.08	200.67	6,694.1	48.5	62.5	-42.8	0.13	-0.08	
6,800.0	0.14	153.03	6,794.1	48.3	62.6	-42.7	0.11	0.08	
6,900.0	0.13	103.75	6,894.1	48.2	62.7	-42.5	0.11	-0.01	
7,000.0	0.10	91.59	6,994.1	48.2	62.9	-42.5	0.04	-0.03	
7,100.0	0.09	103.28	7,094.1	48.2	63.1	-42.4	0.02	-0.01	
7,200.0	0.08	111.75	7,194.1	48.1	63.2	-42.4	0.02	-0.01	
7,300.0	0.09	199.83	7,294.1	48.0	63.3	-42.3	0.12	0.01	
7,400.0	0.08	203.86	7,394.1	47.9	63.2	-42.1	0.01	-0.01	
7,500.0	0.09	318.77	7,494.1	47.9	63.2	-42.1	0.14	0.01	
7,600.0	0.09	61.92	7,594.1	48.0	63.2	-42.2	0.14	0.00	
7,700.0	0.10	30.60	7,694.1	48.1	63.3	-42.3	0.05	0.01	
7,800.0	0.10	33.07	7,794.1	48.2	63.4	-42.5	0.00	0.00	
7,900.0	0.10	41.53	7,894.1	48.4	63.5	-42.6	0.01	0.00	
8,000.0	0.13	11.32	7,994.1	48.5	63.6	-42.8	0.07	0.03	
8,100.0	0.10	323.33	8,094.1	48.7	63.5	-43.0	0.10	-0.03	
8,200.0	0.10	307.00	8,194.1	48.8	63.4	-43.1	0.03	0.00	
8,300.0	0.13	289.45	8,294.1	48.9	63.2	-43.2	0.05	0.03	
8,400.0	0.10	272.61	8,394.1	49.0	63.0	-43.3	0.04	-0.03	
8,500.0	0.09	244.38	8,494.1	48.9	62.9	-43.2	0.05	-0.01	
8,600.0	0.11	231.87	8,594.1	48.9	62.7	-43.2	0.03	0.02	
8,700.0	0.12	224.61	8,694.1	48.7	62.6	-43.0	0.02	0.01	
8,800.0	0.11	202.38	8,794.1	48.6	62.5	-42.9	0.05	-0.01	
8,900.0	0.12	198.62	8,894.1	48.4	62.4	-42.7	0.01	0.01	
9,000.0	0.10	210.92	8,994.1	48.2	62.3	-42.5	0.03	-0.02	
9,100.0	0.42	222.08	9,094.1	47.8	62.0	-42.2	0.32	0.32	
9,200.0	1.16	238.21	9,194.1	47.0	60.9	-41.5	0.77	0.74	
9,300.0	1.05	230.42	9,294.0	45.9	59.4	-40.5	0.19	-0.11	
9,400.0	0.42	212.44	9,394.0	45.0	58.5	-39.7	0.66	-0.63	
9,500.0	0.88	211.81	9,494.0	44.1	57.9	-38.8	0.46	0.46	
9,600.0	0.59	222.46	9,594.0	43.0	57.1	-37.9	0.32	-0.29	
9,700.0	0.65	224.14	9,694.0	42.3	56.4	-37.1	0.06	0.06	
9,800.0	0.24	200.54	9,794.0	41.6	55.9	-36.6	0.44	-0.41	
9,900.0	0.24	253.91	9,894.0	41.4	55.6	-36.4	0.22	0.00	
10,000.0	0.11	70.34	9,994.0	41.4	55.5	-36.3	0.35	-0.13	
10,100.0	0.13	307.30	10,094.0	41.5	55.5	-36.4	0.21	0.02	
10,200.0	0.22	74.65	10,194.0	41.6	55.6	-36.6	0.32	0.09	
10,300.0	0.21	83.43	10,294.0	41.7	56.0	-36.6	0.03	-0.01	
10,400.0	0.14	180.90	10,394.0	41.6	56.2	-36.5	0.27	-0.07	
10,500.0	0.08	232.20	10,494.0	41.4	56.1	-36.3	0.11	-0.06	
10,600.0	0.17	171.60	10,594.0	41.2	56.1	-36.1	0.15	0.09	
10,700.0	0.23	89.90	10,694.0	41.1	56.3	-36.0	0.27	0.06	
10,745.0	0.29	33.32	10,739.0	41.2	56.4	-36.0	0.56	0.13	
10,872.0	6.30	185.10	10,865.8	34.5	56.0	-29.4	5.16	4.73	
10,921.0	13.60	178.80	10,914.0	26.0	55.9	-21.0	15.04	14.90	
10,968.0	19.30	177.70	10,959.0	12.7	56.3	-7.7	12.15	12.13	
11,018.0	21.20	177.30	11,004.1	-3.9	57.0	8.9	3.97	3.96	
11,063.0	23.40	183.60	11,047.8	-21.7	56.8	26.6	6.91	4.68	
11,111.0	28.10	183.60	11,090.8	-42.5	55.5	47.2	9.79	9.79	
11,158.0	32.00	182.20	11,131.5	-68.0	54.3	70.5	8.47	8.30	
11,206.0	36.00	178.80	11,171.3	-92.8	54.1	97.2	9.22	8.33	
11,253.0	38.80	179.40	11,208.6	-121.3	54.5	125.7	6.01	5.96	

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 Design: Final

Local Co-ordinate Reference: Well West Copperline 29 State Com #4H
 TVD Reference: WELL @ 3584.0usft (Patriot 1)
 MD Reference: WELL @ 3584.0usft (Patriot 1)
 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
11,301.0	43.50	179.80	11,244.7	-152.9	54.7	157.1	9.81	9.79	
11,347.0	48.30	179.20	11,278.7	-185.9	55.0	180.1	10.48	10.43	
11,395.0	51.70	179.80	11,307.8	-222.7	55.4	228.7	7.15	7.08	
11,442.0	57.30	180.60	11,334.9	-281.0	55.2	284.8	12.00	11.91	
11,490.0	64.00	181.10	11,358.4	-302.8	54.8	308.4	13.99	13.96	
11,537.0	71.90	181.50	11,378.0	-348.3	53.8	349.8	16.83	16.81	
11,585.0	75.30	180.20	11,389.5	-392.3	52.9	385.4	7.54	7.08	
11,632.0	77.40	179.20	11,400.6	-438.0	53.2	441.0	4.92	4.47	
11,655.0	79.30	179.30	11,405.3	-480.5	53.5	483.4	8.27	8.26	
11,680.0	81.00	179.50	11,409.8	-485.1	53.7	488.0	6.85	6.80	
11,775.0	88.30	180.40	11,420.1	-579.5	53.8	582.0	5.68	5.58	
11,822.0	87.30	180.50	11,422.7	-628.4	53.4	628.7	2.14	2.13	
11,870.0	88.80	180.30	11,424.4	-674.4	53.1	678.5	2.74	2.71	
11,985.0	91.40	179.90	11,424.4	-789.4	52.9	771.1	2.98	2.95	
12,060.0	89.40	180.30	11,423.7	-884.4	52.8	885.7	2.15	-2.11	
12,155.0	88.90	181.20	11,425.1	-959.4	51.5	960.2	1.08	-0.53	
12,250.0	88.90	179.90	11,427.0	-1,054.3	50.6	1,054.7	1.37	0.00	
12,345.0	90.30	180.00	11,427.8	-1,149.3	50.7	1,149.4	1.48	1.47	
12,441.0	91.60	180.00	11,428.0	-1,245.3	50.7	1,245.0	1.35	1.35	
12,538.0	89.40	180.50	11,425.2	-1,340.3	50.3	1,339.6	2.37	-2.32	
12,583.0	89.70	180.80	11,425.6	-1,387.3	49.7	1,388.3	0.90	0.84	
12,631.0	89.50	181.10	11,425.9	-1,435.3	48.9	1,434.1	0.75	-0.42	
12,678.0	87.60	180.30	11,427.1	-1,482.3	48.4	1,480.8	4.39	-4.04	
12,728.0	88.00	180.60	11,429.0	-1,530.2	48.0	1,528.8	1.04	0.83	
12,773.0	88.80	180.70	11,430.3	-1,577.2	47.5	1,575.3	1.29	1.28	
12,821.0	88.40	180.40	11,431.6	-1,625.2	47.0	1,623.1	0.75	-0.42	
12,888.0	88.00	179.00	11,433.1	-1,672.2	47.2	1,669.9	3.10	-0.85	
12,918.0	87.10	178.80	11,435.1	-1,720.1	48.2	1,717.7	1.92	-1.87	
12,963.0	87.80	178.80	11,437.2	-1,767.1	49.1	1,764.8	1.49	1.49	
13,011.0	88.40	178.80	11,438.8	-1,815.0	50.2	1,812.4	1.25	1.25	
13,058.0	88.70	178.80	11,440.0	-1,862.0	51.1	1,859.3	0.84	0.84	
13,108.0	87.20	178.80	11,441.7	-1,910.0	52.1	1,907.2	3.12	-3.12	
13,202.0	87.00	179.10	11,448.8	-2,005.8	53.9	2,002.8	0.38	-0.21	
13,297.0	90.90	179.20	11,448.3	-2,100.8	55.3	2,097.5	4.11	4.11	
13,393.0	88.10	178.30	11,449.2	-2,196.7	57.4	2,193.3	3.06	-2.92	
13,488.0	89.70	178.80	11,451.0	-2,291.7	59.8	2,288.1	1.76	1.68	
13,583.0	90.70	178.50	11,450.6	-2,386.7	62.0	2,382.9	1.10	1.05	
13,678.0	91.20	179.30	11,449.1	-2,481.6	63.9	2,477.7	0.99	0.53	
13,773.0	90.60	180.20	11,447.8	-2,576.6	64.3	2,572.3	1.14	-0.63	
13,868.0	89.50	181.40	11,447.5	-2,671.6	63.0	2,668.8	1.71	-1.16	
13,964.0	90.70	180.70	11,447.3	-2,767.6	61.2	2,762.3	1.45	1.25	
14,059.0	89.80	180.80	11,446.9	-2,862.6	60.0	2,858.8	0.95	-0.95	
14,154.0	90.20	181.00	11,446.9	-2,957.6	58.5	2,951.3	0.47	0.42	
14,249.0	89.90	180.60	11,446.8	-3,052.6	57.1	3,045.8	0.53	-0.32	
14,344.0	91.10	180.20	11,448.0	-3,147.5	58.5	3,140.4	1.33	1.26	
14,439.0	91.50	180.20	11,443.8	-3,242.5	56.1	3,235.0	0.42	0.42	
14,534.0	90.50	181.00	11,442.2	-3,337.5	55.1	3,329.5	1.35	-1.05	
14,629.0	88.90	180.90	11,442.7	-3,432.5	53.8	3,424.0	1.89	-1.68	
14,724.0	87.20	181.40	11,445.9	-3,527.4	51.7	3,518.4	1.87	-1.79	
14,819.0	88.40	181.30	11,449.8	-3,622.3	49.4	3,612.7	1.27	1.26	
14,914.0	89.00	181.30	11,451.7	-3,717.3	47.3	3,707.1	0.63	0.63	
15,009.0	90.00	180.90	11,452.6	-3,812.2	45.4	3,801.5	1.13	1.05	
15,104.0	91.10	180.50	11,451.6	-3,907.2	44.3	3,896.1	1.23	1.16	

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Local Co-ordinate Reference: Well West Copperline 29 State Com #4H
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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 (°/100usft)	Build Rate (°/100u)	Formations / Comments
15,199.0	90.80	180.70	11,450.1	-4,002.2	43.3	3,990.8	0.38	-0.32	
15,294.0	89.70	180.40	11,449.8	-4,097.2	42.4	4,085.1	1.20	-1.16	
15,390.0	90.90	180.10	11,449.1	-4,193.2	42.0	4,180.7	1.29	1.25	
15,485.0	89.90	179.50	11,448.5	-4,288.2	42.3	4,275.4	1.23	-1.05	
15,580.0	91.20	178.90	11,447.8	-4,383.2	43.8	4,370.1	1.51	1.37	
15,675.0	92.00	178.70	11,444.9	-4,478.1	45.8	4,464.9	0.87	0.84	
15,770.0	88.30	178.70	11,444.7	-4,573.1	47.8	4,559.6	3.89	-3.89	
15,865.0	88.60	178.50	11,447.2	-4,668.0	50.1	4,854.4	0.38	0.32	
15,960.0	89.80	178.80	11,448.8	-4,763.0	52.3	4,749.2	1.30	1.26	Last CES Survey @ 15960' MD
16,015.0	89.80	178.80	11,448.8	-4,818.0	53.5	4,804.1	0.00	0.00	Bit Projection @ 16015' MD

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
PBHL #4H P2 - actual wellpath misses target center by 28.3usft at 15992.8usft MD (11448.7 TVD, -4795.7 N, 53.0 E) - Point	0.00	0.00	11,424.0	-4,796.0	44.0	462,632.90	758,198.30	32,269132	-103.497985
PBHL #4H P3 - actual wellpath misses target center by 17.2usft at 15992.8usft MD (11448.7 TVD, -4795.8 N, 53.0 E) - Point	0.00	0.00	11,434.0	-4,796.0	44.0	462,632.90	758,198.30	32,269132	-103.497985
PBHL #4H P4 - actual wellpath misses target center by 10.2usft at 15992.8usft MD (11448.7 TVD, -4795.8 N, 53.0 E) - Point	0.00	0.00	11,444.0	-4,796.0	44.0	462,632.90	758,198.30	32,269132	-103.497985

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
15,960.0	11,448.6	-4,763.0	52.3	Last CES Survey @ 15960' MD
16,015.0	11,448.8	-4,818.0	53.5	Bit Projection @ 16015' MD

Checked By: _____ Approved By: _____ Date: _____