



A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

April 8, 2014

NM OIL CONSERVATION
ARTESIA DISTRICT

JUN 03 2014

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

RECEIVED

Attn: Kanicia Castillo

RE: Blue Thunder 5 Federal Com 6H

Please find enclosed a copy of the survey from 0.00' to 8160.00' ran on the
above referenced well.

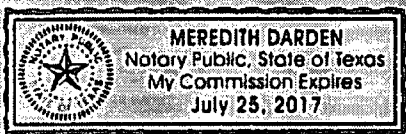
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 8th day of April,
A.D., 2014, by Keith Havelka.


Meredith Darden
Notary Public, State of Texas





Company: COG OPERATING , LLC
Lease/Well: BLUE THUNDER 5 FEDERAL COM /6H

Rig Name: PATRIOT # 6
State/County: NEW MEXICO/EDDY
Latitude: 32.69, Longitude: -103.88
GRID North is 0.24 Degrees East of True North
VS-Azi: 0.00 Degrees



NM OIL CONSERVATION
ARTESIA DISTRICT

RECEIVED

JUN 03 2014

Depth Reference : R.K.B=17FT

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: blue thunder 6h-de_01.ut

Minimum Curvature Method

Report Date/Time: 4/8/2014 / 16:16

Vaughn Energy Services
West, Texas
432-563-6444

Surveyor: Javier Estrada
Blue Thunder 5 Federal Com 6H / API 30-015-41614

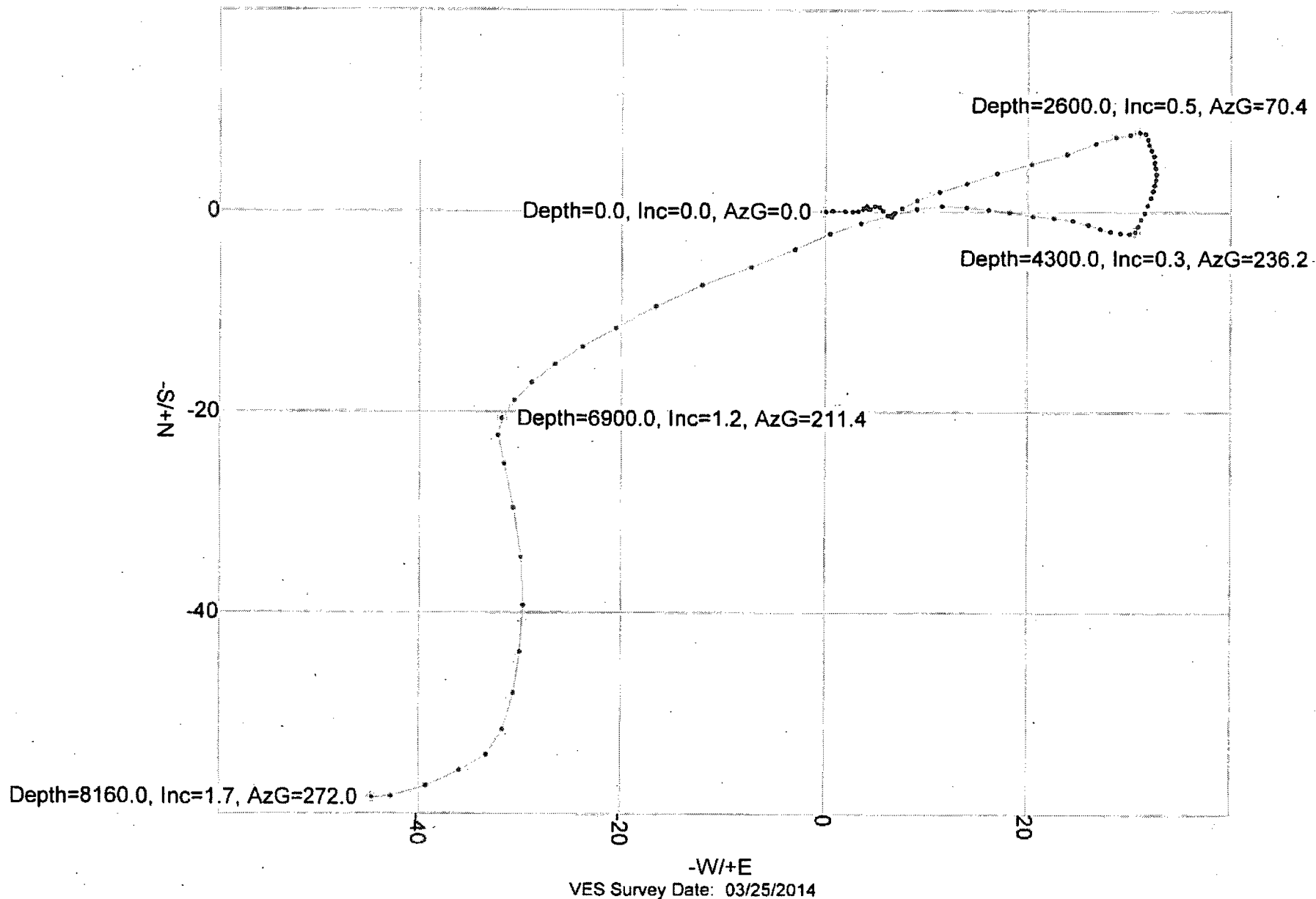
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----
100.00	0.78	83.82	100.00	0.07	0.68	0.07	0.68	83.82	0.78
200.00	0.63	101.67	199.99	0.04	1.89	0.04	1.90	88.92	0.27
300.00	0.26	77.11	299.99	-0.03	2.65	-0.03	2.65	90.55	0.41
400.00	0.32	83.45	399.99	0.06	3.14	0.06	3.14	88.98	0.07
500.00	0.36	51.15	499.98	0.29	3.67	0.29	3.68	85.53	0.20
600.00	0.13	64.45	599.98	0.53	4.02	0.53	4.05	82.43	0.24
700.00	0.30	176.52	699.98	0.32	4.13	0.32	4.14	85.61	0.37
800.00	0.34	40.26	799.98	0.28	4.34	0.28	4.35	86.32	0.60
900.00	0.33	82.75	899.98	0.54	4.82	0.54	4.85	83.58	0.24
1000.00	0.26	121.99	999.98	0.46	5.29	0.46	5.31	85.06	0.21
1100.00	0.32	151.27	1099.98	0.09	5.62	0.09	5.62	89.06	0.16
1200.00	0.49	120.66	1199.97	-0.37	6.12	-0.37	6.14	93.48	0.27
1300.00	0.08	31.73	1299.97	-0.53	6.53	-0.53	6.55	94.65	0.50
1400.00	0.17	14.25	1399.97	-0.33	6.61	-0.33	6.61	92.82	0.10
1500.00	0.25	63.92	1499.97	-0.08	6.84	-0.08	6.84	90.71	0.19
1600.00	0.69	56.51	1599.97	0.34	7.54	0.34	7.55	87.38	0.44
1700.00	1.26	66.33	1699.95	1.12	9.05	1.12	9.12	82.95	0.60
1800.00	1.46	71.63	1799.93	1.96	11.27	1.96	11.44	80.12	0.24

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
1900.00	1.79	73.56	1899.89	2.81	13.99	2.81	14.27	78.64	0.33
2000.00	1.82	70.02	1999.84	3.79	16.98	3.79	17.40	77.40	0.11
2100.00	2.26	78.07	2099.77	4.75	20.40	4.75	20.95	76.91	0.53
2200.00	1.93	70.70	2199.71	5.71	23.92	5.71	24.59	76.58	0.43
2300.00	1.50	67.17	2299.66	6.77	26.71	6.77	27.56	75.77	0.44
2400.00	0.93	79.45	2399.64	7.43	28.72	7.43	29.66	75.50	0.62
2500.00	0.62	79.98	2499.63	7.67	30.05	7.67	31.01	75.68	0.31
2600.00	0.51	70.36	2599.62	7.91	31.00	7.91	32.00	75.68	0.15
2700.00	0.41	153.34	2699.62	7.75	31.58	7.75	32.51	76.22	0.61
2800.00	0.29	158.70	2799.62	7.19	31.83	7.19	32.63	77.27	0.12
2900.00	0.36	176.04	2899.62	6.64	31.94	6.64	32.63	78.26	0.12
3000.00	0.35	137.07	2999.62	6.10	32.17	6.10	32.75	79.27	0.24
3100.00	0.42	169.79	3099.61	5.52	32.45	5.52	32.91	80.35	0.23
3200.00	0.30	186.74	3199.61	4.90	32.48	4.90	32.85	81.42	0.16
3300.00	0.37	156.68	3299.61	4.34	32.58	4.34	32.86	82.40	0.19
3400.00	0.33	189.88	3399.61	3.77	32.65	3.77	32.87	83.42	0.20
3500.00	0.32	179.60	3499.61	3.21	32.61	3.21	32.77	84.38	0.06
3600.00	0.34	210.31	3599.61	2.68	32.46	2.68	32.57	85.28	0.18
3700.00	0.37	176.71	3699.60	2.10	32.33	2.10	32.40	86.28	0.21
3800.00	0.49	211.98	3799.60	1.42	32.12	1.42	32.15	87.46	0.28
3900.00	0.48	197.19	3899.60	0.66	31.77	0.66	31.78	88.81	0.12
4000.00	0.43	204.75	3999.59	-0.08	31.49	-0.08	31.49	90.15	0.08
4100.00	0.43	215.24	4099.59	-0.74	31.11	-0.74	31.12	91.36	0.08
4200.00	0.47	187.40	4199.59	-1.45	30.84	-1.45	30.88	92.70	0.22
4300.00	0.33	236.15	4299.59	-2.02	30.55	-2.02	30.61	93.78	0.35
4400.00	0.41	266.64	4399.58	-2.20	29.95	-2.20	30.03	94.21	0.21
4500.00	0.57	280.47	4499.58	-2.13	29.10	-2.13	29.18	94.19	0.20
4600.00	0.59	274.48	4599.58	-2.00	28.10	-2.00	28.17	94.08	0.06
4700.00	0.60	296.97	4699.57	-1.73	27.12	-1.73	27.18	93.64	0.23
4800.00	0.81	287.54	4799.56	-1.28	25.98	-1.28	26.02	92.81	0.24
4900.00	1.05	282.83	4899.55	-0.86	24.41	-0.86	24.43	92.02	0.26
5000.00	1.04	272.44	4999.53	-0.62	22.61	-0.62	22.62	91.56	0.19
5100.00	1.35	277.86	5099.51	-0.42	20.53	-0.42	20.54	91.16	0.33
5200.00	1.31	280.99	5199.48	-0.04	18.24	-0.04	18.24	90.12	0.08
5300.00	1.11	271.59	5299.46	0.21	16.14	0.21	16.14	89.26	0.28
5400.00	1.38	279.25	5399.44	0.43	13.98	0.43	13.99	88.25	0.31
5500.00	1.46	267.97	5499.41	0.58	11.52	0.58	11.54	87.14	0.29
5600.00	1.44	258.04	5599.38	0.27	9.02	0.27	9.02	88.28	0.25
5700.00	1.72	254.88	5699.34	-0.38	6.34	-0.38	6.35	93.44	0.29

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
5800.00	1.73	253.57	5799.29	-1.20	3.44	-1.20	3.65	109.20	0.04
5900.00	1.94	248.69	5899.24	-2.24	0.42	-2.24	2.28	169.34	0.26
6000.00	2.38	243.18	5999.17	-3.79	-3.00	-3.79	4.84	218.39	0.49
6100.00	2.90	250.35	6099.06	-5.58	-7.24	-5.58	9.14	232.38	0.62
6200.00	2.97	248.33	6198.93	-7.39	-12.04	-7.39	14.12	238.46	0.13
6300.00	2.74	241.06	6298.81	-9.50	-16.54	-9.50	19.08	240.12	0.43
6400.00	2.44	241.74	6398.71	-11.67	-20.51	-11.67	23.59	240.36	0.31
6500.00	1.90	240.02	6498.63	-13.50	-23.82	-13.50	27.38	240.45	0.54
6600.00	1.80	234.53	6598.58	-15.24	-26.54	-15.24	30.60	240.12	0.20
6700.00	1.55	228.52	6698.54	-17.05	-28.83	-17.05	33.49	239.40	0.31
6800.00	1.32	216.89	6798.51	-18.87	-30.53	-18.87	35.89	238.28	0.37
6900.00	1.19	211.39	6898.48	-20.68	-31.76	-20.68	37.90	236.94	0.18
7000.00	0.95	169.56	6998.47	-22.38	-32.15	-22.38	39.18	235.16	0.80
7100.00	2.38	166.94	7098.42	-25.22	-31.53	-25.22	40.38	231.35	1.44
7200.00	2.69	168.79	7198.32	-29.55	-30.61	-29.55	42.55	226.00	0.32
7300.00	2.99	173.13	7298.20	-34.45	-29.84	-34.45	45.57	220.90	0.36
7400.00	2.62	182.41	7398.08	-39.32	-29.62	-39.32	49.23	217.00	0.58
7500.00	2.66	185.60	7497.98	-43.91	-29.95	-43.91	53.15	214.29	0.15
7600.00	2.17	191.78	7597.89	-48.07	-30.56	-48.07	56.96	212.45	0.55
7700.00	2.24	200.16	7697.81	-51.76	-31.62	-51.76	60.65	211.42	0.33
7800.00	1.33	235.15	7797.77	-54.26	-33.25	-54.26	63.63	211.50	1.38
7900.00	2.11	244.66	7897.72	-55.71	-35.86	-55.71	66.26	212.77	0.82
8000.00	2.21	246.08	7997.65	-57.28	-39.29	-57.28	69.46	214.45	0.11
8100.00	2.03	262.59	8097.58	-58.29	-42.80	-58.29	72.31	216.29	0.63
8160.00	1.68	271.96	8157.55	-58.39	-44.73	-58.39	73.56	217.46	0.77



Vaughn Energy Services
West, Texas
432-563-5444
Surveyor: Javier Estrada
Blue Thunder 5 Federal Com 6H / API 30-015-41614





Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Blue Thunder 5 Federal Well 6H
Project:	Eddy County, New Mexico NAD83	TVD Reference:	RKB=3586.2+18 @ 3604.19usft (Patriot 6)
Site:	Blue Thunder 5 Federal	MD Reference:	RKB=3586.2+18 @ 3604.19usft (Patriot 6)
Well:	Blue Thunder 5 Federal Well 6H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Ddatabase

Project	Eddy County, New Mexico NAD83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Blue Thunder 5 Federal		
Site Position:		Northing:	615,737.69 usft
From:	Map	Easting:	679,748.55 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 41' 30.83715311 N
		Longitude:	103° 53' 0.31000195 W
		Grid Convergence:	0.24 °

Well	Blue Thunder 5 Federal Well 6H		
Well Position	+N-S	0.00 usft	Northing:
	+E-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 41' 30.83715311 N
		Longitude:	103° 53' 0.31000195 W
		Ground Level:	3,586.19 usft

Wellbore	Original Hole		
Magnetics	Model Name	Sample Date	Declination
	IGRF200510	3/12/2014	7.42
			Dip Angle
			60.53
			Field Strength
			48,635

Design	Surveys Original Hole		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			266.61

Survey Program	Date 4/3/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	8,160.00	Gyro (Original Hole)	NS-GYRO-MS
8,217.00	13,370.00	MWD (Original Hole)	MWD
			Description
			North sensing gyrocompassing m/s
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N-S	+E-W	Map	Map	Latitude	Longitude
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting		
(usft)			(usft)			(usft)	(usft)		
0.00	0.00	0.00	0.00	0.00	0.00	615,737.69	679,748.55	2° 41' 30.83715311 N	103° 53' 0.31000195 W
100.00	0.78	83.82	100.00	0.07	0.68	615,737.77	679,749.22	2° 41' 30.83784977 N	103° 53' 0.30207862 W
Gyro									
200.00	0.63	101.87	199.99	0.04	1.89	615,737.73	679,750.44	2° 41' 30.83742346 N	103° 53' 0.28786266 W
300.00	0.26	77.11	299.99	-0.03	2.65	615,737.67	679,751.20	2° 41' 30.83679205 N	103° 53' 0.27897726 W
400.00	0.32	83.45	399.99	0.06	3.15	615,737.75	679,751.70	2° 41' 30.83758716 N	103° 53' 0.27313866 W
500.00	0.36	51.15	499.98	0.29	3.67	615,737.98	679,752.22	2° 41' 30.83983042 N	103° 53' 0.26701793 W
600.00	0.13	64.45	599.98	0.53	4.02	615,738.23	679,752.56	2° 41' 30.84224998 N	103° 53' 0.26294504 W
700.00	0.30	178.52	699.98	0.32	4.14	615,738.01	679,752.68	2° 41' 30.84014344 N	103° 53' 0.26157193 W
800.00	0.34	40.26	799.98	0.28	4.34	615,737.98	679,752.89	2° 41' 30.83978944 N	103° 53' 0.25914391 W
900.00	0.33	82.75	899.98	0.55	4.82	615,738.24	679,753.37	2° 41' 30.84236948 N	103° 53' 0.25354420 W



Survey Report - Geographic



Company: COG Operating LLC
Project: Eddy County, New Mexico NAD83
Site: Blue Thunder 5 Federal
Well: Blue Thunder 5 Federal Well 6H
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Blue Thunder 5 Federal Well 6H
TVD Reference: RKB=3586.2+18 @ 3604.19usft (Patriot 6)
MD Reference: RKB=3586.2+18 @ 3604.19usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Database

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,000.00	0.26	121.99	999.98	0.48	5.30	815,738.18	879,753.85	2° 41' 30.84151981 N	103° 53' 0.24795363 W
1,100.00	0.32	151.27	1,099.98	0.10	5.63	815,737.79	879,754.17	2° 41' 30.83789348 N	103° 53' 0.24414817 W
1,200.00	0.49	120.68	1,199.97	-0.38	6.13	815,737.33	879,754.67	2° 41' 30.83329174 N	103° 53' 0.23829721 W
1,300.00	0.08	31.73	1,299.97	-0.52	6.53	815,737.17	879,755.08	2° 41' 30.83170468 N	103° 53' 0.23357123 W
1,400.00	0.17	14.25	1,399.97	-0.32	6.81	815,737.37	879,755.15	2° 41' 30.83371194 N	103° 53' 0.23270419 W
1,500.00	0.25	63.92	1,499.97	-0.08	6.84	815,737.61	879,755.38	2° 41' 30.83607402 N	103° 53' 0.22997189 W
1,600.00	0.69	56.51	1,599.97	0.35	7.54	815,738.04	879,756.08	2° 41' 30.84028137 N	103° 53' 0.22178158 W
1,700.00	1.26	66.33	1,699.95	1.12	9.05	815,738.82	879,757.59	2° 41' 30.84767337 N	103° 53' 0.20408356 W
1,800.00	1.46	71.63	1,799.93	1.86	11.26	815,739.66	879,759.81	2° 41' 30.85812079 N	103° 53' 0.17811060 W
1,900.00	1.79	73.56	1,899.89	2.81	13.97	815,740.50	879,762.51	2° 41' 30.86435365 N	103° 53' 0.14639213 W
2,000.00	1.82	70.02	1,999.84	3.79	16.86	815,741.49	879,765.51	2° 41' 30.87387080 N	103° 53' 0.11135080 W
2,100.00	2.28	78.07	2,099.77	4.74	20.38	815,742.44	879,768.93	2° 41' 30.88322948 N	103° 53' 0.07126560 W
2,200.00	1.93	70.70	2,199.71	5.71	23.90	815,743.40	879,772.45	2° 41' 30.89262207 N	103° 53' 0.03004607 W
2,300.00	1.50	87.17	2,299.66	6.77	26.70	815,744.47	879,775.24	2° 41' 30.90303695 N	103° 52' 59.99727950 W
2,400.00	0.93	79.45	2,399.64	7.43	28.70	815,745.12	879,777.25	2° 41' 30.90944816 N	103° 52' 59.97379507 W
2,500.00	0.62	79.98	2,499.63	7.67	30.03	815,745.36	879,778.58	2° 41' 30.91179408 N	103° 52' 59.95821253 W
2,600.00	0.51	70.36	2,599.62	7.91	30.98	815,745.61	879,779.53	2° 41' 30.91416577 N	103° 52' 59.94700897 W
2,700.00	0.41	153.34	2,699.62	7.74	31.56	815,745.44	879,780.11	2° 41' 30.91245764 N	103° 52' 59.94028587 W
2,800.00	0.29	158.70	2,799.62	7.19	31.81	815,744.88	879,780.36	2° 41' 30.90895000 N	103° 52' 59.93735915 W
2,900.00	0.36	178.04	2,899.62	6.64	31.93	815,744.33	879,780.47	2° 41' 30.90151096 N	103° 52' 59.93605681 W
3,000.00	0.35	137.07	2,999.62	6.10	32.16	815,743.80	879,780.70	2° 41' 30.89618729 N	103° 52' 59.93338528 W
3,100.00	0.42	168.79	3,099.61	5.52	32.43	815,743.21	879,780.98	2° 41' 30.89039373 N	103° 52' 59.93022975 W
3,200.00	0.30	186.74	3,199.61	4.90	32.47	815,742.59	879,781.01	2° 41' 30.88425044 N	103° 52' 59.92985987 W
3,300.00	0.37	156.68	3,299.61	4.34	32.56	815,742.03	879,781.11	2° 41' 30.87873982 N	103° 52' 59.92875134 W
3,400.00	0.33	189.86	3,399.61	3.76	32.64	815,741.45	879,781.19	2° 41' 30.87299530 N	103° 52' 59.92786268 W
3,500.00	0.32	179.60	3,499.61	3.20	32.59	815,740.89	879,781.14	2° 41' 30.86742687 N	103° 52' 59.92644601 W
3,600.00	0.34	210.31	3,599.61	2.66	32.45	815,740.36	879,780.99	2° 41' 30.86213538 N	103° 52' 59.93020199 W
3,700.00	0.37	176.71	3,699.60	2.08	32.31	815,739.78	879,780.86	2° 41' 30.85841661 N	103° 52' 59.93176610 W
3,800.00	0.49	211.98	3,799.60	1.40	32.11	815,739.09	879,780.85	2° 41' 30.84984668 N	103° 52' 59.93423333 W
3,900.00	0.46	197.19	3,899.60	0.84	31.76	815,738.33	879,780.30	2° 41' 30.84211278 N	103° 52' 59.93836986 W
4,000.00	0.43	204.75	3,999.59	-0.11	31.48	815,737.59	879,780.02	2° 41' 30.83479299 N	103° 52' 59.94169358 W
4,100.00	0.43	215.24	4,099.59	-0.75	31.10	815,736.94	879,779.85	2° 41' 30.82840412 N	103° 52' 59.94609785 W
4,200.00	0.47	187.40	4,199.59	-1.47	30.83	815,736.23	879,779.38	2° 41' 30.82135821 N	103° 52' 59.94928481 W
4,300.00	0.33	236.15	4,299.59	-2.03	30.54	815,735.66	879,779.09	2° 41' 30.81575857 N	103° 52' 59.95272978 W
4,400.00	0.41	268.84	4,399.58	-2.21	29.94	815,735.48	879,778.49	2° 41' 30.81398685 N	103° 52' 59.95971897 W
4,500.00	0.57	280.47	4,499.58	-2.14	29.10	815,735.55	879,777.84	2° 41' 30.81471129 N	103° 52' 59.96961673 W
4,600.00	0.59	274.48	4,599.58	-2.01	28.10	815,735.68	879,778.84	2° 41' 30.81604572 N	103° 52' 59.98134027 W
4,700.00	0.60	296.97	4,699.57	-1.74	27.12	815,735.98	879,775.66	2° 41' 30.81683447 N	103° 52' 59.99279343 W
4,800.00	0.81	287.54	4,799.56	-1.29	25.97	815,736.41	879,774.52	2° 41' 30.82333987 N	103° 53' 0.00611827 W
4,900.00	1.05	282.83	4,899.55	-0.87	24.41	815,736.82	879,772.95	2° 41' 30.82752676 N	103° 53' 0.02443822 W
5,000.00	1.04	272.44	4,999.53	-0.63	22.61	815,737.07	879,771.15	2° 41' 30.82999787 N	103° 53' 0.04549012 W
5,100.00	1.35	277.86	5,099.51	-0.43	20.53	815,737.27	879,769.08	2° 41' 30.83208124 N	103° 53' 0.06974518 W
5,200.00	1.31	280.89	5,199.48	-0.05	18.24	815,737.65	879,766.79	2° 41' 30.83590764 N	103° 53' 0.09651218 W
5,300.00	1.11	271.59	5,299.46	0.20	16.15	815,737.89	879,764.70	2° 41' 30.83841780 N	103° 53' 0.12098077 W
5,400.00	1.38	276.25	5,399.44	0.42	14.00	815,738.11	879,762.54	2° 41' 30.84088635 N	103° 53' 0.14618730 W
5,500.00	1.48	287.97	5,499.41	0.57	11.54	815,738.28	879,760.08	2° 41' 30.84228142 N	103° 53' 0.17498559 W
5,600.00	1.44	256.04	5,599.38	0.26	9.03	815,737.95	879,757.58	2° 41' 30.83934341 N	103° 53' 0.20426296 W
5,700.00	1.72	254.88	5,699.34	-0.39	6.36	815,737.30	879,754.90	2° 41' 30.83300579 N	103° 53' 0.23565297 W
5,800.00	1.73	253.57	5,799.29	-1.21	3.48	815,736.48	879,752.00	2° 41' 30.82502920 N	103° 53' 0.28958933 W
5,900.00	1.94	248.69	5,899.24	-2.25	0.43	815,735.44	879,748.98	2° 41' 30.81484475 N	103° 53' 0.30503597 W
6,000.00	2.38	243.16	5,999.17	-3.80	-3.00	815,733.89	879,745.55	2° 41' 30.79831917 N	103° 53' 0.34524901 W
6,100.00	2.80	250.35	6,099.06	-5.59	-7.23	815,732.10	879,741.31	2° 41' 30.78212242 N	103° 53' 0.39489871 W
6,200.00	2.87	248.33	6,198.93	-7.40	-12.02	815,730.29	879,738.52	2° 41' 30.7644036 N	103° 53' 0.45103838 W
6,300.00	2.74	241.06	6,298.81	-9.51	-16.52	815,728.18	879,732.02	2° 41' 30.74371869 N	103° 53' 0.50379280 W
6,400.00	2.44	241.74	6,398.71	-11.88	-20.49	815,726.02	879,728.06	2° 41' 30.72246771 N	103° 53' 0.55031702 W



Survey Report - Geographic



Company: COG Operating LLC
Project: Eddy County, New Mexico NAD83
Site: Blue Thunder 5 Federal
Well: Blue Thunder 5 Federal Well 6H
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinate Reference: Well Blue Thunder 5 Federal Well 6H
TVD Reference: RKB=3586.2+18 @ 3604.19usft (Patriot 6)
MD Reference: RKB=3586.2+18 @ 3604.19usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Ddatabase

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,500.00	1.90	240.02	6,498.83	-13.51	-23.80	615,724.18	679,724.75	2° 41' 30.70443685 N	103° 53' 0.58915151 W
6,600.00	1.80	234.53	6,598.58	-15.25	-26.51	615,722.44	679,722.03	2° 41' 30.68733814 N	103° 53' 0.62100834 W
6,700.00	1.55	228.52	6,698.54	-17.08	-28.81	615,720.83	679,719.74	2° 41' 30.66955037 N	103° 53' 0.64782221 W
6,800.00	1.32	216.89	6,798.51	-18.88	-30.51	615,718.82	679,718.04	2° 41' 30.65184231 N	103° 53' 0.66795990 W
6,900.00	1.19	211.39	6,898.49	-20.68	-31.74	615,717.01	679,718.80	2° 41' 30.63380748 N	103° 53' 0.68246930 W
7,000.00	0.95	169.56	6,998.47	-22.39	-32.13	615,715.31	679,718.41	2° 41' 30.61698536 N	103° 53' 0.68712499 W
7,100.00	2.38	168.94	7,098.42	-25.22	-31.51	615,712.47	679,717.03	2° 41' 30.58887675 N	103° 53' 0.68001725 W
7,200.00	2.69	168.79	7,198.33	-29.55	-30.59	615,708.14	679,717.96	2° 41' 30.54604705 N	103° 53' 0.66940319 W
7,300.00	2.99	173.13	7,298.20	-34.44	-29.82	615,703.25	679,718.73	2° 41' 30.49781818 N	103° 53' 0.66085703 W
7,400.00	2.62	182.41	7,398.08	-38.31	-29.60	615,698.38	679,718.94	2° 41' 30.44938905 N	103° 53' 0.65837285 W
7,500.00	2.66	185.60	7,497.98	-43.91	-29.93	615,693.79	679,718.62	2° 41' 30.40395529 N	103° 53' 0.73217869 W
7,600.00	2.17	191.78	7,597.89	-48.07	-30.54	615,689.62	679,718.01	2° 41' 30.38279033 N	103° 53' 0.68975423 W
7,700.00	2.24	200.16	7,697.82	-51.76	-31.80	615,685.94	679,718.95	2° 41' 30.32834288 N	103° 53' 0.68234149 W
7,800.00	1.33	235.15	7,797.77	-54.25	-33.23	615,683.44	679,715.32	2° 41' 30.30189505 N	103° 53' 0.70149242 W
7,900.00	2.11	244.66	7,897.72	-55.71	-35.84	615,681.99	679,712.70	2° 41' 30.28744635 N	103° 53' 0.73217869 W
8,000.00	2.21	246.08	7,997.65	-57.28	-39.27	615,680.42	679,708.28	2° 41' 30.27205828 N	103° 53' 0.77235001 W
8,100.00	2.03	262.59	8,097.58	-58.29	-42.79	615,679.41	679,705.76	2° 41' 30.26220992 N	103° 53' 0.81357715 W
8,160.00	1.68	271.88	8,157.55	-58.39	-44.72	615,679.30	679,703.83	2° 41' 30.26123251 N	103° 53' 0.83619977 W
8,217.00	1.80	281.80	8,214.53	-58.18	-46.43	615,679.51	679,702.11	2° 41' 30.26338828 N	103° 53' 0.85622251 W
MWD surveys									
8,249.00	1.80	274.40	8,248.51	-58.04	-47.43	615,679.85	679,701.12	2° 41' 30.26479144 N	103° 53' 0.86784004 W
8,281.00	2.80	288.40	8,278.48	-57.79	-48.68	615,679.91	679,699.87	2° 41' 30.26740912 N	103° 53' 0.88248514 W
8,312.00	5.60	290.40	8,309.40	-57.04	-50.82	615,680.65	679,697.72	2° 41' 30.27483288 N	103° 53' 0.90752228 W
8,344.00	8.80	293.80	8,341.14	-55.50	-54.55	615,682.19	679,694.00	2° 41' 30.29026318 N	103° 53' 0.95108496 W
8,375.00	12.50	294.50	8,371.59	-53.14	-59.80	615,684.55	679,688.75	2° 41' 30.31383288 N	103° 53' 1.01238499 W
8,407.00	16.00	294.10	8,402.60	-49.90	-66.98	615,687.79	679,681.57	2° 41' 30.34817315 N	103° 53' 1.09623387 W
8,439.00	19.30	293.40	8,433.09	-48.00	-75.86	615,691.89	679,672.69	2° 41' 30.38515717 N	103° 53' 1.19998925 W
8,470.00	22.20	292.50	8,462.08	-41.72	-85.97	615,695.97	679,662.57	2° 41' 30.42789948 N	103° 53' 1.31811453 W
8,502.00	25.30	291.70	8,491.37	-36.88	-97.92	615,700.81	679,650.83	2° 41' 30.47632104 N	103° 53' 1.45760868 W
8,534.00	28.70	280.80	8,519.88	-31.62	-111.46	615,708.07	679,637.09	2° 41' 30.52891970 N	103° 53' 1.61578886 W
8,565.00	32.20	289.70	8,548.60	-28.19	-126.19	615,711.50	679,622.35	2° 41' 30.58328004 N	103° 53' 1.78799337 W
8,597.00	35.30	280.40	8,573.20	-20.10	-142.89	615,717.60	679,605.65	2° 41' 30.64430384 N	103° 53' 1.98307424 W
8,629.00	38.00	288.50	8,598.87	-13.75	-160.80	615,723.95	679,587.84	2° 41' 30.70789052 N	103° 53' 2.19352259 W
8,660.00	40.80	266.40	8,622.82	-7.86	-179.67	615,729.84	679,568.87	2° 41' 30.76894868 N	103° 53' 2.41287360 W
8,692.00	43.70	283.90	8,646.51	-2.25	-200.44	615,735.45	679,548.11	2° 41' 30.82331931 N	103° 53' 2.65558998 W
8,699.00	44.28	283.38	8,651.55	-1.10	-205.18	615,736.59	679,543.38	2° 41' 30.83485859 N	103° 53' 2.71081148 W
330 Hard line intercept @ 8699 MD 1740 FNL 330 FEL									
8,724.00	46.30	281.80	8,669.14	2.74	-222.51	615,740.43	679,526.04	2° 41' 30.87354757 N	103° 53' 2.91356364 W
8,755.00	48.40	280.40	8,690.14	7.08	-244.89	615,744.78	679,503.66	2° 41' 30.91749125 N	103° 53' 3.17523874 W
8,787.00	50.80	278.00	8,710.86	10.97	-268.96	615,748.66	679,479.59	2° 41' 30.95698025 N	103° 53' 3.45870819 W
8,819.00	54.10	276.20	8,730.34	14.10	-294.14	615,751.79	679,454.40	2° 41' 30.98899474 N	103° 53' 3.75130140 W
8,850.00	57.80	275.30	8,747.89	18.67	-319.70	615,754.38	679,428.85	2° 41' 31.01547971 N	103° 53' 4.05016926 W
8,877.00	61.20	274.80	8,761.39	18.71	-342.87	615,756.41	679,405.68	2° 41' 31.03689242 N	103° 53' 4.32120076 W
8,908.00	65.10	274.30	8,775.39	20.90	-370.43	615,758.60	679,378.11	2° 41' 31.05953199 N	103° 53' 4.64365829 W
8,940.00	67.90	273.40	8,788.15	22.87	-399.71	615,760.57	679,348.84	2° 41' 31.08022825 N	103° 53' 4.98814510 W
8,972.00	70.50	272.20	8,799.51	24.33	-429.58	615,762.02	679,318.96	2° 41' 31.09590979 N	103° 53' 5.33568899 W
9,003.00	73.00	271.30	8,809.22	25.23	-459.01	615,762.92	679,289.54	2° 41' 31.10601882 N	103° 53' 5.67993973 W
9,035.00	75.80	270.90	8,817.83	25.82	-489.82	615,763.51	679,258.72	2° 41' 31.11315546 N	103° 53' 6.04046882 W
9,067.00	78.90	270.60	8,824.83	26.23	-521.04	615,763.92	679,227.51	2° 41' 31.11849948 N	103° 53' 6.40573822 W
9,098.00	82.10	270.20	8,829.95	26.44	-551.61	615,764.13	679,196.94	2° 41' 31.12188438 N	103° 53' 6.76345042 W
9,130.00	85.50	269.30	8,833.40	26.30	-583.42	615,763.99	679,165.13	2° 41' 31.12183255 N	103° 53' 7.13586038 W
9,162.00	88.20	268.30	8,835.16	25.63	-615.36	615,763.33	679,133.19	2° 41' 31.11654320 N	103° 53' 7.50946158 W
9,225.00	90.00	266.60	8,836.15	22.83	-678.28	615,760.52	679,070.28	2° 41' 31.09143981 N	103° 53' 8.24583072 W
9,320.00	91.50	265.50	8,834.91	16.29	-773.04	615,753.98	678,975.50	2° 41' 31.03065128 N	103° 53' 9.35513357 W
9,447.00	91.60	264.80	8,831.47	5.55	-899.54	615,743.25	678,849.00	2° 41' 30.92871983 N	103° 53' 10.83591007 W



Survey Report - Geographic



Company: COG Operating LLC
Project: Eddy County, New Mexico NAD83
Site: Blue Thunder 5 Federal
Well: Blue Thunder 5 Federal Well 6H
Wellbore: Original Hole
Design: Surveys Original Hole

Local Co-ordinates Reference: Well Blue Thunder 5 Federal Well 6H
TVD Reference: RKB=3586.2+18 @ 3604.19usft (Patriot 6)
MD Reference: RKB=3586.2+18 @ 3604.19usft (Patriot 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Database

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,510.00	92.40	284.80	8,829.28	-0.15	-982.24	615,737.54	678,786.30	2° 41' 30.87588938 N	03° 53' 11.58991272 W
9,605.00	92.80	284.80	8,824.97	-8.78	-1,058.75	615,728.94	678,691.79	2° 41' 30.79469771 N	03° 53' 12.87628299 W
9,700.00	92.40	284.80	8,820.66	-17.36	-1,151.27	615,720.34	678,597.28	2° 41' 30.71352332 N	03° 53' 13.78265274 W
9,795.00	92.30	285.30	8,816.78	-25.55	-1,245.83	615,712.15	678,502.71	2° 41' 30.63641480 N	03° 53' 14.88963786 W
9,921.00	89.70	266.20	8,814.56	-34.88	-1,371.45	615,702.81	678,377.09	2° 41' 30.54926743 N	03° 53' 16.38009339 W
10,016.00	90.90	266.20	8,814.06	-41.18	-1,466.24	615,696.52	678,282.30	2° 41' 30.49090744 N	03° 53' 17.46958584 W
10,111.00	89.80	265.50	8,813.48	-48.05	-1,560.99	615,689.64	678,187.56	2° 41' 30.42681498 N	03° 53' 18.57862543 W
10,206.00	90.90	265.30	8,812.90	-55.87	-1,655.88	615,682.02	678,092.88	2° 41' 30.35356282 N	03° 53' 19.68704345 W
10,301.00	89.80	263.40	8,812.32	-65.02	-1,750.21	615,672.87	677,998.33	2° 41' 30.26673422 N	03° 53' 20.79367497 W
10,396.00	90.00	261.80	8,812.48	-77.42	-1,844.39	615,660.27	677,904.15	2° 41' 30.14794258 N	03° 53' 21.89638619 W
10,523.00	88.50	263.00	8,814.15	-94.44	-1,970.23	615,643.26	677,778.31	2° 41' 29.98478551 N	03° 53' 23.36972941 W
10,618.00	89.10	264.20	8,818.14	-105.02	-2,064.62	615,632.67	677,683.93	2° 41' 29.88394147 N	03° 53' 24.47471279 W
10,713.00	90.30	265.30	8,816.84	-113.72	-2,159.21	615,623.98	677,589.33	2° 41' 29.80184142 N	03° 53' 25.58208245 W
10,808.00	90.00	265.80	8,818.39	-121.09	-2,253.93	615,616.61	677,494.62	2° 41' 29.73281764 N	03° 53' 26.69074317 W
10,903.00	90.30	266.90	8,816.14	-127.13	-2,348.73	615,610.56	677,399.81	2° 41' 29.67688787 N	03° 53' 27.80042159 W
10,997.00	90.70	267.60	8,815.32	-131.64	-2,442.82	615,606.05	677,305.93	2° 41' 29.63613578 N	03° 53' 28.89928240 W
11,092.00	91.10	266.50	8,813.83	-136.53	-2,537.48	615,601.16	677,211.08	2° 41' 29.59187453 N	03° 53' 30.00955137 W
11,187.00	90.00	265.50	8,812.92	-143.16	-2,632.24	615,594.53	677,116.30	2° 41' 29.53000826 N	03° 53' 31.11874384 W
11,282.00	90.70	263.90	8,812.34	-151.93	-2,726.83	615,585.76	677,021.71	2° 41' 29.44707560 N	03° 53' 32.22601452 W
11,377.00	91.40	262.50	8,810.60	-163.18	-2,821.14	615,574.51	676,927.40	2° 41' 29.33967473 N	03° 53' 33.33018149 W
11,472.00	90.70	263.20	8,808.85	-175.00	-2,915.39	615,562.69	676,833.18	2° 41' 29.22658684 N	03° 53' 34.43357177 W
11,567.00	88.70	266.50	8,809.35	-183.53	-3,009.98	615,554.17	676,738.58	2° 41' 29.14608632 N	03° 53' 35.54093240 W
11,662.00	88.90	267.80	8,811.34	-188.25	-3,104.84	615,549.44	676,643.70	2° 41' 29.10325159 N	03° 53' 36.65117744 W
11,757.00	89.50	267.10	8,812.67	-192.48	-3,199.74	615,545.22	676,548.81	2° 41' 29.06532456 N	03° 53' 37.76181995 W
11,852.00	91.40	267.10	8,811.92	-197.28	-3,294.61	615,540.41	676,453.93	2° 41' 29.02185751 N	03° 53' 38.87220283 W
11,948.00	90.00	267.60	8,810.75	-201.72	-3,390.50	615,535.97	676,358.05	2° 41' 28.98167017 N	03° 53' 39.99446113 W
12,043.00	91.50	267.20	8,809.51	-206.03	-3,485.39	615,531.66	676,263.16	2° 41' 28.94291683 N	03° 53' 41.10505453 W
12,138.00	93.80	267.90	8,805.28	-210.09	-3,580.20	615,527.61	676,168.34	2° 41' 28.89664787 N	03° 53' 42.21472376 W
12,235.00	91.00	269.30	8,800.18	-213.18	-3,707.05	615,524.51	676,041.50	2° 41' 28.88117008 N	03° 53' 43.89918047 W
12,359.00	90.70	268.10	8,798.79	-215.32	-3,801.01	615,522.38	675,947.53	2° 41' 28.86390666 N	03° 53' 44.79881443 W
12,454.00	92.70	267.20	8,795.97	-219.21	-3,895.89	615,518.48	675,852.68	2° 41' 28.82925598 N	03° 53' 45.90918898 W
12,549.00	90.70	266.70	8,793.15	-224.26	-3,990.70	615,513.43	675,757.84	2° 41' 28.78312803 N	03° 53' 47.01894734 W
12,612.00	87.70	266.20	8,794.03	-228.16	-4,053.57	615,509.53	675,694.98	2° 41' 28.74709909 N	03° 53' 47.75476738 W
12,675.00	88.20	268.00	8,788.29	-232.45	-4,116.38	615,505.25	675,632.16	2° 41' 28.70728466 N	03° 53' 48.4899769 W
12,739.00	89.30	268.20	8,787.68	-238.80	-4,180.22	615,500.90	675,588.33	2° 41' 28.66882185 N	03° 53' 49.23718954 W
12,834.00	88.70	268.70	8,789.34	-242.88	-4,275.02	615,495.01	675,473.52	2° 41' 28.61248153 N	03° 53' 50.34881839 W
12,929.00	89.80	266.50	8,800.58	-248.31	-4,369.84	615,489.38	675,378.70	2° 41' 28.56059249 N	03° 53' 51.45667830 W
13,055.00	87.20	265.80	8,803.88	-256.77	-4,485.51	615,480.93	675,253.04	2° 41' 28.48202393 N	03° 53' 52.92752669 W
13,150.00	87.10	265.80	8,808.60	-263.72	-4,590.13	615,473.98	675,158.41	2° 41' 28.41710400 N	03° 53' 54.03518052 W
13,308.00	88.90	265.30	8,814.12	-275.97	-4,747.55	615,461.72	675,000.99	2° 41' 28.30225913 N	03° 53' 55.87783051 W
13,370.00	88.90	265.30	8,815.31	-281.05	-4,809.33	615,456.85	674,939.21	2° 41' 28.25450296 N	03° 53' 56.60100326 W

Survey projected to 13370.00 MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Comment
100.00	100.00	0.07	0.68	Gyro
8,217.00	8,214.53	-58.18	-46.43	MWD surveys
8,899.00	8,851.55	-1.10	-205.18	330 Hard line intercept @ 8689 MD 1740 FNL 330 FEL
13,370.00	8,815.31	-281.05	-4,809.33	Survey projected to 13370.00 MD



COG Operating LLC

Well: Blue Thunder 5 Federal Well 6H

Site: Blue Thunder 5 Federal

Project: Eddy County, New Mexico NAD83

Design: rays

Rig: Patriot 6

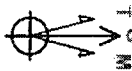
SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Dieg	Tface	VSed	Annotation
1	8160.00	1.68	271.96	8157.55	-58.39	-44.72	0.00	0.00	47.50	Annotation
2	8368.94	1.68	271.96	8366.40	-58.18	-50.84	0.00	0.00	54.00	Survey @ 8160.00 MD
3	8398.74	5.00	278.50	8394.15	-57.99	-52.45	12.00	8.82	55.80	KOP Begin 127100' build
4	8105.07	90.00	278.50	8830.00	12.32	-52.87	12.00	0.00	521.37	Begin 127100' build
5	8422.81	90.00	265.79	8830.00	24.18	-838.74	4.00	-90.00	837.09	Begin 47100' turn
6	13417.68	90.00	8830.00	-269.06	-4823.63	0.00	0.00	0.00	4831.33	Begin 90.00' lateral

ANNOTATIONS

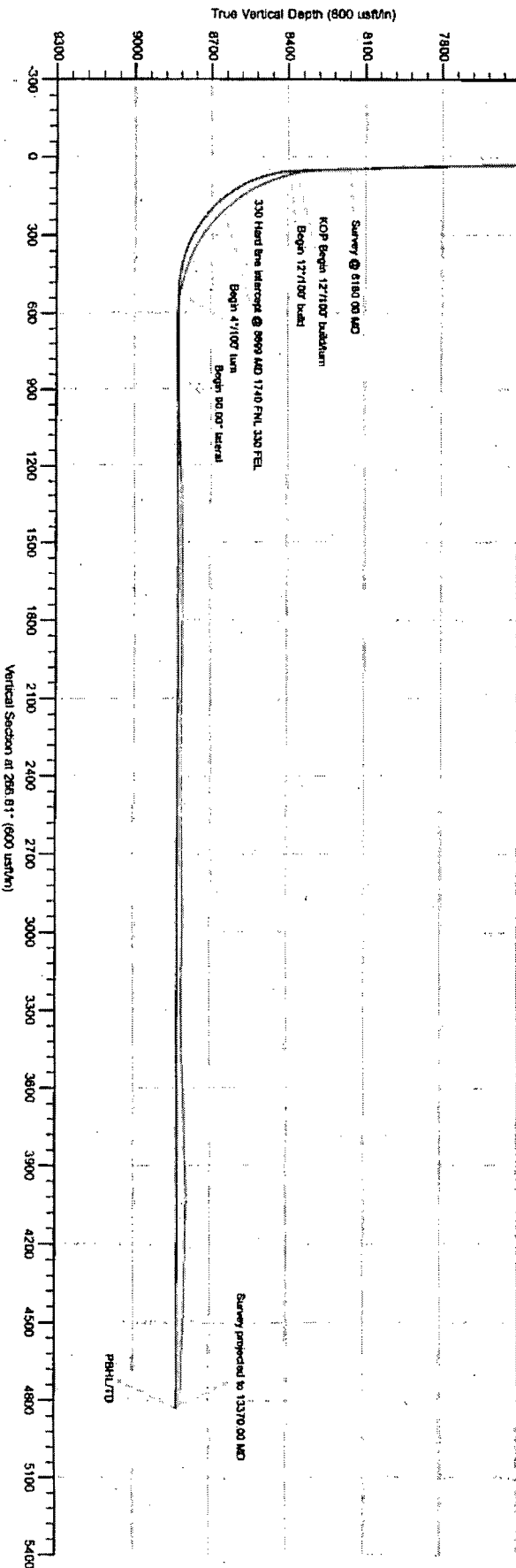
TVD	MD	Inc	Azi	+N/S	+E/W	VSed	Departure	Annotation
100.00	100.00	0.78	83.82	0.07	0.69	-0.69	0.68	Gyro
8214.53	8217.00	1.80	281.60	-58.18	-45.43	49.60	163.07	MWD surveys
8651.53	8659.00	44.26	285.38	-1.10	-205.18	204.91	332.11	330 Hard line intercept @ 8659 MD 1740 FNL 330 FEL
8815.31	8817.00	68.80	285.38	-281.05	-4809.35	4817.52	4850.73	Survey projected to 13370.00 MD

Surface Location: RIG=3586.2+18 @ 3604.1 bust (Patriot 6)
US State Plane 1983
New Mexico Eastern Zone
Northing 815737.85
Easting 68744.55
Total Correction (M => G) 10 convert a Magnetic Direction to a Grid Direction, Add 7.18°



Astronomy to Grid North
True North: 0.24°
Magnetic North: 7.18°
Magnetic Field
Strength: 48314.6 nT
Dir Angle: 90.53°
Date: 3/12/2014
Model: IGRF200510

N=0°



10/53 April 03 2014