



Company: COG Operating LLC (Concho)

Lease/Well: Patton 5 Fee/No. 004H

Location: S5, T19s, R26e

Rig Name: JW Drilling #4

State/County: New Mexico/Eddy

Latitude: 32.69

GRID North is 0.04 Degrees West of True North

VS-Azi: 0.00 Degrees



Depth Reference : RKB= 13 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: patton 5 fee #004h_ed.ut

Minimum Curvature Method

Report Date/Time: 5/22/2012 / 14:42

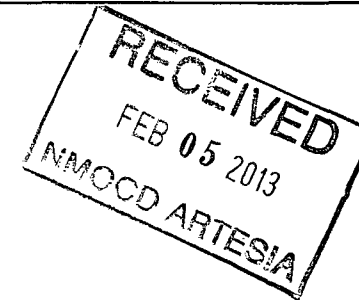
Vaughn Energy Services

Gardendale, Texas

432-563-5444

Surveyor: Seth Hardin

Patton 5 Fee No. 004H / API 30-015-39842



Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W 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	****
100.00	0.65	205.08	100.00	-0.51	-0.24	0.56	205.08	0.65
200.00	0.77	129.29	199.99	-1.44	0.04	1.44	178.42	0.87
300.00	1.04	192.03	299.98	-2.76	0.37	2.78	172.40	0.97
400.00	1.39	173.49	399.96	-4.85	0.32	4.86	176.27	0.52
500.00	1.38	173.32	499.93	-7.26	0.59	7.28	175.32	0.01
600.00	1.11	180.45	599.91	-9.43	0.73	9.46	175.59	0.31
700.00	0.99	190.29	699.89	-11.25	0.56	11.27	177.13	0.22
800.00	0.80	196.85	799.88	-12.77	0.21	12.77	179.06	0.22
900.00	0.85	193.88	899.87	-14.16	-0.17	14.16	180.69	0.07
1000.00	0.83	187.35	999.86	-15.60	-0.44	15.60	181.62	0.10
1100.00	0.65	176.12	1099.85	-16.89	-0.50	16.89	181.69	0.23
1200.00	0.82	180.41	1199.84	-18.17	-0.46	18.18	181.46	0.18
1300.00	0.85	167.46	1299.83	-19.61	-0.31	19.61	180.90	0.19
1400.00	0.86	173.98	1399.82	-21.08	-0.07	21.08	180.19	0.10
1500.00	0.64	166.74	1499.81	-22.37	0.14	22.37	179.65	0.24
1600.00	0.65	176.25	1599.80	-23.48	0.30	23.48	179.26	0.11
1700.00	0.71	154.07	1699.80	-24.60	0.61	24.60	178.58	0.27
1800.00	0.48	169.42	1799.79	-25.56	0.96	25.58	177.86	0.28

30 015 39842

Handwritten notes: 2.80 and 1.2

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.36	173.06	1899.79	-26.28	1.07	26.30	177.67	0.12
2000.00	0.42	150.74	1999.79	-26.91	1.28	26.94	177.27	0.16
2063.00	0.39	175.99	2062.78	-27.32	1.41	27.36	177.04	0.28

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: Concho Oil and Gas
Well: Patton 5 Fee #4H
County: Eddy
Rig: JW #4

M.W.D. OPERATORS: Matt Rainey/CJ Hall
DIRECTIONAL DRILLERS: Derek Patterson/Derek Orona
Tool Azimuth to Grid North: 7.94
Job #: PB-12286

Vertical Section Angle: 89.03

API#: 30-015-39842

Sur. #	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N/-S	+E/-W	DLS
Tie In	2063.00	0.39	175.99	2062.78	0.96	-27.32	1.41	0.00
1	2100.00	0.40	197.60	2099.78	0.91	-27.57	1.38	0.40
2	2131.00	1.00	89.60	2130.78	1.15	-27.67	1.62	3.83
3	2162.00	4.20	68.20	2161.74	2.48	-27.25	2.94	10.61
4	2193.00	7.70	70.10	2192.57	5.51	-26.12	5.95	11.31
5	2224.00	11.30	67.60	2223.14	10.30	-24.25	10.71	11.69
6	2256.00	14.50	65.90	2254.33	16.90	-21.42	17.27	10.07
7	2287.00	18.00	64.70	2284.09	24.84	-17.79	25.15	11.34
8	2318.00	21.00	65.80	2313.30	34.31	-13.46	34.54	9.75
9	2349.00	24.60	68.30	2341.88	45.45	-8.80	45.61	12.02
10	2380.00	28.10	70.20	2369.65	58.40	-3.94	58.48	11.61
11	2411.00	31.80	71.00	2396.51	73.08	1.20	73.08	12.00
12	2443.00	35.30	71.70	2423.17	89.93	6.84	89.83	11.00
13	2474.00	39.00	71.50	2447.88	107.79	12.75	107.59	11.94
14	2505.00	41.90	71.20	2471.47	126.95	19.19	126.64	9.38
15	2536.00	45.10	71.60	2493.95	147.29	25.99	146.87	10.36
16	2567.00	48.50	71.70	2515.17	168.85	33.10	168.31	10.97
17	2598.00	51.60	73.40	2535.07	191.64	40.22	190.98	10.85
18	2630.00	54.60	74.90	2554.28	216.37	47.20	215.60	10.10
19	2661.00	57.90	76.10	2571.50	241.42	53.65	240.55	11.12
20	2692.00	61.00	77.90	2587.26	267.53	59.65	266.56	11.18
21	2724.00	64.00	80.40	2602.04	295.49	64.98	294.43	11.66
22	2755.00	67.20	82.30	2614.84	323.46	69.22	322.34	11.73
23	2787.00	69.40	84.00	2626.67	353.03	72.76	351.85	8.46
24	2818.00	72.20	85.30	2636.87	382.22	75.49	381.00	9.86
25	2849.00	74.70	86.20	2645.70	411.89	77.69	410.63	8.53
26	2880.00	77.50	86.30	2653.14	441.94	79.66	440.65	9.04
27	2911.00	79.30	87.00	2659.38	472.28	81.43	470.97	6.21
28	2942.00	81.30	88.60	2664.60	502.83	82.60	501.50	8.22
29	3036.00	86.30	91.60	2674.75	596.22	82.43	594.91	6.19
30	3130.00	89.40	91.50	2678.28	690.05	79.89	688.80	3.30
31	3224.00	89.80	91.20	2678.93	783.97	77.67	782.77	0.53
32	3319.00	90.10	90.60	2679.02	878.92	76.18	877.76	0.71
33	3412.00	90.00	90.40	2678.94	971.89	75.37	970.75	0.24
34	3506.00	90.30	89.90	2678.69	1065.87	75.12	1064.75	0.62
35	3600.00	90.70	89.90	2677.87	1159.86	75.29	1158.75	0.43
36	3693.00	91.30	89.90	2676.25	1252.83	75.45	1251.73	0.65
37	3787.00	89.10	90.00	2675.92	1346.81	75.53	1345.73	2.34
38	3880.00	87.20	89.40	2678.92	1439.75	76.02	1438.67	2.14
39	3974.00	87.90	89.90	2682.94	1533.66	76.59	1532.58	0.91

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: Concho Oil and Gas

M.W.D. OPERATORS: Matt Rainey/CJ Hall

Well: Patton 5 Fee #4H

DIRECTIONAL DRILLERS: Derek Patterson/Derek Orona

County: Eddy

Tool Azimuth to Grid North: 7.94

Rig: JW #4

Job #: PB-12286

Vertical Section Angle: 89.03

API#: 30-015-39842

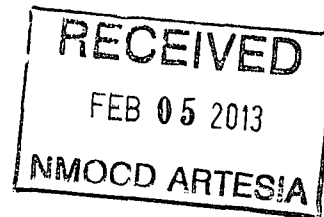
Sur #	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N / -S	+E / -W	DLS
40	4067.00	88.40	89.90	2685.94	1626.60	76.75	1625.53	0.54
41	4161.00	88.90	90.30	2688.16	1720.56	76.59	1719.51	0.68
42	4254.00	89.50	90.60	2689.45	1813.52	75.86	1812.49	0.72
43	4348.00	90.20	90.60	2689.70	1907.48	74.88	1906.49	0.74
44	4442.00	90.70	90.30	2688.96	2001.45	74.14	2000.48	0.62
45	4536.00	89.00	90.70	2689.21	2095.42	73.32	2094.47	1.86
46	4629.00	89.20	90.60	2690.67	2188.37	72.26	2187.46	0.24
47	4723.00	88.30	89.90	2692.72	2282.32	71.85	2281.43	1.21
48	4816.00	88.50	89.50	2695.32	2375.28	72.34	2374.39	0.48
49	4910.00	88.70	88.80	2697.61	2469.25	73.73	2468.36	0.77
50	5004.00	89.10	88.70	2699.42	2563.23	75.78	2562.32	0.44

COG Operating LLC

Eddy County, NM

Patton 5 Fee 4H

Patton 5 Fee 4H



Wellbore #1

Survey: Survey #2

Standard Survey Report

08 January, 2013

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

Project	Eddy 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		Patton 5 Fee 4H			
Site Position:		Northing:		614,892.20 ft	
From: Map		Easting:		475,942.20 ft	
Position Uncertainty:		Slot Radius:		Grid Convergence:	
0.00 ft		13.200 in		32.6904098	
				-104.4115351	
				-0.04 °	

Well	Patton 5 Fee 4H					
Well Position	+N/-S	0.00 ft	Northing:	614,892.20 ft	Latitude:	32.6904098
	+E/-W	0.00 ft	Easting:	475,942.20 ft	Longitude:	-104.4115351
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,368.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/23/2012	7.90	60.45	48,717

Design:	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.00	0.00	0.00	89.03	

Survey Program		Date	1/8/2013		
From	To	Survey (Wellbore)	Tool Name	Description	
(ft)	(ft)				
100.00	2,063.00	Gyro Surveys (Wellbore #1)	Good_mag	Good Magnetic	
2,100.00	5,064.00	Survey #2 (Wellbore #1)	Good_mag	Good Magnetic	

Survey										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate	
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(°/100ft)	(°/100ft)	(°/100ft)	
2,063.00	0.39	175.99	2,062.78	-27.33	1.42	0.96	0.00	0.00	0.00	
2,100.00	0.40	197.60	2,099.78	-27.57	1.39	0.92	0.40	0.03	58.41	
2,131.00	1.00	89.60	2,130.78	-27.68	1.63	1.16	3.83	1.94	-348.39	
2,162.00	4.20	68.20	2,161.75	-27.25	2.95	2.49	10.61	10.32	-69.03	
2,193.00	7.70	70.10	2,192.57	-26.12	5.96	5.52	11.31	11.29	6.13	
2,224.00	11.30	67.60	2,223.14	-24.26	10.72	10.31	11.69	11.61	-8.06	
2,256.00	14.50	65.90	2,254.33	-21.43	17.28	16.92	10.07	10.00	-5.31	
2,287.00	18.00	64.70	2,284.09	-17.79	25.16	24.85	11.34	11.29	-3.87	
2,318.00	21.00	65.80	2,313.31	-13.47	34.56	34.32	9.75	9.68	3.55	
2,349.00	24.60	68.30	2,341.88	-8.81	45.62	45.47	12.02	11.61	8.06	

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

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)
2,380.00	28.10	70.20	2,369.66	-3.94	58.49	58.41	11.61	11.29	6.13
2,411.00	31.80	71.00	2,396.51	1.19	73.09	73.10	12.00	11.94	2.58
2,443.00	35.30	71.70	2,423.18	6.84	89.84	89.94	11.00	10.94	2.19
2,474.00	39.00	71.50	2,447.88	12.75	107.60	107.80	11.94	11.94	-0.65
2,505.00	41.90	71.20	2,471.47	19.18	126.66	126.96	9.38	9.35	-0.97
2,536.00	45.10	71.60	2,493.95	25.98	146.88	147.30	10.36	10.32	1.29
2,567.00	48.50	71.70	2,515.17	33.10	168.32	168.86	10.97	10.97	0.32
2,598.00	51.60	73.40	2,535.08	40.21	190.99	191.65	10.85	10.00	5.48
2,630.00	54.60	74.90	2,554.29	47.20	215.61	216.38	10.10	9.38	4.69
2,661.00	57.90	76.10	2,571.51	53.64	240.56	241.43	11.12	10.65	3.87
2,692.00	61.00	77.90	2,587.27	59.64	266.57	267.54	11.18	10.00	5.81
2,724.00	64.00	80.40	2,602.04	64.98	294.44	295.50	11.66	9.38	7.81
2,755.00	67.20	82.30	2,614.85	69.21	322.35	323.47	11.73	10.32	6.13
2,787.00	69.40	84.00	2,626.68	72.76	351.86	353.05	8.46	6.88	5.31
2,818.00	72.20	85.30	2,636.87	75.48	381.01	382.23	9.86	9.03	4.19
2,849.00	74.70	86.20	2,645.70	77.68	410.64	411.90	8.53	8.06	2.90
2,880.00	77.50	86.30	2,653.15	79.65	440.67	441.95	9.04	9.03	0.32
2,911.00	79.30	87.00	2,659.38	81.43	470.98	472.29	6.21	5.81	2.26
2,942.00	81.30	88.60	2,664.61	82.60	501.51	502.84	8.22	6.45	5.16
3,036.00	86.30	91.60	2,674.76	82.42	594.92	596.23	6.19	5.32	3.19
3,130.00	89.40	91.50	2,678.28	79.88	688.81	690.06	3.30	3.30	-0.11
3,224.00	89.80	91.20	2,678.94	77.67	782.78	783.98	0.53	0.43	-0.32
3,319.00	90.10	90.60	2,679.02	76.18	877.77	878.93	0.71	0.32	-0.63
3,412.00	90.00	90.40	2,678.94	75.36	970.76	971.90	0.24	-0.11	-0.22
3,506.00	90.30	89.90	2,678.69	75.12	1,064.76	1,065.88	0.62	0.32	-0.53
3,600.00	90.70	89.90	2,677.87	75.28	1,158.76	1,159.87	0.43	0.43	0.00
3,693.00	91.30	89.90	2,676.25	75.44	1,251.74	1,252.84	0.65	0.65	0.00
3,787.00	89.10	90.00	2,675.92	75.53	1,345.74	1,346.82	2.34	-2.34	0.11
3,880.00	87.20	89.40	2,678.93	76.01	1,438.68	1,439.76	2.14	-2.04	-0.65
3,974.00	87.90	89.90	2,682.94	76.59	1,532.59	1,533.67	0.91	0.74	0.53
4,067.00	88.40	89.90	2,685.95	76.75	1,625.55	1,626.61	0.54	0.54	0.00
4,161.00	88.90	90.30	2,688.16	76.58	1,719.52	1,720.57	0.68	0.53	0.43
4,254.00	89.50	90.60	2,689.46	75.85	1,812.51	1,813.53	0.72	0.65	0.32
4,348.00	90.20	90.60	2,689.71	74.87	1,906.50	1,907.49	0.74	0.74	0.00
4,442.00	90.70	90.30	2,688.97	74.13	2,000.49	2,001.46	0.62	0.53	-0.32
4,536.00	89.00	90.70	2,689.21	73.31	2,094.49	2,095.43	1.86	-1.81	0.43
4,629.00	89.20	90.60	2,690.67	72.26	2,187.47	2,188.38	0.24	0.22	-0.11
4,723.00	88.30	89.90	2,692.72	71.85	2,281.44	2,282.33	1.21	-0.96	-0.74
4,816.00	88.50	89.50	2,695.32	72.33	2,374.41	2,375.29	0.48	0.22	-0.43
4,910.00	88.70	88.80	2,697.62	73.73	2,468.37	2,469.26	0.77	0.21	-0.74
5,004.00	89.10	88.70	2,699.42	75.78	2,562.33	2,563.24	0.44	0.43	-0.11
Last Survey @ 5004.00' MD 2699.42' TVD 89.10° INC 88.70° AZ									
5,064.00	89.10	88.70	2,700.36	77.14	2,622.30	2,623.23	0.00	0.00	0.00

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

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)
Straight line Projection to TD @ 5064.00' MD, 2700.36' TVD.									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
5,004.00	2,699.42	75.78	2,562.33	Last Survey @ 5004.00' MD, 2699.42' TVD, 89.10° INC, 88.70° AZ
5,064.00	2,700.36	77.14	2,622.30	Straight line Projection to TD @ 5064.00' MD, 2700.36' TVD.

Checked By: _____	Approved By: _____	Date: _____
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CONCHO

Author: Stroup
 Well Name **Patton 5 Fee** Well No. **#4H**
 Field Glorieta Yeso API #: 30-015-39842
 County EDDY Prop #:
 State NM Zone:
 Date
 GL 3456'
 KB 3478'

Description	O.D.	Grade	Weight	Depth	Cmt Sx	TOC
Surface Csg	9 5/8	J55	36	1,225	1050	Surface
Inter Csg						
Prod Csg	7	L80	26	2,095	650	Surface
Liner						

