



COG Operating LLC

LEA COUNTY, NM

AVALON SHALE

GATSBY FEDERAL COM #1H

OWB

Plan: PWP0

Standard Planning Report

03 February, 2016

HOBBS OCD

JUN 06 2016

RECEIVED



COG Operating LLC
Planning Report

Database:	EDM_Users	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Company:	COG Operating LLC	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Project:	LEA COUNTY, NM	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site:	AVALON SHALE	North Reference:	Grid
Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	PWP0		

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	AVALON SHALE			
Site Position:		Northing:	419,780.50 usft	Latitude: 32° 9' 6.058 N
From:	Map	Easting:	741,734.30 usft	Longitude: 103° 33' 8.114 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: 0.42 °

Well	GATSBY FEDERAL COM #1H			
Well Position	+N/-S	37,298.8 usft	Northing:	457,079.30 usft
	+E/-W	47,141.5 usft	Easting:	788,875.80 usft
Position Uncertainty	3.0 usft	Wellhead Elevation:	0.0 usft	Ground Level: 3,455.9 usft

Wellbore	OWB				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM2015	2/3/2016	7.04	60.13	48,107

Design	PWP0			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	179.08

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
8,449.0	0.00	0.00	8,449.0	0.0	0.0	0.00	0.00	0.00	0.00	
9,341.9	89.27	179.08	9,022.0	-565.7	9.1	10.00	10.00	0.00	179.08	
18,821.2	89.27	179.08	9,142.0	-10,043.0	160.9	0.00	0.00	0.00	0.00	PBHL-Gatsby Fed Co



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Site:	AVALON SHALE	North Reference:	Grid
Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	PWPD		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00	



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Site:	AVALON SHALE	North Reference:	Grid
Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	PWP0		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,449.0	0.00	0.00	8,449.0	0.0	0.0	0.0	0.00	0.00	0.00	
KOP, 8449' MD										
8,500.0	5.10	179.08	8,499.9	-2.3	0.0	2.3	10.00	10.00	0.00	
8,600.0	15.10	179.08	8,598.3	-19.8	0.3	19.8	10.00	10.00	0.00	
8,700.0	25.10	179.08	8,692.1	-54.1	0.9	54.1	10.00	10.00	0.00	
8,800.0	35.09	179.08	8,778.5	-104.2	1.7	104.2	10.00	10.00	0.00	
8,900.0	45.09	179.08	8,854.9	-168.5	2.7	168.5	10.00	10.00	0.00	
9,000.0	55.09	179.08	8,918.9	-245.1	3.9	245.1	10.00	10.00	0.00	
9,100.0	65.09	179.08	8,968.7	-331.6	5.3	331.7	10.00	10.00	0.00	
9,200.0	75.09	179.08	9,002.7	-425.5	6.8	425.6	10.00	10.00	0.00	
9,300.0	85.09	179.08	9,019.9	-523.9	8.4	524.0	10.00	10.00	0.00	
9,341.9	89.27	179.08	9,022.0	-565.7	9.1	565.8	9.99	9.99	0.00	
LANDING POINT, 9341.9' MD, 9022' TVD										
9,400.0	89.27	179.08	9,022.7	-623.8	10.0	623.9	0.00	0.00	0.00	
9,500.0	89.27	179.08	9,024.0	-723.8	11.6	723.9	0.00	0.00	0.00	
9,600.0	89.27	179.08	9,025.3	-823.8	13.2	823.9	0.00	0.00	0.00	
9,700.0	89.27	179.08	9,026.5	-923.8	14.8	923.9	0.00	0.00	0.00	
9,800.0	89.27	179.08	9,027.8	-1,023.7	16.4	1,023.9	0.00	0.00	0.00	
9,900.0	89.27	179.08	9,029.1	-1,123.7	18.0	1,123.9	0.00	0.00	0.00	



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Project:	LEA COUNTY, NM	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site:	AVALON SHALE	North Reference:	Grid
Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	PVWP0		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
10,000.0	89.27	179.08	9,030.3	-1,223.7	19.6	1,223.9	0.00	0.00	0.00	
10,100.0	89.27	179.08	9,031.6	-1,323.7	21.2	1,323.8	0.00	0.00	0.00	
10,200.0	89.27	179.08	9,032.9	-1,423.7	22.8	1,423.8	0.00	0.00	0.00	
10,300.0	89.27	179.08	9,034.1	-1,523.6	24.4	1,523.8	0.00	0.00	0.00	
10,400.0	89.27	179.08	9,035.4	-1,623.6	26.0	1,623.8	0.00	0.00	0.00	
10,500.0	89.27	179.08	9,036.7	-1,723.6	27.6	1,723.8	0.00	0.00	0.00	
10,600.0	89.27	179.08	9,037.9	-1,823.6	29.2	1,823.8	0.00	0.00	0.00	
10,700.0	89.27	179.08	9,039.2	-1,923.6	30.8	1,923.8	0.00	0.00	0.00	
10,800.0	89.27	179.08	9,040.5	-2,023.5	32.4	2,023.8	0.00	0.00	0.00	
10,900.0	89.27	179.08	9,041.7	-2,123.5	34.0	2,123.8	0.00	0.00	0.00	
11,000.0	89.27	179.08	9,043.0	-2,223.5	35.6	2,223.8	0.00	0.00	0.00	
11,100.0	89.27	179.08	9,044.3	-2,323.5	37.2	2,323.8	0.00	0.00	0.00	
11,200.0	89.27	179.08	9,045.5	-2,423.5	38.8	2,423.8	0.00	0.00	0.00	
11,300.0	89.27	179.08	9,046.8	-2,523.4	40.4	2,523.8	0.00	0.00	0.00	
11,400.0	89.27	179.08	9,048.1	-2,623.4	42.0	2,623.7	0.00	0.00	0.00	
11,500.0	89.27	179.08	9,049.3	-2,723.4	43.6	2,723.7	0.00	0.00	0.00	
11,600.0	89.27	179.08	9,050.6	-2,823.4	45.2	2,823.7	0.00	0.00	0.00	
11,700.0	89.27	179.08	9,051.8	-2,923.3	46.8	2,923.7	0.00	0.00	0.00	
11,800.0	89.27	179.08	9,053.1	-3,023.3	48.4	3,023.7	0.00	0.00	0.00	
11,900.0	89.27	179.08	9,054.4	-3,123.3	50.0	3,123.7	0.00	0.00	0.00	
12,000.0	89.27	179.08	9,055.6	-3,223.3	51.6	3,223.7	0.00	0.00	0.00	
12,100.0	89.27	179.08	9,056.9	-3,323.3	53.2	3,323.7	0.00	0.00	0.00	
12,200.0	89.27	179.08	9,058.2	-3,423.2	54.8	3,423.7	0.00	0.00	0.00	
12,300.0	89.27	179.08	9,059.4	-3,523.2	56.4	3,523.7	0.00	0.00	0.00	
12,400.0	89.27	179.08	9,060.7	-3,623.2	58.0	3,623.7	0.00	0.00	0.00	
12,500.0	89.27	179.08	9,062.0	-3,723.2	59.6	3,723.7	0.00	0.00	0.00	
12,600.0	89.27	179.08	9,063.2	-3,823.2	61.2	3,823.6	0.00	0.00	0.00	
12,700.0	89.27	179.08	9,064.5	-3,923.1	62.8	3,923.6	0.00	0.00	0.00	
12,800.0	89.27	179.08	9,065.8	-4,023.1	64.4	4,023.6	0.00	0.00	0.00	
12,900.0	89.27	179.08	9,067.0	-4,123.1	66.0	4,123.6	0.00	0.00	0.00	
13,000.0	89.27	179.08	9,068.3	-4,223.1	67.6	4,223.6	0.00	0.00	0.00	
13,100.0	89.27	179.08	9,069.6	-4,323.1	69.2	4,323.6	0.00	0.00	0.00	
13,200.0	89.27	179.08	9,070.8	-4,423.0	70.8	4,423.6	0.00	0.00	0.00	
13,300.0	89.27	179.08	9,072.1	-4,523.0	72.4	4,523.6	0.00	0.00	0.00	
13,400.0	89.27	179.08	9,073.4	-4,623.0	74.0	4,623.6	0.00	0.00	0.00	
13,500.0	89.27	179.08	9,074.6	-4,723.0	75.6	4,723.6	0.00	0.00	0.00	
13,600.0	89.27	179.08	9,075.9	-4,823.0	77.2	4,823.6	0.00	0.00	0.00	
13,700.0	89.27	179.08	9,077.2	-4,922.9	78.9	4,923.6	0.00	0.00	0.00	
13,800.0	89.27	179.08	9,078.4	-5,022.9	80.5	5,023.6	0.00	0.00	0.00	
13,900.0	89.27	179.08	9,079.7	-5,122.9	82.1	5,123.5	0.00	0.00	0.00	
14,000.0	89.27	179.08	9,081.0	-5,222.9	83.7	5,223.5	0.00	0.00	0.00	
14,100.0	89.27	179.08	9,082.2	-5,322.8	85.3	5,323.5	0.00	0.00	0.00	
14,200.0	89.27	179.08	9,083.5	-5,422.8	86.9	5,423.5	0.00	0.00	0.00	
14,300.0	89.27	179.08	9,084.8	-5,522.8	88.5	5,523.5	0.00	0.00	0.00	
14,400.0	89.27	179.08	9,086.0	-5,622.8	90.1	5,623.5	0.00	0.00	0.00	
14,500.0	89.27	179.08	9,087.3	-5,722.8	91.7	5,723.5	0.00	0.00	0.00	
14,600.0	89.27	179.08	9,088.6	-5,822.7	93.3	5,823.5	0.00	0.00	0.00	
14,700.0	89.27	179.08	9,089.8	-5,922.7	94.9	5,923.5	0.00	0.00	0.00	
14,800.0	89.27	179.08	9,091.1	-6,022.7	96.5	6,023.5	0.00	0.00	0.00	
14,900.0	89.27	179.08	9,092.4	-6,122.7	98.1	6,123.5	0.00	0.00	0.00	
15,000.0	89.27	179.08	9,093.6	-6,222.7	99.7	6,223.5	0.00	0.00	0.00	
15,100.0	89.27	179.08	9,094.9	-6,322.6	101.3	6,323.4	0.00	0.00	0.00	



COG Operating LLC
Planning Report

Database:	EDM Users	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Company:	COG Operating LLC	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Project:	LEA COUNTY, NM	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site:	AVALON SHALE	North Reference:	Grid
Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	PWPO		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,200.0	89.27	179.08	9,096.2	-6,422.6	102.9	6,423.4	0.00	0.00	0.00
15,300.0	89.27	179.08	9,097.4	-6,522.6	104.5	6,523.4	0.00	0.00	0.00
15,400.0	89.27	179.08	9,098.7	-6,622.6	106.1	6,623.4	0.00	0.00	0.00
15,500.0	89.27	179.08	9,100.0	-6,722.6	107.7	6,723.4	0.00	0.00	0.00
15,600.0	89.27	179.08	9,101.2	-6,822.5	109.3	6,823.4	0.00	0.00	0.00
15,700.0	89.27	179.08	9,102.5	-6,922.5	110.9	6,923.4	0.00	0.00	0.00
15,800.0	89.27	179.08	9,103.8	-7,022.5	112.5	7,023.4	0.00	0.00	0.00
15,900.0	89.27	179.08	9,105.0	-7,122.5	114.1	7,123.4	0.00	0.00	0.00
16,000.0	89.27	179.08	9,106.3	-7,222.4	115.7	7,223.4	0.00	0.00	0.00
16,100.0	89.27	179.08	9,107.6	-7,322.4	117.3	7,323.4	0.00	0.00	0.00
16,200.0	89.27	179.08	9,108.8	-7,422.4	118.9	7,423.4	0.00	0.00	0.00
16,300.0	89.27	179.08	9,110.1	-7,522.4	120.5	7,523.4	0.00	0.00	0.00
16,400.0	89.27	179.08	9,111.3	-7,622.4	122.1	7,623.3	0.00	0.00	0.00
16,500.0	89.27	179.08	9,112.6	-7,722.3	123.7	7,723.3	0.00	0.00	0.00
16,600.0	89.27	179.08	9,113.9	-7,822.3	125.3	7,823.3	0.00	0.00	0.00
16,700.0	89.27	179.08	9,115.1	-7,922.3	126.9	7,923.3	0.00	0.00	0.00
16,800.0	89.27	179.08	9,116.4	-8,022.3	128.5	8,023.3	0.00	0.00	0.00
16,900.0	89.27	179.08	9,117.7	-8,122.3	130.1	8,123.3	0.00	0.00	0.00
17,000.0	89.27	179.08	9,118.9	-8,222.2	131.7	8,223.3	0.00	0.00	0.00
17,100.0	89.27	179.08	9,120.2	-8,322.2	133.3	8,323.3	0.00	0.00	0.00
17,200.0	89.27	179.08	9,121.5	-8,422.2	134.9	8,423.3	0.00	0.00	0.00
17,300.0	89.27	179.08	9,122.7	-8,522.2	136.5	8,523.3	0.00	0.00	0.00
17,400.0	89.27	179.08	9,124.0	-8,622.2	138.1	8,623.3	0.00	0.00	0.00
17,500.0	89.27	179.08	9,125.3	-8,722.1	139.7	8,723.3	0.00	0.00	0.00
17,600.0	89.27	179.08	9,126.5	-8,822.1	141.3	8,823.2	0.00	0.00	0.00
17,700.0	89.27	179.08	9,127.8	-8,922.1	142.9	8,923.2	0.00	0.00	0.00
17,800.0	89.27	179.08	9,129.1	-9,022.1	144.5	9,023.2	0.00	0.00	0.00
17,900.0	89.27	179.08	9,130.3	-9,122.1	146.1	9,123.2	0.00	0.00	0.00
18,000.0	89.27	179.08	9,131.6	-9,222.0	147.7	9,223.2	0.00	0.00	0.00
18,100.0	89.27	179.08	9,132.9	-9,322.0	149.3	9,323.2	0.00	0.00	0.00
18,200.0	89.27	179.08	9,134.1	-9,422.0	150.9	9,423.2	0.00	0.00	0.00
18,300.0	89.27	179.08	9,135.4	-9,522.0	152.5	9,523.2	0.00	0.00	0.00
18,400.0	89.27	179.08	9,136.7	-9,621.9	154.1	9,623.2	0.00	0.00	0.00
18,500.0	89.27	179.08	9,137.9	-9,721.9	155.7	9,723.2	0.00	0.00	0.00
18,600.0	89.27	179.08	9,139.2	-9,821.9	157.3	9,823.2	0.00	0.00	0.00
18,700.0	89.27	179.08	9,140.5	-9,921.9	158.9	9,923.2	0.00	0.00	0.00
18,800.0	89.27	179.08	9,141.7	-10,021.9	160.5	10,023.2	0.00	0.00	0.00
18,821.2	89.27	179.08	9,142.0	-10,043.0	160.9	10,044.3	0.00	0.00	0.00

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL-Gatsby Fed Com	0.00	0.00	9,142.0	-10,043.0	160.9	447,036.26	789,036.66	32° 13' 32.029 N	103° 23' 55.189 W
- plan hits target center									
- Point									



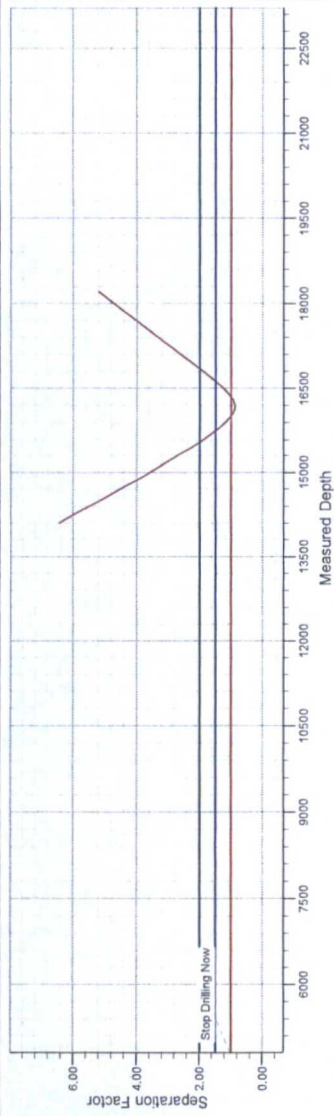
COG Operating LLC
Planning Report

Database:	EDM_Users	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Company:	COG Operating LLC	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Project:	LEA COUNTY, NM	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site:	AVALON SHALE	North Reference:	Grid
Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OWB		
Design:	PWP0		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
8,449.0	8,449.0	0.0	0.0	KOP, 8449' MD	
9,341.9	9,022.0	-565.7	9.1	LANDING POINT, 9341.9' MD, 9022' TVD	

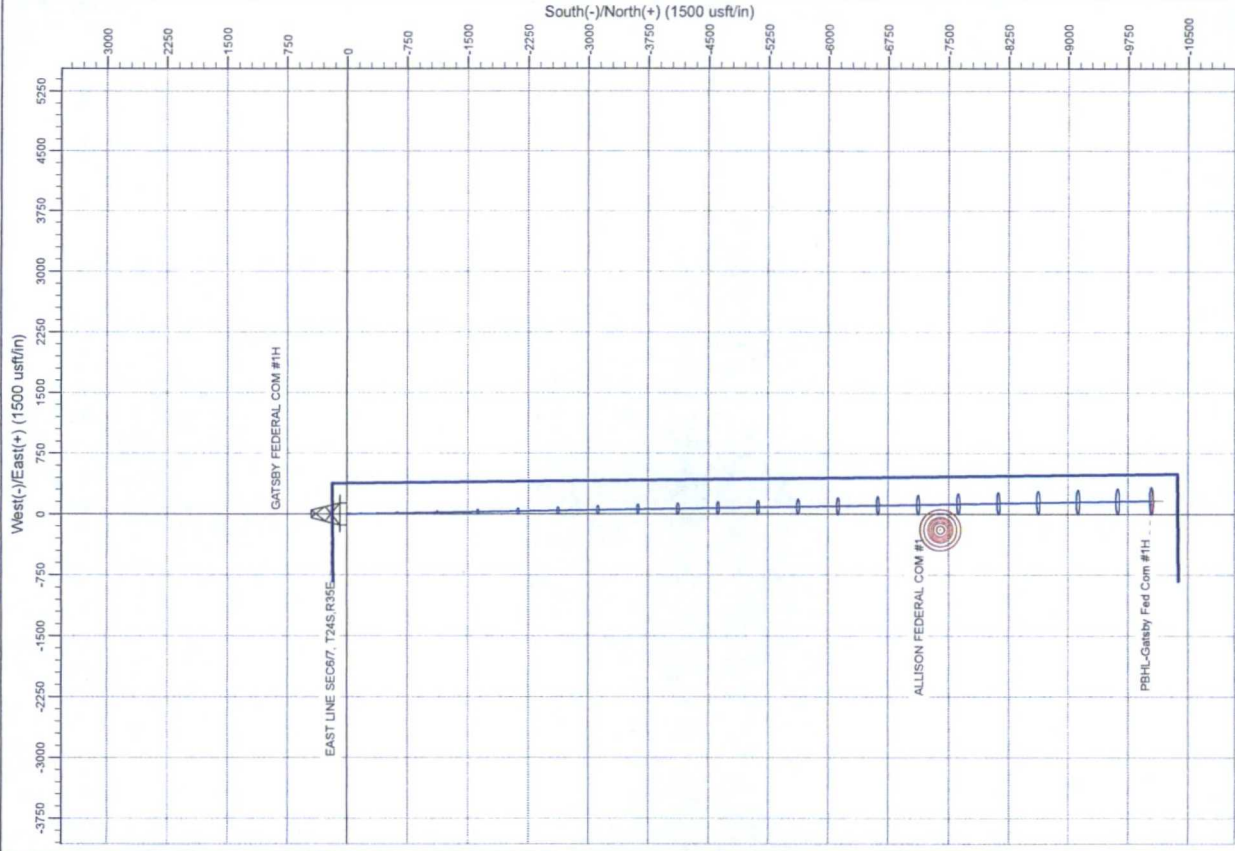
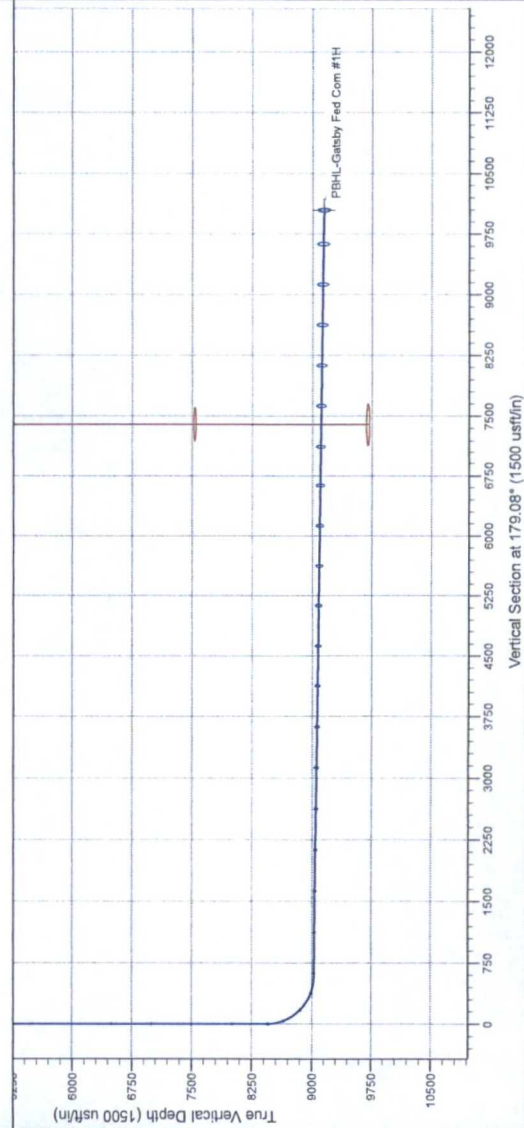


Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: GATSBY FEDERAL COM #1H
Wellbore: OWB
Design: PWP0



LEGEND

- ALLISON FEDERAL COM #1, OVER ACTUAL WELLPATH V0
- PWP0





COG OPERATING LLC

LEA COUNTY, NM

AVALON SHALE

GATSBY FEDERAL COM #1H

OWB

PWP0

Anticollision Report

11 February, 2016



COG Operating LLC
Anticollision Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Reference	PWP0		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 2,151.5 usft	Error Surface:	Circular Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	2/3/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.0	8,449.0	PWP0 (OWB)	VES GyroFlex		
8,449.0	18,820.9	PWP0 (OWB)	MWD	OWSG MWD - Standard	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
AVALON SHALE						
ALLISON FEDERAL COM #1 - OWB - ACTUAL WELLPA	16,170.8	9,032.2	316.9	-44.2	0.878	Stop Drilling Now, CC, ES, S

AVALON SHALE - ALLISON FEDERAL COM #1 - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Offset Design		Survey Program: 520-INC-ONLY											Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
14,100.0	9,082.2	9,006.0	9,004.3	89.1	236.7	85.27	-7,398.3	-198.4	2,094.7	1,768.9	325.84	6.429		
14,200.0	9,083.5	9,007.3	9,005.6	90.8	236.7	85.50	-7,398.3	-198.4	1,996.0	1,668.4	327.54	6.094		
14,300.0	9,084.8	9,008.6	9,006.9	92.5	236.8	85.73	-7,398.3	-198.4	1,897.3	1,568.1	329.24	5.763		
14,400.0	9,086.0	9,009.8	9,008.1	94.1	236.8	85.95	-7,398.3	-198.4	1,798.8	1,467.9	330.94	5.435		
14,500.0	9,087.3	9,011.1	9,009.4	95.8	236.8	86.18	-7,398.3	-198.4	1,700.5	1,367.8	332.64	5.112		
14,600.0	9,088.6	9,012.4	9,010.7	97.5	236.9	86.41	-7,398.3	-198.4	1,602.3	1,268.0	334.34	4.792		
14,700.0	9,089.8	9,013.6	9,011.9	99.1	236.9	86.64	-7,398.3	-198.4	1,504.4	1,168.4	336.04	4.477		
14,800.0	9,091.1	9,014.9	9,013.2	100.8	236.9	86.87	-7,398.3	-198.4	1,406.8	1,069.1	337.75	4.165		
14,900.0	9,092.4	9,016.2	9,014.5	102.5	237.0	87.09	-7,398.3	-198.4	1,309.6	970.2	339.45	3.858		
15,000.0	9,093.6	9,017.4	9,015.7	104.1	237.0	87.32	-7,398.3	-198.4	1,212.8	871.7	341.15	3.555		
15,100.0	9,094.9	9,018.7	9,017.0	105.8	237.0	87.55	-7,398.3	-198.4	1,116.6	773.8	342.85	3.257		
15,200.0	9,096.2	9,019.9	9,018.3	107.5	237.1	87.78	-7,398.3	-198.4	1,021.1	676.6	344.55	2.964		
15,300.0	9,097.4	9,021.2	9,019.5	109.1	237.1	88.01	-7,398.3	-198.4	926.6	580.4	346.25	2.676		
15,400.0	9,098.7	9,022.5	9,020.8	110.8	237.2	88.24	-7,398.3	-198.4	833.3	485.4	347.95	2.395		
15,500.0	9,100.0	9,023.7	9,022.1	112.5	237.2	88.46	-7,398.3	-198.4	741.8	392.2	349.65	2.122		
15,600.0	9,101.2	9,025.0	9,023.3	114.1	237.2	88.69	-7,398.3	-198.4	652.8	301.5	351.36	1.858	Advise and Monitor	
15,700.0	9,102.5	9,026.3	9,024.6	115.8	237.3	88.92	-7,398.3	-198.4	567.5	214.4	353.06	1.607	Advise and Monitor	
15,800.0	9,103.8	9,027.5	9,025.9	117.5	237.3	89.15	-7,398.3	-198.4	487.7	133.0	354.76	1.375	Shut in Produces	
15,900.0	9,105.0	9,028.8	9,027.1	119.1	237.3	89.38	-7,398.3	-198.4	416.8	60.3	356.46	1.169	Shut in Produces	
16,000.0	9,106.3	9,030.1	9,028.4	120.8	237.4	89.61	-7,398.3	-198.4	360.0	1.8	358.16	1.005	Shut in Produces	
16,100.0	9,107.6	9,031.3	9,029.7	122.5	237.4	89.84	-7,398.3	-198.4	324.7	-35.2	359.87	0.902	Stop Drilling Now	
16,170.8	9,108.4	9,032.2	9,030.5	123.6	237.4	90.00	-7,398.3	-198.4	316.9	-44.2	361.07	0.878	Stop Drilling Now, CC, ES, SF	
16,200.0	9,108.8	9,032.6	9,030.9	124.1	237.4	90.07	-7,398.3	-198.4	318.2	-43.4	361.57	0.880	Stop Drilling Now	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



COG Operating LLC
Anticollision Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - ALLISON FEDERAL COM #1 - OWB - ACTUAL WELLPATH													Offset Site Error:	0.0 usft
Survey Program: 520-INC-ONLY													Offset Well Error:	3.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
16,300.0	9,110.1	9,033.9	9,032.2	125.8	237.5	90.30		-7,398.3	-198.4	342.2	-21.1	363.27	0.942	Stop Drilling Now
16,400.0	9,111.3	9,035.1	9,033.4	127.5	237.5	90.52		-7,398.3	-198.4	391.0	26.1	364.97	1.071	Shut in Produces
16,500.0	9,112.6	9,036.4	9,034.7	129.1	237.5	90.75		-7,398.3	-198.4	456.9	90.2	366.68	1.246	Shut in Produces
16,600.0	9,113.9	9,037.7	9,036.0	130.8	237.6	90.98		-7,398.3	-198.4	533.5	165.1	368.38	1.448	Shut in Produces
16,700.0	9,115.1	9,038.9	9,037.2	132.5	237.6	91.21		-7,398.3	-198.4	616.8	246.7	370.08	1.667	Advise and Monitor
16,800.0	9,116.4	9,040.2	9,038.5	134.1	237.6	91.44		-7,398.3	-198.4	704.4	332.6	371.78	1.895	Advise and Monitor
16,900.0	9,117.7	9,041.5	9,039.8	135.8	237.7	91.67		-7,398.3	-198.4	795.0	421.5	373.49	2.129	
17,000.0	9,118.9	9,042.7	9,041.0	137.5	237.7	91.90		-7,398.3	-198.4	887.6	512.4	375.19	2.366	
17,100.0	9,120.2	9,044.0	9,042.3	139.1	237.7	92.13		-7,398.3	-198.4	981.7	604.8	376.89	2.605	
17,200.0	9,121.5	9,045.3	9,043.6	140.8	237.8	92.35		-7,398.3	-198.4	1,076.8	698.2	378.59	2.844	
17,300.0	9,122.7	9,046.5	9,044.8	142.5	237.8	92.58		-7,398.3	-198.4	1,172.7	792.4	380.30	3.084	
17,400.0	9,124.0	9,047.8	9,046.1	144.1	237.9	92.81		-7,398.3	-198.4	1,269.3	887.3	382.00	3.323	
17,500.0	9,125.3	9,049.1	9,047.4	145.8	237.9	93.04		-7,398.3	-198.4	1,366.3	982.6	383.70	3.561	
17,600.0	9,126.5	9,050.3	9,048.6	147.5	237.9	93.27		-7,398.3	-198.4	1,463.8	1,078.4	385.41	3.798	
17,700.0	9,127.8	9,051.6	9,049.9	149.2	238.0	93.50		-7,398.3	-198.4	1,561.6	1,174.4	387.11	4.034	
17,800.0	9,129.1	9,052.9	9,051.2	150.8	238.0	93.72		-7,398.3	-198.4	1,659.6	1,270.8	388.81	4.268	
17,900.0	9,130.3	9,054.1	9,052.4	152.5	238.0	93.95		-7,398.3	-198.4	1,757.8	1,367.3	390.51	4.501	
18,000.0	9,131.6	9,055.4	9,053.7	154.2	238.1	94.18		-7,398.3	-198.4	1,856.3	1,464.1	392.22	4.733	
18,100.0	9,132.9	9,056.7	9,055.0	155.8	238.1	94.41		-7,398.3	-198.4	1,954.9	1,561.0	393.92	4.963	
18,200.0	9,134.1	9,057.9	9,056.2	157.5	238.1	94.63		-7,398.3	-198.4	2,053.6	1,658.0	395.62	5.191	

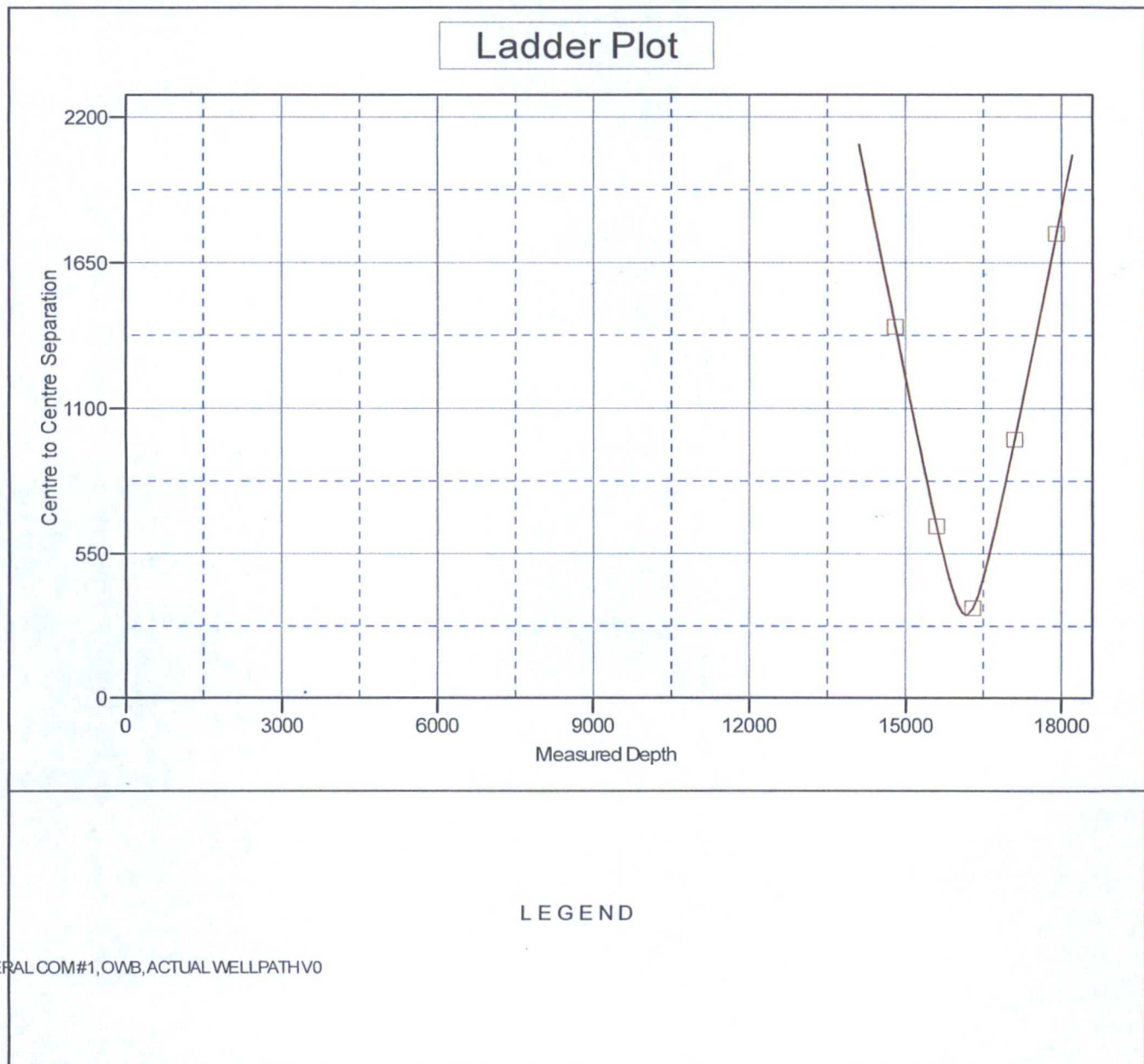


COG Operating LLC
Anticollision Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWP0	Offset TVD Reference:	Offset Datum

Reference Depths are relative to RKB=3455.9+26 @ 3481.9usft (SCAN
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: GATSBY FEDERAL COM #1H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.50°





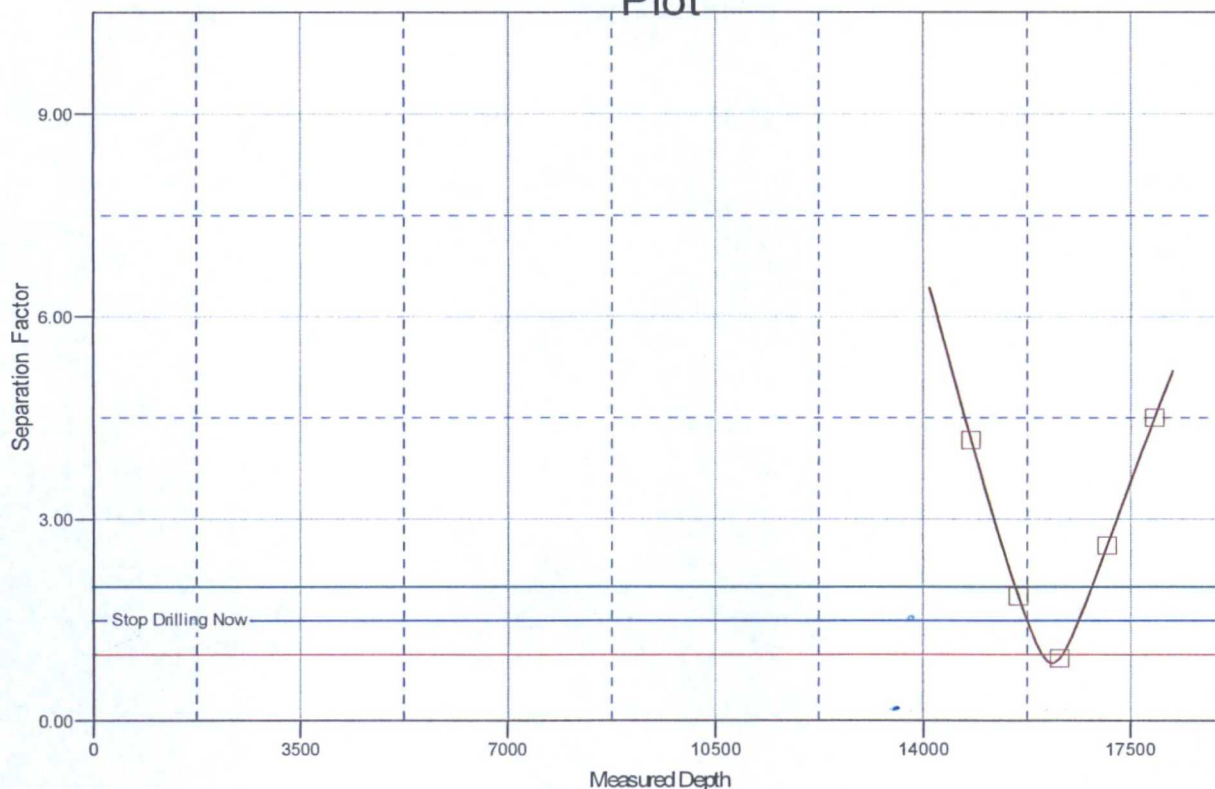
COG Operating LLC
Anticollision Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GATSBY FEDERAL COM #1H
Project:	LEA COUNTY, NM	TVD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Reference Site:	AVALON SHALE	MD Reference:	RKB=3455.9+26 @ 3481.9usft (SCANDRILL FREEDOM)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	GATSBY FEDERAL COM #1H	Survey Calculation Method:	Minimum Curvature
Well Error:	3.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	OWB	Database:	EDM_Users
Reference Design:	PWPO	Offset TVD Reference:	Offset Datum

Reference Depths are relative to RKB=3455.9+26 @ 3481.9usft (SCAN
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: GATSBY FEDERAL COM #1H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.50°

Separation Factor Plot



LEGEND

ERAL COM#1,OWB,ACTUAL WELLPATH V0