



COG Operating, LLC

Lea County, NM

Sec 31, T19S, R32E

Nightcap 6 Federal 1H

Wellbore #1

HOBBS OCD

AUG 17 2015

RECEIVED

Plan: Design #1

DDC Well Planning Report

10 July, 2015



AUG 20 2015



HP
Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Project:	Lea County, NM	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site:	Sec 31, T19S, R32E	North Reference:	Grid
Well:	Nightcap 6 Federal 1H	Survey/Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

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: Sec 31, T19S, R32E					
Site Position:		Northing:	586,390.00 usft	Latitude:	32° 36' 39.641 N
From:	Map	Easting:	660,307.00 usft	Longitude:	103° 48' 45.815 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.28

Well:	Nightcap 6 Federal 1H					
Well Position	+N/-S	1,266.0 usft	Northing:	587,656.00 usft	Latitude:	32° 36' 51.951 N
	+E/-W	4,427.5 usft	Easting:	664,734.50 usft	Longitude:	103° 47' 53.979 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,524.0 usft	

Wellbore:		Wellbore #1			
Magnetics:	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	7/9/2015	7.30	60.41	48,346

Design: Design #1				
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	180.23

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
8,855.8	0.00	0.00	8,855.8	0.0	0.0	0.00	0.00	0.00	0.00	
9,601.0	89.42	180.23	9,333.2	-472.6	-1.9	12.00	12.00	-24.12	180.23	
11,258.5	89.42	180.23	9,350.0	-2,130.1	-8.5	0.00	0.00	0.00	0.00	Northern Hardline Nig
21,149.5	89.42	180.23	9,450.0	-12,020.5	-47.8	0.00	0.00	0.00	0.00	PBHL Nightcap 6 Fed



HP
Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Project:	Lea County, NM	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site:	Sec 31 T19S R32E	North Reference:	Grid
Well:	Nightcap 6 Federal 1H	Survey/Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

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)
Build 12°/100'									
8,855.8	0.00	0.00	8,855.8	0.0	0.0	0.0	0.00	0.00	0.00
8,900.0	5.30	180.23	8,899.9	-2.0	0.0	2.0	12.00	12.00	0.00
9,000.0	17.30	180.23	8,997.8	-21.6	-0.1	21.6	12.00	12.00	0.00
9,100.0	29.30	180.23	9,089.5	-61.1	-0.2	61.1	12.00	12.00	0.00
9,200.0	41.30	180.23	9,171.0	-118.8	-0.5	118.8	12.00	12.00	0.00
SBSG_sand									
9,235.1	45.52	180.23	9,196.4	-142.9	-0.6	142.9	12.00	12.00	0.00
9,300.0	53.30	180.23	9,238.6	-192.1	-0.8	192.1	12.00	12.00	0.00
9,400.0	65.30	180.23	9,289.6	-278.0	-1.1	278.0	12.00	12.00	0.00
9,500.0	77.30	180.23	9,321.6	-372.5	-1.5	372.5	12.00	12.00	0.00
9,600.0	89.30	180.23	9,333.2	-471.7	-1.9	471.7	12.00	12.00	0.00
End of Curve / 89.42° Inc / 180.23° Azm / 9333' TVD									
9,601.0	89.42	180.23	9,333.2	-472.6	-1.9	472.6	12.00	12.00	0.00
9,700.0	89.42	180.23	9,334.2	-571.7	-2.3	571.7	0.00	0.00	0.00
9,800.0	89.42	180.23	9,335.3	-671.6	-2.7	671.7	0.00	0.00	0.00
9,900.0	89.42	180.23	9,336.3	-771.6	-3.1	771.6	0.00	0.00	0.00
10,000.0	89.42	180.23	9,337.3	-871.6	-3.5	871.6	0.00	0.00	0.00
10,100.0	89.42	180.23	9,338.3	-971.6	-3.9	971.6	0.00	0.00	0.00
10,200.0	89.42	180.23	9,339.3	-1,071.6	-4.3	1,071.6	0.00	0.00	0.00
10,300.0	89.42	180.23	9,340.3	-1,171.6	-4.7	1,171.6	0.00	0.00	0.00
10,400.0	89.42	180.23	9,341.3	-1,271.6	-5.1	1,271.6	0.00	0.00	0.00
10,500.0	89.42	180.23	9,342.3	-1,371.6	-5.5	1,371.6	0.00	0.00	0.00
Min. Distance 62'									
10,528.7	89.42	180.23	9,342.6	-1,400.3	-5.6	1,400.3	0.00	0.00	0.00
10,600.0	89.42	180.23	9,343.3	-1,471.6	-5.9	1,471.6	0.00	0.00	0.00
10,700.0	89.42	180.23	9,344.4	-1,571.6	-6.2	1,571.6	0.00	0.00	0.00
10,800.0	89.42	180.23	9,345.4	-1,671.6	-6.6	1,671.6	0.00	0.00	0.00
10,900.0	89.42	180.23	9,346.4	-1,771.6	-7.0	1,771.6	0.00	0.00	0.00
11,000.0	89.42	180.23	9,347.4	-1,871.6	-7.4	1,871.6	0.00	0.00	0.00
11,100.0	89.42	180.23	9,348.4	-1,971.6	-7.8	1,971.6	0.00	0.00	0.00
11,200.0	89.42	180.23	9,349.4	-2,071.6	-8.2	2,071.6	0.00	0.00	0.00
Cross N Hard Line @ 9350' TVD									
11,258.5	89.42	180.23	9,350.0	-2,130.1	-8.5	2,130.1	0.00	0.00	0.00
11,300.0	89.42	180.23	9,350.4	-2,171.6	-8.6	2,171.6	0.00	0.00	0.00
11,400.0	89.42	180.23	9,351.4	-2,271.6	-9.0	2,271.6	0.00	0.00	0.00
11,500.0	89.42	180.23	9,352.4	-2,371.5	-9.4	2,371.6	0.00	0.00	0.00
11,600.0	89.42	180.23	9,353.5	-2,471.5	-9.8	2,471.6	0.00	0.00	0.00
11,700.0	89.42	180.23	9,354.5	-2,571.5	-10.2	2,571.6	0.00	0.00	0.00
11,800.0	89.42	180.23	9,355.5	-2,671.5	-10.6	2,671.6	0.00	0.00	0.00
11,900.0	89.42	180.23	9,356.5	-2,771.5	-11.0	2,771.5	0.00	0.00	0.00
12,000.0	89.42	180.23	9,357.5	-2,871.5	-11.4	2,871.5	0.00	0.00	0.00
12,100.0	89.42	180.23	9,358.5	-2,971.5	-11.8	2,971.5	0.00	0.00	0.00
12,200.0	89.42	180.23	9,359.5	-3,071.5	-12.2	3,071.5	0.00	0.00	0.00
12,300.0	89.42	180.23	9,360.5	-3,171.5	-12.6	3,171.5	0.00	0.00	0.00
12,400.0	89.42	180.23	9,361.5	-3,271.5	-13.0	3,271.5	0.00	0.00	0.00
12,500.0	89.42	180.23	9,362.6	-3,371.5	-13.4	3,371.5	0.00	0.00	0.00
12,600.0	89.42	180.23	9,363.6	-3,471.5	-13.8	3,471.5	0.00	0.00	0.00
12,700.0	89.42	180.23	9,364.6	-3,571.5	-14.2	3,571.5	0.00	0.00	0.00
12,800.0	89.42	180.23	9,365.6	-3,671.5	-14.6	3,671.5	0.00	0.00	0.00
12,900.0	89.42	180.23	9,366.6	-3,771.5	-15.0	3,771.5	0.00	0.00	0.00
13,000.0	89.42	180.23	9,367.6	-3,871.5	-15.4	3,871.5	0.00	0.00	0.00
13,100.0	89.42	180.23	9,368.6	-3,971.5	-15.8	3,971.5	0.00	0.00	0.00



HP
Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Project:	Lea County NM	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site:	Sec 31, T19S, R32E	North Reference:	Grid
Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Built Rate (°/100usft)	Turn Rate (°/100usft)
13,200.0	89.42	180.23	9,369.6	-4,071.4	-16.2	4,071.5	0.00	0.00	0.00
13,300.0	89.42	180.23	9,370.6	-4,171.4	-16.6	4,171.5	0.00	0.00	0.00
13,400.0	89.42	180.23	9,371.7	-4,271.4	-17.0	4,271.5	0.00	0.00	0.00
13,500.0	89.42	180.23	9,372.7	-4,371.4	-17.4	4,371.5	0.00	0.00	0.00
13,600.0	89.42	180.23	9,373.7	-4,471.4	-17.8	4,471.5	0.00	0.00	0.00
13,700.0	89.42	180.23	9,374.7	-4,571.4	-18.2	4,571.5	0.00	0.00	0.00
13,800.0	89.42	180.23	9,375.7	-4,671.4	-18.6	4,671.5	0.00	0.00	0.00
13,900.0	89.42	180.23	9,376.7	-4,771.4	-19.0	4,771.4	0.00	0.00	0.00
14,000.0	89.42	180.23	9,377.7	-4,871.4	-19.4	4,871.4	0.00	0.00	0.00
14,100.0	89.42	180.23	9,378.7	-4,971.4	-19.8	4,971.4	0.00	0.00	0.00
14,200.0	89.42	180.23	9,379.7	-5,071.4	-20.2	5,071.4	0.00	0.00	0.00
14,300.0	89.42	180.23	9,380.8	-5,171.4	-20.6	5,171.4	0.00	0.00	0.00
14,400.0	89.42	180.23	9,381.8	-5,271.4	-21.0	5,271.4	0.00	0.00	0.00
14,500.0	89.42	180.23	9,382.8	-5,371.4	-21.4	5,371.4	0.00	0.00	0.00
14,600.0	89.42	180.23	9,383.8	-5,471.4	-21.8	5,471.4	0.00	0.00	0.00
14,700.0	89.42	180.23	9,384.8	-5,571.4	-22.2	5,571.4	0.00	0.00	0.00
14,800.0	89.42	180.23	9,385.8	-5,671.4	-22.6	5,671.4	0.00	0.00	0.00
14,900.0	89.42	180.23	9,386.8	-5,771.3	-23.0	5,771.4	0.00	0.00	0.00
15,000.0	89.42	180.23	9,387.8	-5,871.3	-23.3	5,871.4	0.00	0.00	0.00
15,100.0	89.42	180.23	9,388.8	-5,971.3	-23.7	5,971.4	0.00	0.00	0.00
15,200.0	89.42	180.23	9,389.9	-6,071.3	-24.1	6,071.4	0.00	0.00	0.00
15,300.0	89.42	180.23	9,390.9	-6,171.3	-24.5	6,171.4	0.00	0.00	0.00
15,400.0	89.42	180.23	9,391.9	-6,271.3	-24.9	6,271.4	0.00	0.00	0.00
15,500.0	89.42	180.23	9,392.9	-6,371.3	-25.3	6,371.4	0.00	0.00	0.00
15,600.0	89.42	180.23	9,393.9	-6,471.3	-25.7	6,471.4	0.00	0.00	0.00
15,700.0	89.42	180.23	9,394.9	-6,571.3	-26.1	6,571.4	0.00	0.00	0.00
15,800.0	89.42	180.23	9,395.9	-6,671.3	-26.5	6,671.3	0.00	0.00	0.00
15,900.0	89.42	180.23	9,396.9	-6,771.3	-26.9	6,771.3	0.00	0.00	0.00
16,000.0	89.42	180.23	9,397.9	-6,871.3	-27.3	6,871.3	0.00	0.00	0.00
16,100.0	89.42	180.23	9,399.0	-6,971.3	-27.7	6,971.3	0.00	0.00	0.00
16,200.0	89.42	180.23	9,400.0	-7,071.3	-28.1	7,071.3	0.00	0.00	0.00
16,300.0	89.42	180.23	9,401.0	-7,171.3	-28.5	7,171.3	0.00	0.00	0.00
16,400.0	89.42	180.23	9,402.0	-7,271.3	-28.9	7,271.3	0.00	0.00	0.00
16,500.0	89.42	180.23	9,403.0	-7,371.3	-29.3	7,371.3	0.00	0.00	0.00
16,600.0	89.42	180.23	9,404.0	-7,471.2	-29.7	7,471.3	0.00	0.00	0.00
16,700.0	89.42	180.23	9,405.0	-7,571.2	-30.1	7,571.3	0.00	0.00	0.00
16,800.0	89.42	180.23	9,406.0	-7,671.2	-30.5	7,671.3	0.00	0.00	0.00
16,900.0	89.42	180.23	9,407.0	-7,771.2	-30.9	7,771.3	0.00	0.00	0.00
17,000.0	89.42	180.23	9,408.1	-7,871.2	-31.3	7,871.3	0.00	0.00	0.00
17,100.0	89.42	180.23	9,409.1	-7,971.2	-31.7	7,971.3	0.00	0.00	0.00
17,200.0	89.42	180.23	9,410.1	-8,071.2	-32.1	8,071.3	0.00	0.00	0.00
17,300.0	89.42	180.23	9,411.1	-8,171.2	-32.5	8,171.3	0.00	0.00	0.00
17,400.0	89.42	180.23	9,412.1	-8,271.2	-32.9	8,271.3	0.00	0.00	0.00
17,500.0	89.42	180.23	9,413.1	-8,371.2	-33.3	8,371.3	0.00	0.00	0.00
17,600.0	89.42	180.23	9,414.1	-8,471.2	-33.7	8,471.3	0.00	0.00	0.00
17,700.0	89.42	180.23	9,415.1	-8,571.2	-34.1	8,571.3	0.00	0.00	0.00
17,800.0	89.42	180.23	9,416.1	-8,671.2	-34.5	8,671.2	0.00	0.00	0.00
17,900.0	89.42	180.23	9,417.2	-8,771.2	-34.9	8,771.2	0.00	0.00	0.00
18,000.0	89.42	180.23	9,418.2	-8,871.2	-35.3	8,871.2	0.00	0.00	0.00
18,100.0	89.42	180.23	9,419.2	-8,971.2	-35.7	8,971.2	0.00	0.00	0.00
18,200.0	89.42	180.23	9,420.2	-9,071.2	-36.1	9,071.2	0.00	0.00	0.00
18,300.0	89.42	180.23	9,421.2	-9,171.1	-36.5	9,171.2	0.00	0.00	0.00
18,400.0	89.42	180.23	9,422.2	-9,271.1	-36.9	9,271.2	0.00	0.00	0.00
18,500.0	89.42	180.23	9,423.2	-9,371.1	-37.3	9,371.2	0.00	0.00	0.00



HP
Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Project:	Lea County, NM	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site:	Sec 31, T19S, R32E	North Reference:	Grid
Well:	Nightcap 6 Federal 1H	Survey/Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/S (usft)	+E/W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)	
18,600.0	89.42	180.23	9,424.2	-9,471.1	-37.7	9,471.2	0.00	0.00	0.00	
18,700.0	89.42	180.23	9,425.2	-9,571.1	-38.1	9,571.2	0.00	0.00	0.00	
18,800.0	89.42	180.23	9,426.3	-9,671.1	-38.5	9,671.2	0.00	0.00	0.00	
18,900.0	89.42	180.23	9,427.3	-9,771.1	-38.9	9,771.2	0.00	0.00	0.00	
19,000.0	89.42	180.23	9,428.3	-9,871.1	-39.3	9,871.2	0.00	0.00	0.00	
19,100.0	89.42	180.23	9,429.3	-9,971.1	-39.7	9,971.2	0.00	0.00	0.00	
19,200.0	89.42	180.23	9,430.3	-10,071.1	-40.0	10,071.2	0.00	0.00	0.00	
19,300.0	89.42	180.23	9,431.3	-10,171.1	-40.4	10,171.2	0.00	0.00	0.00	
19,400.0	89.42	180.23	9,432.3	-10,271.1	-40.8	10,271.2	0.00	0.00	0.00	
19,500.0	89.42	180.23	9,433.3	-10,371.1	-41.2	10,371.2	0.00	0.00	0.00	
19,600.0	89.42	180.23	9,434.3	-10,471.1	-41.6	10,471.2	0.00	0.00	0.00	
19,700.0	89.42	180.23	9,435.4	-10,571.1	-42.0	10,571.1	0.00	0.00	0.00	
19,800.0	89.42	180.23	9,436.4	-10,671.1	-42.4	10,671.1	0.00	0.00	0.00	
19,900.0	89.42	180.23	9,437.4	-10,771.1	-42.8	10,771.1	0.00	0.00	0.00	
20,000.0	89.42	180.23	9,438.4	-10,871.0	-43.2	10,871.1	0.00	0.00	0.00	
20,100.0	89.42	180.23	9,439.4	-10,971.0	-43.6	10,971.1	0.00	0.00	0.00	
20,200.0	89.42	180.23	9,440.4	-11,071.0	-44.0	11,071.1	0.00	0.00	0.00	
20,300.0	89.42	180.23	9,441.4	-11,171.0	-44.4	11,171.1	0.00	0.00	0.00	
20,400.0	89.42	180.23	9,442.4	-11,271.0	-44.8	11,271.1	0.00	0.00	0.00	
20,500.0	89.42	180.23	9,443.4	-11,371.0	-45.2	11,371.1	0.00	0.00	0.00	
20,600.0	89.42	180.23	9,444.5	-11,471.0	-45.6	11,471.1	0.00	0.00	0.00	
20,700.0	89.42	180.23	9,445.5	-11,571.0	-46.0	11,571.1	0.00	0.00	0.00	
20,800.0	89.42	180.23	9,446.5	-11,671.0	-46.4	11,671.1	0.00	0.00	0.00	
20,900.0	89.42	180.23	9,447.5	-11,771.0	-46.8	11,771.1	0.00	0.00	0.00	
21,000.0	89.42	180.23	9,448.5	-11,871.0	-47.2	11,871.1	0.00	0.00	0.00	
21,100.0	89.42	180.23	9,449.5	-11,971.0	-47.6	11,971.1	0.00	0.00	0.00	
PBHL @ 21150' MD / 9450' TVD										
21,149.5	89.42	180.23	9,450.0	-12,020.5	-47.8	12,020.6	0.00	0.00	0.00	

Design Targets										
Target Name	hit/miss target	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N/S (usft)	+E/W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Northern Hardline Night	- plan hits target center	0.00	0.00	9,350.0	-2,130.1	-8.5	585,525.92	664,726.03	32° 36' 30.874 N	103° 47' 54.204 W
	- Point									
PBHL Nightcap 6 Feder	- plan hits target center	0.00	0.00	9,450.0	-12,020.5	-47.8	575,635.50	664,686.70	32° 34' 53.007 N	103° 47' 55.245 W
	- Point									



HP
Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Project:	Lea County, NM	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site:	Sec 31, T19S, R32E	North Reference:	Grid
Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction	
857.0	62.0	Rustler		0.58	180.23	
948.0	153.0	TOS		0.58	180.23	
2,489.0	1,694.0	BOS / Tansill		0.58	180.23	
2,599.0	1,804.0	Yates		0.58	180.23	
2,766.0	1,971.0	Seven Rivers		0.58	180.23	
2,879.0	2,084.0	Captain Reef		0.58	180.23	
4,359.0	3,564.0	Base of Reef (CYCN)		0.58	180.23	
5,635.0	4,840.0	Brushy Canyon		0.58	180.23	
7,315.0	6,520.0	Bone Spring (BSGL)		0.58	180.23	
8,494.0	7,699.0	FBSG_sand		0.58	180.23	
9,235.1	8,401.4	SBSG_sand		0.58	180.23	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
8,855.8	8,855.8	0.0	0.0	Build 12"/100'	
9,601.0	9,333.2	-472.6	-1.9	End of Curve / 89.42° Inc / 180.23° Azm / 9333' TVD	
10,528.7	9,342.6	-1,400.3	-5.6	Min. Distance 62'	
11,258.5	9,350.0	-2,130.1	-8.5	Cross N Hard Line @ 9350' TVD	
21,149.5	9,450.0	-12,020.5	-47.8	PBHL @ 21150' MD / 9450' TVD	



COG Operating, LLC

Lea County, NM

Sec 31, T19S, R32E

Nightcap 6 Federal 1H

Wellbore #1

Design #1

HOBBS OCD

AUG 17 2015

RECEIVED

DDC Anticollision Report

10 July, 2015





HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference:	Design #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date: 7/9/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
0.0	21,149.5	Design #1 (Wellbore #1)	MWD default
			Description
			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:						
Sec 31, T19S, R32E:						
Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1	9,175.0	14,539.9	375.3	355.1	18.620	SF
Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1	9,214.4	14,539.4	371.6	352.0	18.953	CC, ES
Dirty Dozen State Com 4H - Wellbore #1 - Wellbore #1	10,528.9	14,795.3	78.9	61.9	4.619	CC, ES, SF
Nightcap 6 Federal 2H - Wellbore #1 - Design #1	8,835.9	8,835.9	156.3	116.8	3.964	CC
Nightcap 6 Federal 2H - Wellbore #1 - Design #1	8,855.8	8,852.2	156.3	116.8	3.957	ES
Nightcap 6 Federal 2H - Wellbore #1 - Design #1	21,149.5	21,470.2	1,320.1	882.1	3.014	SF
String Bean Federal Com 2H - Wellbore #1 - Wellbore #1	6,416.3	6,410.5	111.3	93.6	6.305	CC
String Bean Federal Com 2H - Wellbore #1 - Wellbore #1	6,700.0	6,693.9	111.7	93.3	6.063	ES
String Bean Federal Com 2H - Wellbore #1 - Wellbore #1	8,855.8	8,849.4	119.8	95.7	4.977	SF

Offset Design:	Sec 31, T19S, R32E - Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1									
Survey Program:	100									
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor
0.0	0.0	0.0	0.0	0.0	-89.77	21.5	-5,436.1	5,436.2		
100.0	100.0	96.6	96.6	0.1	-89.77	21.5	-5,435.9	5,436.0	5,435.9	N/A
200.0	200.0	180.5	180.5	0.3	-89.77	21.5	-5,435.6	5,435.6	5,435.3	N/A
300.0	300.0	271.6	271.6	0.5	-89.78	21.3	-5,435.5	5,435.5	5,435.0	N/A
324.3	324.3	294.3	294.3	0.6	-89.78	21.3	-5,435.5	5,435.5	5,434.9	9,340.747
400.0	400.0	360.6	360.6	0.8	-89.78	21.0	-5,435.5	5,435.6	5,434.8	7,227.762
500.0	500.0	452.6	452.6	1.0	-89.78	20.5	-5,435.8	5,435.9	5,434.9	5,564.910
600.0	600.0	550.6	550.5	1.2	-89.79	19.6	-5,436.1	5,436.2	5,435.0	4,524.229
700.0	700.0	664.3	664.3	1.4	-89.81	18.5	-5,436.5	5,436.5	5,435.1	3,811.498
800.0	800.0	782.4	782.4	1.7	-89.82	17.1	-5,436.4	5,436.4	5,434.8	3,292.585
900.0	900.0	915.8	915.8	1.9	-89.84	15.4	-5,435.7	5,435.9	5,434.0	2,897.781
1,000.0	1,000.0	1,023.0	1,023.0	2.1	-89.85	14.0	-5,434.7	5,434.9	5,432.8	2,587.284
1,100.0	1,100.0	1,123.9	1,123.9	2.3	-89.87	12.7	-5,433.7	5,434.0	5,431.6	2,336.780
1,200.0	1,200.0	1,220.1	1,220.1	2.5	-89.88	11.4	-5,432.7	5,433.0	5,430.4	2,130.441
1,300.0	1,300.0	1,311.1	1,311.1	2.8	-89.89	10.3	-5,432.0	5,432.2	5,429.4	1,957.581
1,400.0	1,400.0	1,416.6	1,416.5	3.0	-89.90	9.1	-5,431.1	5,431.4	5,428.4	1,810.631
1,500.0	1,500.0	1,522.1	1,522.0	3.2	-89.91	8.2	-5,430.2	5,430.5	5,427.2	1,684.142
1,600.0	1,600.0	1,643.0	1,642.9	3.4	-89.92	7.5	-5,428.9	5,429.4	5,425.9	1,574.076

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31 T19S R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31 T19S R32E - Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 usft
Survey Program: 100													Offset Well Error:	0.0 usft
Reference	Vertical	Measured	Offset	Vertical	Semi-Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Between	Between	Separation	Warning	
Depth	Depth	Depth	Depth	Depth	Reference	Depth	Toolface	N-S	E-W	Centres	Ellipses	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)			
1,700.0	1,700.0	1,969.7	1,969.3	3.7	0.0	-89.91	8.6	-5,418.2	5,426.5	5,422.8	1,476.996			
1,800.0	1,800.0	2,118.1	2,117.5	3.9	0.0	-89.89	10.7	-5,409.2	5,420.3	5,416.4	1,390.269			
1,900.0	1,900.0	2,215.0	2,214.2	4.1	0.0	-89.87	12.2	-5,402.9	5,413.9	5,409.8	1,312.930			
2,000.0	2,000.0	2,300.0	2,299.0	4.3	0.0	-89.86	13.3	-5,397.8	5,407.8	5,403.4	1,243.657			
2,100.0	2,100.0	2,391.7	2,390.5	4.6	0.0	-89.85	14.3	-5,392.4	5,401.9	5,397.3	1,181.241			
2,200.0	2,200.0	2,469.8	2,468.6	4.8	0.0	-89.84	15.0	-5,387.9	5,396.1	5,391.3	1,124.704			
2,300.0	2,300.0	2,532.5	2,531.1	5.0	0.0	-89.84	15.3	-5,384.6	5,390.9	5,385.9	1,073.330			
2,400.0	2,400.0	2,600.0	2,598.6	5.2	0.0	-89.83	15.6	-5,381.6	5,386.5	5,381.3	1,026.519			
2,500.0	2,500.0	2,644.7	2,643.3	5.5	0.0	-89.83	15.9	-5,380.1	5,382.9	5,377.4	983.692			
2,600.0	2,600.0	2,700.0	2,698.5	5.7	0.0	-89.82	16.6	-5,378.5	5,380.0	5,374.4	944.382			
2,700.0	2,700.0	2,779.1	2,777.5	5.9	0.0	-89.81	17.6	-5,376.7	5,377.8	5,371.9	908.157			
2,800.0	2,800.0	2,866.2	2,864.7	6.1	0.0	-89.80	18.7	-5,375.1	5,376.0	5,369.8	874.647			
2,900.0	2,900.0	2,963.7	2,962.2	6.4	0.0	-89.79	19.7	-5,373.4	5,374.2	5,367.9	843.520			
3,000.0	3,000.0	3,063.4	3,061.8	6.6	0.0	-89.78	20.6	-5,371.7	5,372.5	5,365.9	814.517			
3,100.0	3,100.0	3,169.5	3,167.9	6.8	0.0	-89.77	21.2	-5,369.8	5,370.8	5,364.0	787.420			
3,200.0	3,200.0	3,337.4	3,335.8	7.0	0.0	-89.77	22.0	-5,365.7	5,368.3	5,361.2	761.946			
3,300.0	3,300.0	3,432.8	3,431.1	7.3	0.0	-89.75	23.2	-5,362.7	5,365.2	5,357.9	737.961			
3,400.0	3,400.0	3,500.0	3,498.2	7.5	0.0	-89.73	24.8	-5,360.8	5,362.4	5,354.9	715.461			
3,500.0	3,500.0	3,587.8	3,586.0	7.7	0.0	-89.71	27.3	-5,358.7	5,360.0	5,352.3	694.322			
3,600.0	3,600.0	3,683.5	3,681.6	7.9	0.0	-89.68	30.0	-5,356.7	5,357.9	5,350.0	674.414			
3,700.0	3,700.0	3,775.8	3,773.9	8.2	0.0	-89.65	32.5	-5,354.8	5,355.9	5,347.7	655.611			
3,800.0	3,800.0	3,867.4	3,865.5	8.4	0.0	-89.63	34.7	-5,353.1	5,354.0	5,345.6	637.835			
3,900.0	3,900.0	3,955.9	3,953.9	8.6	0.0	-89.61	36.4	-5,351.6	5,352.4	5,343.7	621.005			
4,000.0	4,000.0	4,043.1	4,041.1	8.8	0.0	-89.59	37.9	-5,350.3	5,350.9	5,342.1	605.059			
4,100.0	4,100.0	14,488.0	9,404.4	9.1	0.0	-24.69	141.3	-65.0	5,336.7	5,327.6	588.492			
4,200.0	4,200.0	14,488.0	9,404.4	9.3	0.0	-24.69	141.3	-65.0	5,236.7	5,227.4	563.503			
4,300.0	4,300.0	14,488.0	9,404.4	9.5	0.0	-24.69	141.3	-65.0	5,136.8	5,127.2	539.694			
4,400.0	4,400.0	14,488.0	9,404.4	9.7	0.0	-24.69	141.3	-65.0	5,036.8	5,027.1	516.983			
4,500.0	4,500.0	14,488.0	9,404.4	10.0	0.0	-24.69	141.3	-65.0	4,936.9	4,926.9	495.298			
4,600.0	4,600.0	14,488.0	9,404.4	10.2	0.0	-24.69	141.3	-65.0	4,836.9	4,826.7	474.569			
4,700.0	4,700.0	14,488.0	9,404.4	10.4	0.0	-24.69	141.3	-65.0	4,737.0	4,726.5	454.734			
4,800.0	4,800.0	14,500.8	9,404.5	10.6	0.0	-20.20	141.7	-52.2	4,637.0	4,626.3	435.735			
4,900.0	4,900.0	14,501.4	9,404.5	10.9	0.0	-19.98	141.8	-51.5	4,537.0	4,526.2	417.525			
5,000.0	5,000.0	14,502.1	9,404.5	11.1	0.0	-19.76	141.8	-50.9	4,437.1	4,426.0	400.052			
5,100.0	5,100.0	14,502.7	9,404.5	11.3	0.0	-19.53	141.8	-50.3	4,337.2	4,325.8	383.275			
5,200.0	5,200.0	14,503.3	9,404.5	11.5	0.0	-19.29	141.8	-49.6	4,237.2	4,225.7	367.150			
5,300.0	5,300.0	14,504.0	9,404.6	11.8	0.0	-19.05	141.8	-49.0	4,137.3	4,125.5	351.643			
5,400.0	5,400.0	14,504.7	9,404.6	12.0	0.0	-18.80	141.9	-48.3	4,037.3	4,025.4	336.716			
5,500.0	5,500.0	14,505.4	9,404.6	12.2	0.0	-18.55	141.9	-47.6	3,937.4	3,925.2	322.340			
5,600.0	5,600.0	14,506.1	9,404.6	12.4	0.0	-18.30	141.9	-46.9	3,837.5	3,825.1	308.483			
5,700.0	5,700.0	14,506.8	9,404.6	12.7	0.0	-18.04	141.9	-46.2	3,737.6	3,724.9	295.118			
5,800.0	5,800.0	14,507.5	9,404.6	12.9	0.0	-17.77	141.9	-45.5	3,637.7	3,624.8	282.220			
5,900.0	5,900.0	14,508.2	9,404.6	13.1	0.0	-17.50	142.0	-44.8	3,537.7	3,524.6	269.764			
6,000.0	6,000.0	14,509.0	9,404.6	13.3	0.0	-17.22	142.0	-44.0	3,437.8	3,424.5	257.729			
6,100.0	6,100.0	14,509.8	9,404.6	13.6	0.0	-16.93	142.0	-43.2	3,337.9	3,324.4	246.092			
6,200.0	6,200.0	14,510.5	9,404.6	13.8	0.0	-16.64	142.0	-42.5	3,238.0	3,224.2	234.836			
6,300.0	6,300.0	14,511.3	9,404.6	14.0	0.0	-16.34	142.1	-41.7	3,138.1	3,124.1	223.941			
6,400.0	6,400.0	14,512.2	9,404.6	14.2	0.0	-16.04	142.1	-40.8	3,038.2	3,024.0	213.390			
6,500.0	6,500.0	14,513.0	9,404.7	14.5	0.0	-15.72	142.1	-40.0	2,938.4	2,923.9	203.168			
6,600.0	6,600.0	14,513.8	9,404.7	14.7	0.0	-15.40	142.2	-39.2	2,838.5	2,823.8	193.259			
6,700.0	6,700.0	14,514.7	9,404.7	14.9	0.0	-15.08	142.2	-38.3	2,738.6	2,723.7	183.650			
6,800.0	6,800.0	14,515.6	9,404.7	15.1	0.0	-14.74	142.2	-37.4	2,638.8	2,623.7	174.326			

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1												Offset Site Error:
Survey Program: 100												0.0 usft
Reference Measured Depth (usft)	Vertical Measured Depth (usft)	Offset Measured Depth (usft)	Vertical Measured Depth (usft)	Semi-Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
6,900.0	6,900.0	14,516.5	9,404.7	15.4	0.0	-14.40	142.2	-36.5	2,539.0	2,523.6	165.277	
7,000.0	7,000.0	14,517.4	9,404.7	15.6	0.0	-14.04	142.3	-35.6	2,439.1	2,423.5	156.489	
7,100.0	7,100.0	14,518.3	9,404.7	15.8	0.0	-13.68	142.3	-34.6	2,339.3	2,323.5	147.951	
7,200.0	7,200.0	14,519.3	9,404.7	16.0	0.0	-13.31	142.3	-33.7	2,239.5	2,223.5	139.655	
7,300.0	7,300.0	14,520.3	9,404.8	16.3	0.0	-12.94	142.4	-32.7	2,139.7	2,123.5	131.588	
7,400.0	7,400.0	14,521.3	9,404.8	16.5	0.0	-12.55	142.4	-31.7	2,040.0	2,023.5	123.743	
7,500.0	7,500.0	14,522.3	9,404.8	16.7	0.0	-12.15	142.4	-30.7	1,940.3	1,923.5	116.110	
7,600.0	7,600.0	14,523.4	9,404.8	16.9	0.0	-11.74	142.5	-29.6	1,840.6	1,823.6	108.682	
7,700.0	7,700.0	14,524.5	9,404.8	17.2	0.0	-11.32	142.5	-28.5	1,740.9	1,723.7	101.450	
7,800.0	7,800.0	14,525.6	9,404.8	17.4	0.0	-10.89	142.5	-27.4	1,641.3	1,623.9	94.408	
7,900.0	7,900.0	14,526.7	9,404.8	17.6	0.0	-10.45	142.6	-26.3	1,541.7	1,524.1	87.548	
8,000.0	8,000.0	14,527.9	9,404.9	17.8	0.0	-10.00	142.6	-25.1	1,442.1	1,424.3	80.864	
8,100.0	8,100.0	14,529.0	9,404.9	18.1	0.0	-9.53	142.7	-24.0	1,342.7	1,324.6	74.350	
8,200.0	8,200.0	14,530.3	9,404.9	18.3	0.0	-9.06	142.7	-22.7	1,243.3	1,225.0	68.001	
8,300.0	8,300.0	14,531.5	9,404.9	18.5	0.0	-8.57	142.7	-21.5	1,144.0	1,125.5	61.812	
8,400.0	8,400.0	14,532.8	9,404.9	18.7	0.0	-8.06	142.8	-20.2	1,044.9	1,026.2	55.779	
8,500.0	8,500.0	14,534.1	9,404.9	19.0	0.0	-7.54	142.8	-18.9	946.0	927.0	49.899	
8,600.0	8,600.0	14,535.4	9,405.0	19.2	0.0	-7.01	142.9	-17.6	847.3	828.1	44.169	
8,700.0	8,700.0	14,536.8	9,405.0	19.4	0.0	-6.46	142.9	-16.2	748.9	729.5	38.589	
8,800.0	8,800.0	14,538.2	9,405.0	19.6	0.0	-5.90	143.0	-14.8	651.1	631.4	33.183	
8,855.8	8,855.8	14,539.0	9,405.0	19.8	0.0	-5.58	143.0	-14.0	596.8	577.0	30.204	
8,875.0	8,875.0	14,539.3	9,405.0	19.8	0.0	175.08	143.0	-13.7	578.3	558.2	28.867	
8,900.0	8,899.9	14,539.6	9,405.0	19.8	0.0	175.88	143.0	-13.4	554.6	534.2	27.270	
8,925.0	8,924.8	14,539.9	9,405.0	19.9	0.0	176.44	143.0	-13.1	531.5	510.9	25.814	
8,950.0	8,949.4	14,540.1	9,405.0	19.9	0.0	176.84	143.0	-12.9	509.1	488.3	24.492	
8,975.0	8,973.8	14,540.3	9,405.0	20.0	0.0	177.14	143.0	-12.7	487.7	466.8	23.298	
9,000.0	8,997.8	14,540.4	9,405.0	20.0	0.0	177.37	143.0	-12.6	467.4	446.3	22.229	
9,025.0	9,021.5	14,540.5	9,405.0	20.0	0.0	177.54	143.0	-12.5	448.3	427.3	21.287	
9,050.0	9,044.7	14,540.5	9,405.0	20.1	0.0	177.67	143.0	-12.5	430.9	409.8	20.474	
9,075.0	9,067.4	14,540.5	9,405.0	20.1	0.0	177.76	143.0	-12.5	415.2	394.2	19.796	
9,100.0	9,089.5	14,540.4	9,405.0	20.2	0.0	177.82	143.0	-12.6	401.5	380.7	19.261	
9,125.0	9,111.0	14,540.3	9,405.0	20.2	0.0	177.86	143.0	-12.7	390.2	369.5	18.878	
9,150.0	9,131.7	14,540.1	9,405.0	20.2	0.0	177.88	143.0	-12.9	381.4	360.9	18.660	
9,175.0	9,151.7	14,539.9	9,405.0	20.3	0.0	177.87	143.0	-13.1	375.3	355.1	18.620 SF	
9,200.0	9,171.0	14,539.6	9,405.0	20.3	0.0	177.84	143.0	-13.4	372.1	352.3	18.772	
9,214.4	9,181.6	14,539.4	9,405.0	20.4	0.0	177.81	143.0	-13.6	371.6	352.0	18.953 CC, ES	
9,225.0	9,189.3	14,539.3	9,405.0	20.4	0.0	177.79	143.0	-13.8	371.8	352.4	19.130	
9,250.0	9,206.7	14,538.9	9,405.0	20.5	0.0	177.72	143.0	-14.1	374.6	355.6	19.707	
9,275.0	9,223.2	14,538.5	9,405.0	20.5	0.0	177.62	143.0	-14.6	380.2	361.7	20.516	
9,300.0	9,238.6	14,538.0	9,405.0	20.6	0.0	177.50	142.9	-15.0	388.7	370.6	21.571	
9,325.0	9,253.0	14,537.5	9,405.0	20.7	0.0	177.35	142.9	-15.5	399.6	382.2	22.887	
9,350.0	9,266.4	14,536.9	9,405.0	20.8	0.0	177.17	142.9	-16.1	412.9	396.1	24.477	
9,375.0	9,278.6	14,536.3	9,405.0	20.9	0.0	176.95	142.9	-16.7	428.3	412.1	26.358	
9,400.0	9,289.6	14,535.7	9,405.0	21.0	0.0	176.67	142.9	-17.3	445.5	429.9	28.545	
9,425.0	9,299.4	14,535.0	9,405.0	21.1	0.0	176.33	142.8	-18.0	464.3	449.4	31.053	
9,450.0	9,308.1	14,534.3	9,404.9	21.2	0.0	175.91	142.8	-18.7	484.5	470.2	33.879	
9,475.0	9,315.5	14,533.5	9,404.9	21.3	0.0	175.37	142.8	-19.5	505.7	492.1	36.996	
9,500.0	9,321.6	14,532.7	9,404.9	21.5	0.0	174.68	142.8	-20.3	528.0	514.9	40.304	
9,525.0	9,326.4	14,531.9	9,404.9	21.6	0.0	173.75	142.7	-21.1	550.9	538.3	43.573	
9,550.0	9,330.0	14,531.1	9,404.9	21.8	0.0	172.46	142.7	-21.9	574.5	562.1	46.348	
9,575.0	9,332.3	14,530.2	9,404.9	21.9	0.0	170.55	142.7	-22.8	598.6	586.1	47.899	
9,601.0	9,333.2	14,529.3	9,404.9	22.1	0.0	167.31	142.7	-23.7	624.0	610.8	47.247	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid:
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2:00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 31, T19S, R32E - Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program 100												Offset Well Error:	0.0 usft
Reference	Measured	Offset	Vertical	Semi-Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Between	Between	Separation	Warning	
Depth	Depth	Depth	Depth	Reference	Reference	Toolface	N-S	E-W	Centres	Ellipses	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)			
9,700.0	9,334.2	14,525.8	9,404.8	22.8	0.0	165.54	142.5	-27.2	721.7	707.5	51.011		
9,800.0	9,335.3	14,522.2	9,404.8	23.7	0.0	163.78	142.4	-30.8	820.6	805.5	54.115		
9,900.0	9,336.3	14,518.7	9,404.7	24.6	0.0	162.05	142.3	-34.3	919.8	903.5	56.628		
10,000.0	9,337.3	14,515.2	9,404.7	25.7	0.0	160.37	142.2	-37.8	1,019.1	1,001.7	58.646		
10,100.0	9,338.3	14,511.7	9,404.6	26.8	0.0	158.73	142.1	-41.3	1,118.5	1,099.9	60.250		
10,200.0	9,339.3	14,508.2	9,404.6	28.0	0.0	157.14	142.0	-44.8	1,218.0	1,198.2	61.507		
10,300.0	9,340.3	14,504.7	9,404.6	29.3	0.0	155.58	141.9	-48.3	1,317.6	1,296.5	62.476		
10,400.0	9,341.3	14,501.3	9,404.5	30.6	0.0	154.07	141.7	-51.7	1,417.2	1,394.8	63.206		
10,500.0	9,342.3	14,497.9	9,404.5	32.0	0.0	152.61	141.6	-55.1	1,516.9	1,493.1	63.739		
10,600.0	9,343.3	14,494.5	9,404.5	33.4	0.0	151.19	141.5	-58.5	1,616.6	1,591.3	64.110		
10,700.0	9,344.4	14,491.1	9,404.4	34.8	0.0	149.81	141.4	-61.9	1,716.3	1,689.6	64.349		
10,800.0	9,345.4	14,487.5	9,404.4	36.3	0.0	148.42	141.3	-65.4	1,816.0	1,787.8	64.434		
10,900.0	9,346.4	14,482.6	9,404.4	37.8	0.0	146.54	141.1	-70.4	1,915.8	1,885.9	63.990		
11,000.0	9,347.4	14,477.5	9,404.3	39.4	0.0	144.67	141.0	-75.5	2,015.6	1,983.8	63.480		
11,100.0	9,348.4	14,472.2	9,404.3	41.0	0.0	142.81	140.8	-80.8	2,115.4	2,081.8	62.926		
11,200.0	9,349.4	14,466.6	9,404.2	42.5	0.0	140.96	140.6	-86.4	2,215.2	2,179.6	62.345		
11,258.5	9,350.0	14,463.2	9,404.2	43.5	0.0	139.88	140.5	-89.7	2,273.6	2,236.9	61.998		
11,300.0	9,350.4	14,460.8	9,404.2	44.2	0.0	139.12	140.4	-92.2	2,315.0	2,277.5	61.751		
11,400.0	9,351.4	14,454.7	9,404.2	45.8	0.0	137.31	140.2	-98.2	2,414.8	2,375.3	61.156		
11,500.0	9,352.4	14,448.4	9,404.1	47.4	0.0	135.53	139.9	-104.6	2,514.6	2,473.1	60.569		
11,600.0	9,353.5	14,441.8	9,404.1	49.1	0.0	133.77	139.7	-111.2	2,614.4	2,570.9	59.998		
11,700.0	9,354.5	14,434.8	9,404.0	50.7	0.0	132.04	139.4	-118.1	2,714.3	2,668.6	59.446		
11,800.0	9,355.5	14,427.6	9,404.0	52.4	0.0	130.34	139.1	-125.4	2,814.1	2,766.3	58.918		
11,900.0	9,356.5	14,422.1	9,404.0	54.1	0.0	129.12	138.9	-130.9	2,913.9	2,864.2	58.637		
12,000.0	9,357.5	14,417.6	9,403.9	55.8	0.0	128.19	138.7	-135.3	3,013.8	2,962.2	58.478		
12,100.0	9,358.5	14,413.2	9,403.9	57.5	0.0	127.29	138.5	-139.8	3,113.6	3,060.2	58.320		
12,200.0	9,359.5	14,408.7	9,403.9	59.2	0.0	126.42	138.4	-144.2	3,213.4	3,158.2	58.166		
12,300.0	9,360.5	14,404.3	9,403.9	60.9	0.0	125.59	138.2	-148.6	3,313.3	3,256.2	58.015		
12,400.0	9,361.5	14,399.8	9,403.8	62.6	0.0	124.80	138.0	-153.1	3,413.1	3,354.1	57.868		
12,500.0	9,362.6	14,395.4	9,403.8	64.3	0.0	124.03	137.8	-157.5	3,513.0	3,452.1	57.725		
12,600.0	9,363.6	14,390.9	9,403.8	66.1	0.0	123.29	137.6	-162.0	3,612.8	3,550.1	57.586		
12,700.0	9,364.6	14,386.5	9,403.8	67.8	0.0	122.58	137.4	-166.4	3,712.7	3,648.1	57.453		
12,800.0	9,365.6	14,382.1	9,403.7	69.6	0.0	121.90	137.3	-170.8	3,812.5	3,746.0	57.323		
12,900.0	9,366.6	14,377.6	9,403.7	71.3	0.0	121.24	137.1	-175.2	3,912.4	3,844.0	57.198		
13,000.0	9,367.6	14,373.2	9,403.7	73.0	0.0	120.60	136.9	-179.7	4,012.3	3,942.0	57.078		
13,100.0	9,368.6	14,368.8	9,403.7	74.8	0.0	119.99	136.7	-184.1	4,112.1	4,039.9	56.962		
13,200.0	9,369.6	14,364.4	9,403.6	76.6	0.0	119.40	136.5	-188.5	4,212.0	4,137.9	56.851		
13,300.0	9,370.6	14,360.0	9,403.6	78.3	0.0	119.10	136.4	-190.9	4,311.9	4,236.0	56.835		
13,400.0	9,371.7	14,360.0	9,403.6	80.1	0.0	119.10	136.4	-190.9	4,411.7	4,334.2	56.921		
13,500.0	9,372.7	14,362.0	9,403.6	81.8	0.0	119.10	136.4	-190.9	4,511.6	4,432.5	57.002		
13,600.0	9,373.7	14,351.4	9,403.6	83.6	0.0	117.78	136.0	-201.5	4,611.5	4,530.0	56.623		
13,700.0	9,374.7	14,348.4	9,403.5	85.4	0.0	117.44	135.9	-204.5	4,711.4	4,628.1	56.576		
13,800.0	9,375.7	14,345.4	9,403.5	87.1	0.0	117.10	135.8	-207.4	4,811.2	4,726.1	56.529		
13,900.0	9,376.7	14,342.5	9,403.5	88.9	0.0	116.77	135.7	-210.3	4,911.1	4,824.2	56.483		
14,000.0	9,377.7	14,339.7	9,403.5	90.7	0.0	116.46	135.6	-213.2	5,011.0	4,922.2	56.438		
14,100.0	9,378.7	14,336.9	9,403.4	92.5	0.0	116.16	135.4	-216.0	5,110.9	5,020.3	56.394		
14,200.0	9,379.7	14,334.1	9,403.4	94.3	0.0	115.86	135.3	-218.8	5,210.8	5,118.3	56.351		
14,300.0	9,380.8	14,331.4	9,403.4	96.0	0.0	115.58	135.2	-221.5	5,310.7	5,216.4	56.308		
14,400.0	9,381.8	14,328.7	9,403.4	97.8	0.0	115.31	135.1	-224.2	5,410.6	5,314.4	56.267		
14,500.0	9,382.8	14,326.0	9,403.3	99.6	0.0	115.04	135.0	-226.9	5,510.5	5,412.5	56.226		
14,600.0	9,383.8	14,323.4	9,403.3	101.4	0.0	114.78	134.9	-229.5	5,610.4	5,510.5	56.186		
14,700.0	9,384.8	14,320.8	9,403.3	103.2	0.0	114.53	134.8	-232.1	5,710.3	5,608.6	56.147		

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well: Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign:772)
Reference Site:	Sec 31 T19S R32E	MD Reference:	Well @ 3555.0usft (Ensign:772)
Site Error:	0.0usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31 T19S R32E - Dirty Dozen State Com 3H - Wellbore #1 - Wellbore #1												Offset Site Error: 0.0usft
Survey Program: 100												Offset Well Error: 0.0usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi-Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
14,800.0	9,385.8	14,065.6	9,396.9	105.0	0.0	101.56	119.8	-486.7	5,809.9	5,701.6	53.638	
14,900.0	9,386.8	14,056.6	9,396.7	106.8	0.0	101.33	119.1	-495.6	5,809.5	5,799.4	53.631	
15,000.0	9,387.8	14,047.7	9,396.5	108.5	0.0	101.12	118.4	-504.6	5,809.2	5,897.1	53.624	
15,100.0	9,388.8	14,041.0	9,396.4	110.3	0.0	100.96	117.9	-511.2	5,808.8	5,994.9	53.622	
15,200.0	9,389.9	14,032.2	9,396.2	112.1	0.0	100.76	117.2	-520.0	5,808.4	6,092.6	53.615	
15,300.0	9,390.9	14,025.3	9,396.1	113.9	0.0	100.61	116.6	-526.9	5,808.1	6,190.4	53.611	
15,400.0	9,391.9	14,018.4	9,395.9	115.7	0.0	100.46	116.1	-533.8	5,807.7	6,288.2	53.608	
15,500.0	9,392.9	14,011.5	9,395.7	117.5	0.0	100.31	115.5	-540.6	5,807.4	6,386.0	53.604	
15,600.0	9,393.9	14,004.7	9,395.6	119.3	0.0	100.17	115.0	-547.4	5,807.0	6,483.7	53.599	
15,700.0	9,394.9	13,997.9	9,395.4	121.1	0.0	100.03	114.5	-554.2	5,806.7	6,581.5	53.595	
15,800.0	9,395.9	13,991.2	9,395.2	122.9	0.0	99.89	113.9	-560.9	5,806.3	6,679.3	53.590	
15,900.0	9,396.9	13,984.4	9,395.1	124.7	0.0	99.76	113.4	-567.6	5,805.9	6,777.1	53.586	
16,000.0	9,397.9	13,977.0	9,394.9	126.5	0.0	99.62	112.8	-575.0	5,805.6	6,874.8	53.580	
16,100.0	9,399.0	13,970.0	9,394.9	128.3	0.0	99.62	112.8	-575.0	5,805.3	6,972.7	53.585	
16,200.0	9,400.0	13,966.6	9,394.6	130.1	0.0	99.42	112.0	-585.4	5,804.9	7,070.4	53.574	
16,300.0	9,401.0	13,961.1	9,394.5	131.9	0.0	99.33	111.6	-590.8	5,804.6	7,168.2	53.570	
16,400.0	9,402.0	13,955.7	9,394.3	133.7	0.0	99.23	111.2	-596.2	5,804.2	7,266.0	53.567	
16,500.0	9,403.0	13,950.3	9,394.2	135.5	0.0	99.14	110.8	-601.6	5,803.9	7,363.8	53.563	
16,600.0	9,404.0	13,945.0	9,394.1	137.3	0.0	99.05	110.4	-606.9	5,803.6	7,461.6	53.559	
16,700.0	9,405.0	13,939.7	9,393.9	139.1	0.0	98.96	110.0	-612.2	5,803.3	7,559.4	53.555	
16,800.0	9,406.0	13,934.5	9,393.8	140.9	0.0	98.87	109.6	-617.4	5,802.9	7,657.2	53.551	
16,900.0	9,407.0	13,929.3	9,393.7	142.7	0.0	98.79	109.2	-622.6	5,802.6	7,755.0	53.548	
17,000.0	9,408.1	13,924.1	9,393.6	144.5	0.0	98.71	108.8	-627.7	5,802.3	7,852.8	53.544	
17,100.0	9,409.1	13,913.0	9,393.4	146.4	0.0	98.54	108.0	-638.8	5,802.0	7,950.6	53.533	
17,200.0	9,410.1	13,913.0	9,393.4	148.2	0.0	98.54	108.0	-638.8	5,801.7	8,048.5	53.534	
17,300.0	9,411.1	13,913.0	9,393.4	150.0	0.0	98.54	108.0	-638.8	5,801.4	8,146.3	53.536	
17,400.0	9,412.1	13,913.0	9,393.4	151.8	0.0	98.54	108.0	-638.8	5,801.1	8,244.1	53.537	
17,500.0	9,413.1	13,913.0	9,393.4	153.6	0.0	98.54	108.0	-638.8	5,800.8	8,342.0	53.539	
17,600.0	9,414.1	13,913.0	9,393.4	155.4	0.0	98.54	108.0	-638.8	5,800.5	8,439.8	53.540	
17,700.0	9,415.1	13,913.0	9,393.4	157.2	0.0	98.54	108.0	-638.8	5,800.2	8,537.7	53.541	
17,800.0	9,416.1	13,893.4	9,393.1	159.0	0.0	98.27	106.6	-658.3	5,799.9	8,635.5	53.521	
17,900.0	9,417.2	13,890.2	9,393.1	160.8	0.0	98.22	106.3	-661.5	5,899.6	8,733.3	53.518	
18,000.0	9,418.2	13,887.0	9,393.1	162.6	0.0	98.18	106.1	-664.7	5,899.3	8,831.1	53.516	
18,100.0	9,419.2	13,883.8	9,393.0	164.4	0.0	98.14	105.9	-667.9	5,899.0	8,929.0	53.513	
18,200.0	9,420.2	13,880.7	9,393.0	166.2	0.0	98.10	105.7	-671.0	5,898.8	9,026.9	53.511	
18,300.0	9,421.2	13,877.6	9,393.0	168.1	0.0	98.07	105.5	-674.0	5,898.5	9,124.7	53.508	
18,400.0	9,422.2	13,874.6	9,393.0	169.9	0.0	98.03	105.2	-677.1	5,898.2	9,222.6	53.506	
18,500.0	9,423.2	13,871.6	9,393.0	171.7	0.0	98.00	105.0	-680.1	5,898.0	9,320.4	53.503	
18,600.0	9,424.2	13,868.6	9,393.0	173.5	0.0	97.96	104.8	-683.0	5,897.7	9,418.3	53.501	
18,700.0	9,425.2	13,849.0	9,393.2	175.3	0.0	97.76	103.6	-702.6	5,897.5	9,516.2	53.486	
18,800.0	9,426.3	13,849.0	9,393.2	177.1	0.0	97.76	103.6	-702.6	5,897.2	9,614.0	53.486	
18,900.0	9,427.3	13,849.0	9,393.2	178.9	0.0	97.76	103.6	-702.6	5,897.0	9,711.9	53.485	
19,000.0	9,428.3	13,849.0	9,393.2	180.7	0.0	97.76	103.6	-702.6	5,896.7	9,809.8	53.485	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31 T19S R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0' usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0' usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31 T19S R32E - Dirty Dozen State Com 4H - Wellbore #1 - Wellbore #1												Offset Site Error:
Survey Program: 200												0.0' usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-91.47	-138.2	-5,375.1	5,377.0			
100.0	100.0	57.7	57.7	0.1	0.0	-91.47	-138.2	-5,375.1	5,376.9	5,376.8	N/A	
200.0	200.0	145.2	145.2	0.3	0.0	-91.47	-138.3	-5,375.4	5,377.2	5,376.9	N/A	
300.0	300.0	234.9	234.9	0.5	0.0	-91.48	-138.6	-5,375.8	5,377.7	5,377.2	N/A	
400.0	400.0	328.4	328.4	0.8	0.0	-91.48	-138.9	-5,376.4	5,378.3	5,377.6	7,151.632	
500.0	500.0	421.7	421.7	1.0	0.0	-91.49	-139.4	-5,377.1	5,379.1	5,378.1	5,506.802	
600.0	600.0	514.4	514.4	1.2	0.0	-91.49	-140.1	-5,377.9	5,380.0	5,378.8	4,477.444	
700.0	700.0	607.6	607.6	1.4	0.0	-91.50	-140.9	-5,378.8	5,381.0	5,379.6	3,772.598	
800.0	800.0	706.2	706.2	1.7	0.0	-91.51	-141.8	-5,379.9	5,382.1	5,380.5	3,259.697	
900.0	900.0	804.8	804.8	1.9	0.0	-91.52	-142.7	-5,381.0	5,383.2	5,381.4	2,869.721	
1,000.0	1,000.0	903.0	902.9	2.1	0.0	-91.53	-143.7	-5,382.1	5,384.4	5,382.3	2,563.214	
1,100.0	1,100.0	1,001.4	1,001.4	2.3	0.0	-91.54	-144.8	-5,383.2	5,385.6	5,383.2	2,315.973	
1,200.0	1,200.0	1,120.9	1,120.9	2.5	0.0	-91.55	-146.0	-5,384.4	5,386.6	5,384.0	2,112.248	
1,300.0	1,300.0	1,238.7	1,238.6	2.8	0.0	-91.56	-147.0	-5,385.2	5,387.3	5,384.5	1,941.398	
1,400.0	1,400.0	1,353.1	1,353.0	3.0	0.0	-91.57	-148.0	-5,385.6	5,387.6	5,384.6	1,796.055	
1,500.0	1,500.0	1,467.6	1,467.5	3.2	0.0	-91.58	-149.0	-5,385.7	5,387.7	5,384.5	1,670.891	
1,600.0	1,600.0	1,582.2	1,582.1	3.4	0.0	-91.59	-149.8	-5,385.5	5,387.6	5,384.1	1,561.962	
1,700.0	1,700.0	1,696.6	1,696.5	3.7	0.0	-91.60	-150.4	-5,385.0	5,387.1	5,383.5	1,466.287	
1,800.0	1,800.0	2,007.5	2,007.3	3.9	0.0	-91.59	-149.6	-5,378.7	5,386.1	5,382.2	1,381.498	
1,900.0	1,900.0	2,113.6	2,113.3	4.1	0.0	-91.58	-148.0	-5,373.9	5,381.6	5,377.5	1,305.095	
2,000.0	2,000.0	2,217.6	2,217.2	4.3	0.0	-91.56	-146.6	-5,369.1	5,377.0	5,372.6	1,236.565	
2,100.0	2,100.0	2,313.0	2,312.4	4.6	0.0	-91.56	-145.7	-5,364.7	5,372.3	5,367.8	1,174.775	
2,200.0	2,200.0	2,400.0	2,399.4	4.8	0.0	-91.55	-145.5	-5,360.7	5,367.8	5,363.0	1,118.794	
2,300.0	2,300.0	2,473.3	2,472.6	5.0	0.0	-91.56	-145.7	-5,357.7	5,363.6	5,358.6	1,067.899	
2,400.0	2,400.0	2,540.8	2,540.0	5.2	0.0	-91.56	-145.9	-5,355.3	5,360.1	5,354.8	1,021.480	
2,500.0	2,500.0	2,611.2	2,610.4	5.5	0.0	-91.56	-146.1	-5,353.2	5,357.1	5,351.7	978.985	
2,600.0	2,600.0	2,702.7	2,701.9	5.7	0.0	-91.57	-146.5	-5,350.8	5,354.5	5,348.8	939.900	
2,700.0	2,700.0	2,800.0	2,799.2	5.9	0.0	-91.57	-146.9	-5,348.4	5,352.1	5,346.1	903.810	
2,800.0	2,800.0	2,880.5	2,879.6	6.1	0.0	-91.58	-147.3	-5,346.6	5,349.8	5,343.7	870.392	
2,900.0	2,900.0	2,965.5	2,965.6	6.4	0.0	-91.58	-147.7	-5,344.8	5,347.8	5,341.4	839.373	
3,000.0	3,000.0	3,057.3	3,056.4	6.6	0.0	-91.59	-148.2	-5,343.2	5,346.0	5,339.5	810.503	
3,100.0	3,100.0	3,151.2	3,150.3	6.8	0.0	-91.59	-148.4	-5,341.7	5,344.4	5,337.6	783.555	
3,200.0	3,200.0	3,251.8	3,250.8	7.0	0.0	-91.59	-148.4	-5,340.1	5,342.9	5,335.8	758.338	
3,300.0	3,300.0	3,359.5	3,358.6	7.3	0.0	-91.59	-148.0	-5,338.3	5,341.2	5,333.9	734.665	
3,400.0	3,400.0	3,477.2	3,476.3	7.5	0.0	-91.58	-147.5	-5,336.2	5,339.3	5,331.8	712.384	
3,500.0	3,500.0	3,600.8	3,599.9	7.7	0.0	-91.58	-147.1	-5,333.3	5,337.1	5,329.3	691.347	
3,600.0	3,600.0	3,705.8	3,704.8	7.9	0.0	-91.58	-146.9	-5,330.7	5,334.5	5,326.6	671.466	
3,700.0	3,700.0	3,800.0	3,798.9	8.2	0.0	-91.58	-146.9	-5,328.2	5,331.9	5,323.7	652.668	
3,800.0	3,800.0	3,894.0	3,893.0	8.4	0.0	-91.58	-147.0	-5,325.8	5,329.3	5,320.9	634.891	
3,900.0	3,900.0	3,979.3	3,978.2	8.6	0.0	-91.58	-147.3	-5,323.9	5,327.1	5,318.5	618.073	
4,000.0	4,000.0	4,057.7	4,056.6	8.8	0.0	-91.59	-147.7	-5,322.3	5,325.2	5,316.3	602.148	
4,100.0	4,100.0	4,134.0	4,132.8	9.1	0.0	-91.60	-148.4	-5,321.2	5,323.7	5,314.6	587.060	
4,200.0	4,200.0	4,200.0	4,198.9	9.3	0.0	-91.61	-149.1	-5,320.5	5,322.7	5,313.4	572.751	
4,300.0	4,300.0	4,272.9	4,271.4	9.5	0.0	-177.04	-1,395.9	-72.1	5,308.7	5,299.2	557.762	
4,400.0	4,400.0	4,372.8	4,371.4	9.7	0.0	-177.04	-1,395.9	-72.2	5,212.3	5,202.6	534.999	
4,500.0	4,500.0	4,472.8	4,471.4	10.0	0.0	-177.04	-1,395.9	-72.3	5,116.1	5,106.1	513.277	
4,600.0	4,600.0	4,572.8	4,571.4	10.2	0.0	-177.03	-1,395.9	-72.4	5,019.9	5,009.7	492.527	
4,700.0	4,700.0	4,672.8	4,671.4	10.4	0.0	-177.03	-1,395.9	-72.5	4,924.0	4,913.6	472.687	
4,800.0	4,800.0	4,772.8	4,771.4	10.6	0.0	-177.02	-1,395.9	-72.6	4,828.2	4,817.5	453.701	
4,900.0	4,900.0	4,872.8	4,871.4	10.9	0.0	-177.02	-1,395.9	-72.7	4,732.5	4,721.7	435.516	
5,000.0	5,000.0	4,972.8	4,971.4	11.1	0.0	-177.02	-1,395.9	-72.7	4,637.1	4,626.0	418.085	
5,100.0	5,100.0	5,072.8	5,071.4	11.3	0.0	-177.01	-1,395.9	-72.8	4,541.8	4,530.5	401.363	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 31, T19S, R32E - Dirty Dozen State Com 4H - Wellbore #1 - Wellbore #1													Offset Site Error:	0.0 usft
Survey Program 200													Offset Well Error:	0.0 usft
Reference	Measured	Offset	Vertical	Semi-Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Between	Between	Separation	Warning		
Depth	Depth	Depth	Depth	Reference	Reference	Toolface	N-S	E-W	Centres	Ellipses	Factor			
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)			
5,200.0	5,200.0	14,728.2	9,387.4	11.5	0.0	-177.01	-1,395.9	-72.9	4,446.8	4,435.3	385.311			
5,300.0	5,300.0	14,728.1	9,387.4	11.8	0.0	-177.00	-1,395.8	-73.0	4,352.0	4,340.2	369.891			
5,400.0	5,400.0	14,728.0	9,387.4	12.0	0.0	-177.00	-1,395.8	-73.1	4,257.4	4,245.4	355.070			
5,500.0	5,500.0	14,727.9	9,387.4	12.2	0.0	-177.00	-1,395.8	-73.2	4,163.1	4,150.9	340.814			
5,600.0	5,600.0	14,727.8	9,387.4	12.4	0.0	-176.99	-1,395.8	-73.3	4,069.0	4,056.6	327.095			
5,700.0	5,700.0	14,727.6	9,387.4	12.7	0.0	-176.99	-1,395.8	-73.5	3,975.3	3,962.6	313.886			
5,800.0	5,800.0	14,727.5	9,387.4	12.9	0.0	-176.98	-1,395.8	-73.6	3,881.8	3,868.9	301.162			
5,900.0	5,900.0	14,727.4	9,387.4	13.1	0.0	-176.98	-1,395.8	-73.7	3,788.7	3,775.6	288.900			
6,000.0	6,000.0	14,727.3	9,387.4	13.3	0.0	-176.97	-1,395.8	-73.8	3,695.9	3,682.6	277.077			
6,100.0	6,100.0	14,727.2	9,387.4	13.6	0.0	-176.97	-1,395.8	-73.9	3,603.5	3,590.0	265.675			
6,200.0	6,200.0	14,727.1	9,387.4	13.8	0.0	-176.97	-1,395.8	-74.0	3,511.6	3,497.8	254.676			
6,300.0	6,300.0	14,727.0	9,387.4	14.0	0.0	-176.96	-1,395.8	-74.1	3,420.1	3,406.1	244.061			
6,400.0	6,400.0	14,726.9	9,387.4	14.2	0.0	-176.96	-1,395.8	-74.2	3,329.1	3,314.8	233.815			
6,500.0	6,500.0	14,726.7	9,387.4	14.5	0.0	-176.95	-1,395.8	-74.4	3,238.6	3,224.1	223.925			
6,600.0	6,600.0	14,726.6	9,387.4	14.7	0.0	-176.95	-1,395.8	-74.5	3,148.7	3,134.0	214.377			
6,700.0	6,700.0	14,726.5	9,387.4	14.9	0.0	-176.94	-1,395.8	-74.6	3,059.4	3,044.5	205.158			
6,800.0	6,800.0	14,726.4	9,387.4	15.1	0.0	-176.94	-1,395.7	-74.7	2,970.8	2,955.6	196.259			
6,900.0	6,900.0	14,726.2	9,387.4	15.4	0.0	-176.93	-1,395.7	-74.9	2,882.9	2,867.6	187.668			
7,000.0	7,000.0	14,726.1	9,387.4	15.6	0.0	-176.93	-1,395.7	-75.0	2,795.9	2,780.3	179.377			
7,100.0	7,100.0	14,726.0	9,387.4	15.8	0.0	-176.92	-1,395.7	-75.1	2,709.7	2,693.9	171.379			
7,200.0	7,200.0	14,725.9	9,387.4	16.0	0.0	-176.91	-1,395.7	-75.2	2,624.6	2,608.5	163.666			
7,300.0	7,300.0	14,725.7	9,387.4	16.3	0.0	-176.91	-1,395.7	-75.4	2,540.5	2,524.2	156.233			
7,400.0	7,400.0	14,725.6	9,387.4	16.5	0.0	-176.90	-1,395.7	-75.5	2,457.6	2,441.1	149.075			
7,500.0	7,500.0	14,725.4	9,387.4	16.7	0.0	-176.90	-1,395.7	-75.7	2,376.0	2,359.3	142.189			
7,600.0	7,600.0	14,725.3	9,387.4	16.9	0.0	-176.89	-1,395.7	-75.8	2,295.9	2,279.0	135.571			
7,700.0	7,700.0	14,725.1	9,387.4	17.2	0.0	-176.89	-1,395.7	-76.0	2,217.4	2,200.3	129.221			
7,800.0	7,800.0	14,725.0	9,387.4	17.4	0.0	-176.88	-1,395.7	-76.1	2,140.7	2,123.3	123.138			
7,900.0	7,900.0	14,724.8	9,387.4	17.6	0.0	-176.87	-1,395.7	-76.3	2,066.0	2,048.4	117.324			
8,000.0	8,000.0	14,724.7	9,387.4	17.8	0.0	-176.87	-1,395.7	-76.4	1,993.5	1,975.7	111.780			
8,100.0	8,100.0	14,724.5	9,387.4	18.1	0.0	-176.86	-1,395.6	-76.6	1,923.5	1,905.4	106.512			
8,200.0	8,200.0	14,724.4	9,387.4	18.3	0.0	-176.85	-1,395.6	-76.7	1,856.2	1,837.9	101.523			
8,300.0	8,300.0	14,724.2	9,387.4	18.5	0.0	-176.85	-1,395.6	-76.9	1,792.0	1,773.5	96.820			
8,400.0	8,400.0	14,724.0	9,387.4	18.7	0.0	-176.84	-1,395.6	-77.1	1,731.2	1,712.4	92.412			
8,500.0	8,500.0	14,723.9	9,387.4	19.0	0.0	-176.83	-1,395.6	-77.2	1,674.1	1,655.2	88.307			
8,600.0	8,600.0	14,723.7	9,387.4	19.2	0.0	-176.83	-1,395.6	-77.4	1,621.2	1,602.1	84.515			
8,700.0	8,700.0	14,723.5	9,387.4	19.4	0.0	-176.82	-1,395.6	-77.6	1,572.9	1,553.5	81.047			
8,800.0	8,800.0	14,723.3	9,387.4	19.6	0.0	-176.81	-1,395.6	-77.8	1,529.7	1,510.0	77.915			
8,855.8	8,855.8	14,723.2	9,387.4	19.8	0.0	-176.81	-1,395.6	-77.9	1,507.9	1,488.1	76.317			
8,875.0	8,875.0	14,723.2	9,387.4	19.8	0.0	3.02	-1,395.6	-77.9	1,500.4	1,480.6	75.856			
8,900.0	8,899.9	14,723.3	9,387.4	19.8	0.0	-3.09	-1,395.6	-77.8	1,489.9	1,470.2	75.427			
8,925.0	8,924.8	14,723.3	9,387.4	19.9	0.0	3.17	-1,395.6	-77.7	1,478.7	1,459.0	75.156			
8,950.0	8,949.4	14,723.5	9,387.4	19.9	0.0	3.25	-1,395.6	-77.6	1,466.5	1,447.0	75.044			
8,975.0	8,973.8	14,723.7	9,387.4	20.0	0.0	3.35	-1,395.6	-77.4	1,453.6	1,434.3	75.093			
9,000.0	8,997.8	14,724.0	9,387.4	20.0	0.0	3.45	-1,395.6	-77.1	1,439.9	1,420.8	75.304			
9,025.0	9,021.5	14,724.3	9,387.4	20.0	0.0	3.57	-1,395.6	-76.7	1,425.4	1,406.5	75.685			
9,050.0	9,044.7	14,724.8	9,387.4	20.1	0.0	3.69	-1,395.7	-76.3	1,410.1	1,391.6	76.244			
9,075.0	9,067.4	14,725.2	9,387.4	20.1	0.0	3.83	-1,395.7	-75.9	1,394.1	1,376.0	76.991			
9,100.0	9,089.5	14,725.7	9,387.4	20.2	0.0	3.99	-1,395.7	-75.3	1,377.3	1,359.7	77.939			
9,125.0	9,111.0	14,726.3	9,387.4	20.2	0.0	4.16	-1,395.7	-74.8	1,359.9	1,342.7	79.106			
9,150.0	9,131.7	14,727.0	9,387.4	20.2	0.0	4.36	-1,395.8	-74.1	1,341.7	1,325.0	80.512			
9,175.0	9,151.7	14,727.7	9,387.4	20.3	0.0	4.58	-1,395.8	-73.4	1,322.9	1,306.8	82.184			
9,200.0	9,171.0	14,728.4	9,387.4	20.3	0.0	4.83	-1,395.9	-72.7	1,303.4	1,287.9	84.150			

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - Dirty Dozen State Com 4H - Wellbore #1 - Wellbore #1												Offset Site Error:
Survey Program: 200												0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
9,225.0	9,189.3	14,729.2	9,387.4	20.4	0.0	5.12	-1,395.9	-71.9	1,283.3	1,268.5	86.448	
9,250.0	9,206.7	14,730.1	9,387.4	20.5	0.0	5.46	-1,396.0	-71.0	1,262.6	1,248.5	89.119	
9,275.0	9,223.2	14,731.0	9,387.4	20.5	0.0	5.86	-1,396.0	-70.1	1,241.4	1,227.9	92.207	
9,300.0	9,238.6	14,732.0	9,387.4	20.6	0.0	6.33	-1,396.1	-69.1	1,219.6	1,206.9	95.761	
9,325.0	9,253.0	14,733.0	9,387.4	20.7	0.0	6.91	-1,396.1	-68.1	1,197.4	1,185.4	99.816	
9,350.0	9,266.4	14,734.0	9,387.4	20.8	0.0	7.62	-1,396.2	-67.1	1,174.6	1,163.4	104.376	
9,375.0	9,278.6	14,735.1	9,387.4	20.9	0.0	8.52	-1,396.2	-66.0	1,151.4	1,140.9	109.357	
9,400.0	9,289.6	14,736.2	9,387.4	21.0	0.0	9.69	-1,396.3	-64.9	1,127.9	1,118.0	114.457	
9,425.0	9,299.4	14,737.4	9,387.4	21.1	0.0	11.28	-1,396.4	-63.7	1,104.0	1,094.7	118.887	
9,450.0	9,308.1	14,738.5	9,387.4	21.2	0.0	13.56	-1,396.4	-62.6	1,079.7	1,070.8	120.838	
9,475.0	9,315.5	14,739.8	9,387.4	21.3	0.0	17.08	-1,396.5	-61.4	1,055.3	1,046.2	116.818	
9,500.0	9,321.6	14,741.0	9,387.4	21.5	0.0	23.14	-1,396.6	-60.1	1,030.6	1,020.5	102.168	
9,525.0	9,326.4	14,742.2	9,387.4	21.6	0.0	35.50	-1,396.7	-58.9	1,005.7	992.5	75.815	
9,550.0	9,330.0	14,743.5	9,387.4	21.8	0.0	66.24	-1,396.7	-57.6	980.8	960.8	49.034	
9,575.0	9,332.3	14,744.8	9,387.4	21.9	0.0	118.58	-1,396.8	-56.4	955.8	932.9	41.674	
9,601.0	9,333.2	14,746.1	9,387.4	22.1	0.0	147.87	-1,396.9	-55.1	930.0	911.6	50.589	
9,700.0	9,334.2	14,751.2	9,387.4	22.8	0.0	150.59	-1,397.2	-50.0	831.5	813.2	45.617	
9,800.0	9,335.3	14,756.3	9,387.4	23.7	0.0	153.52	-1,397.5	-44.8	732.1	714.1	40.592	
9,900.0	9,336.3	14,761.5	9,387.4	24.6	0.0	156.63	-1,397.8	-39.6	632.9	615.1	35.564	
10,000.0	9,337.3	14,766.8	9,387.4	25.7	0.0	159.92	-1,398.1	-34.4	534.0	516.5	30.500	
10,100.0	9,338.3	14,772.1	9,387.5	26.8	0.0	163.38	-1,398.4	-29.1	435.5	418.3	25.339	
10,200.0	9,339.3	14,777.4	9,387.5	28.0	0.0	166.99	-1,398.7	-23.8	337.8	320.9	20.015	
10,300.0	9,340.3	14,782.8	9,387.5	29.3	0.0	170.74	-1,399.0	-18.4	241.8	225.2	14.519	
10,400.0	9,341.3	14,788.2	9,387.5	30.6	0.0	174.60	-1,399.3	-13.0	151.0	134.4	9.077	
10,500.0	9,342.3	14,793.7	9,387.6	32.0	0.0	178.58	-1,399.6	-7.5	84.1	67.1	4.965	
10,528.9	9,342.6	14,795.3	9,387.6	32.4	0.0	179.73	-1,399.7	-5.9	78.9	61.9	4.619	CC, ES, SF
10,600.0	9,343.3	14,799.2	9,387.6	33.4	0.0	-177.44	-1,400.0	-2.0	106.1	88.5	6.021	
10,700.0	9,344.4	14,804.7	9,387.6	34.8	0.0	-173.48	-1,400.3	3.5	188.2	169.4	10.040	
10,800.0	9,345.4	14,810.2	9,387.6	36.3	0.0	-169.58	-1,400.6	9.0	281.9	261.7	13.949	
10,900.0	9,346.4	14,815.7	9,387.7	37.8	0.0	-165.79	-1,400.9	14.5	378.8	356.9	17.249	
11,000.0	9,347.4	14,821.2	9,387.7	39.4	0.0	-162.11	-1,401.3	19.9	476.9	453.0	19.942	
11,100.0	9,348.4	14,826.7	9,387.7	41.0	0.0	-158.59	-1,401.6	25.4	575.6	549.6	22.132	
11,200.0	9,349.4	14,832.2	9,387.8	42.5	0.0	-155.23	-1,401.9	30.9	674.7	646.5	23.933	
11,258.5	9,350.0	14,835.4	9,387.8	43.5	0.0	-153.34	-1,402.1	34.1	732.7	703.3	24.846	
11,300.0	9,350.4	14,837.7	9,387.8	44.2	0.0	-152.05	-1,402.2	36.4	773.9	743.5	25.441	
11,400.0	9,351.4	14,843.2	9,387.8	45.8	0.0	-149.04	-1,402.6	41.9	873.3	840.6	26.729	
11,500.0	9,352.4	14,848.7	9,387.8	47.4	0.0	-146.21	-1,402.9	47.4	972.8	937.9	27.852	
11,600.0	9,353.5	14,854.2	9,387.9	49.1	0.0	-143.56	-1,403.2	52.9	1,072.4	1,035.2	28.849	
11,700.0	9,354.5	14,859.7	9,387.9	50.7	0.0	-141.08	-1,403.5	58.4	1,172.0	1,132.6	29.749	
11,800.0	9,355.5	14,865.2	9,387.9	52.4	0.0	-138.77	-1,403.9	63.9	1,271.6	1,230.0	30.573	
11,900.0	9,356.5	14,870.7	9,388.0	54.1	0.0	-136.61	-1,404.2	69.4	1,371.3	1,327.5	31.335	
12,000.0	9,357.5	14,876.2	9,388.0	55.8	0.0	-134.59	-1,404.5	74.9	1,471.0	1,425.1	32.047	
12,100.0	9,358.5	14,881.7	9,388.0	57.5	0.0	-132.71	-1,404.8	80.4	1,570.7	1,522.7	32.715	
12,200.0	9,359.5	14,887.2	9,388.0	59.2	0.0	-130.95	-1,405.2	85.9	1,670.4	1,620.3	33.347	
12,300.0	9,360.5	14,892.8	9,388.1	60.9	0.0	-129.32	-1,405.5	91.4	1,770.1	1,718.0	33.946	
12,400.0	9,361.5	14,898.3	9,388.1	62.6	0.0	-127.79	-1,405.8	96.9	1,869.9	1,815.7	34.516	
12,500.0	9,362.6	14,903.8	9,388.1	64.3	0.0	-126.36	-1,406.1	102.4	1,969.7	1,913.5	35.059	
12,600.0	9,363.6	14,909.3	9,388.2	66.1	0.0	-125.02	-1,406.5	107.8	2,069.4	2,011.3	35.579	
12,700.0	9,364.6	14,914.8	9,388.2	67.8	0.0	-123.76	-1,406.8	113.3	2,169.2	2,109.1	36.076	
12,800.0	9,365.6	14,920.3	9,388.2	69.6	0.0	-122.58	-1,407.1	118.8	2,269.0	2,206.9	36.553	
12,900.0	9,366.6	14,925.8	9,388.2	71.3	0.0	-121.48	-1,407.4	124.3	2,368.8	2,304.8	37.010	
13,000.0	9,367.6	14,931.3	9,388.3	73.0	0.0	-120.44	-1,407.8	129.8	2,468.6	2,402.7	37.450	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31 T19S R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31 T19S R32E - Dirty Dozen State Com 4H - Wellbore #1 - Wellbore #1											Offset Site Error:
Survey Program: 200											Offset Well Error:
Reference	Measured	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Between	Separation	Warning
Depth	Depth	Depth	Depth	Reference	Depth	Toolface	N-S	E-W	Centres	Ellipses	Factor
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(ft)	(usft)	(usft)	(usft)	(usft)	
13,100.0	9,368.6	14,936.8	9,388.3	74.8	0.0	-119.46	-1,408.1	135.3	2,568.4	2,500.6	37.872
13,200.0	9,369.6	14,942.3	9,388.3	76.6	0.0	-118.54	-1,408.4	140.8	2,668.2	2,598.5	38.277
13,300.0	9,370.6	14,947.8	9,388.4	78.3	0.0	-117.67	-1,408.7	146.3	2,768.0	2,696.4	38.668
13,400.0	9,371.7	14,953.3	9,388.4	80.1	0.0	-116.85	-1,409.1	151.8	2,867.8	2,794.4	39.044
13,500.0	9,372.7	14,958.8	9,388.4	81.8	0.0	-116.07	-1,409.4	157.3	2,967.6	2,892.3	39.406
13,600.0	9,373.7	14,964.3	9,388.5	83.6	0.0	-115.34	-1,409.7	162.8	3,067.4	2,990.3	39.756
13,700.0	9,374.7	14,969.8	9,388.5	85.4	0.0	-114.64	-1,410.0	168.3	3,167.2	3,088.2	40.092
13,800.0	9,375.7	14,975.3	9,388.5	87.1	0.0	-113.98	-1,410.4	173.8	3,267.1	3,186.2	40.417
13,900.0	9,376.7	14,980.0	9,388.5	88.9	0.0	-113.44	-1,410.6	178.5	3,366.9	3,284.2	40.707
14,000.0	9,377.7	14,980.0	9,388.5	90.7	0.0	-113.44	-1,410.6	178.5	3,466.7	3,382.3	41.092
14,100.0	9,378.7	14,980.0	9,388.5	92.5	0.0	-113.44	-1,410.6	178.5	3,566.5	3,480.5	41.461
14,200.0	9,379.7	14,980.0	9,388.5	94.3	0.0	-113.44	-1,410.6	178.5	3,666.4	3,578.7	41.816
14,300.0	9,380.8	14,980.0	9,388.5	96.0	0.0	-113.44	-1,410.6	178.5	3,766.2	3,676.9	42.157
14,400.0	9,381.8	14,980.0	9,388.5	97.8	0.0	-113.44	-1,410.6	178.5	3,866.1	3,775.1	42.484
14,500.0	9,382.8	14,980.0	9,388.5	99.6	0.0	-113.44	-1,410.6	178.5	3,966.0	3,873.3	42.800
14,600.0	9,383.8	14,980.0	9,388.5	101.4	0.0	-113.44	-1,410.6	178.5	4,065.9	3,971.5	43.104
14,700.0	9,384.8	14,980.0	9,388.5	103.2	0.0	-113.44	-1,410.6	178.5	4,165.7	4,069.7	43.397
14,800.0	9,385.8	14,980.0	9,388.5	105.0	0.0	-113.44	-1,410.6	178.5	4,265.6	4,168.0	43.679
14,900.0	9,386.8	14,980.0	9,388.5	106.8	0.0	-113.44	-1,410.6	178.5	4,365.5	4,266.2	43.952
15,000.0	9,387.8	14,980.0	9,388.5	108.5	0.0	-113.44	-1,410.6	178.5	4,465.4	4,364.4	44.215
15,100.0	9,388.8	14,980.0	9,388.5	110.3	0.0	-113.44	-1,410.6	178.5	4,565.3	4,462.6	44.469
15,200.0	9,389.9	14,980.0	9,388.5	112.1	0.0	-113.44	-1,410.6	178.5	4,665.2	4,560.9	44.714
15,300.0	9,390.9	14,980.0	9,388.5	113.9	0.0	-113.44	-1,410.6	178.5	4,765.1	4,659.1	44.952
15,400.0	9,391.9	14,980.0	9,388.5	115.7	0.0	-113.44	-1,410.6	178.5	4,865.0	4,757.4	45.182
15,500.0	9,392.9	14,980.0	9,388.5	117.5	0.0	-113.44	-1,410.6	178.5	4,965.0	4,855.6	45.404
15,600.0	9,393.9	14,980.0	9,388.5	119.3	0.0	-113.44	-1,410.6	178.5	5,064.9	4,953.9	45.620
15,700.0	9,394.9	14,980.0	9,388.5	121.1	0.0	-113.44	-1,410.6	178.5	5,164.8	5,052.1	45.829
15,800.0	9,395.9	14,980.0	9,388.5	122.9	0.0	-113.44	-1,410.6	178.5	5,264.7	5,150.4	46.031
15,900.0	9,396.9	14,980.0	9,388.5	124.7	0.0	-113.44	-1,410.6	178.5	5,364.7	5,248.6	46.228
16,000.0	9,397.9	14,980.0	9,388.5	126.5	0.0	-113.44	-1,410.6	178.5	5,464.6	5,346.9	46.418
16,100.0	9,399.0	14,980.0	9,388.5	128.3	0.0	-113.44	-1,410.6	178.5	5,564.5	5,445.1	46.603
16,200.0	9,400.0	14,980.0	9,388.5	130.1	0.0	-113.44	-1,410.6	178.5	5,664.5	5,543.4	46.783
16,300.0	9,401.0	14,980.0	9,388.5	131.9	0.0	-113.44	-1,410.6	178.5	5,764.4	5,641.6	46.957
16,400.0	9,402.0	14,980.0	9,388.5	133.7	0.0	-113.44	-1,410.6	178.5	5,864.3	5,739.9	47.127
16,500.0	9,403.0	14,980.0	9,388.5	135.5	0.0	-113.44	-1,410.6	178.5	5,964.3	5,838.2	47.292
16,600.0	9,404.0	14,980.0	9,388.5	137.3	0.0	-113.44	-1,410.6	178.5	6,064.2	5,936.4	47.452
16,700.0	9,405.0	14,980.0	9,388.5	139.1	0.0	-113.44	-1,410.6	178.5	6,164.2	6,034.7	47.608
16,800.0	9,406.0	14,980.0	9,388.5	140.9	0.0	-113.44	-1,410.6	178.5	6,264.1	6,133.0	47.760
16,900.0	9,407.0	14,980.0	9,388.5	142.7	0.0	-113.44	-1,410.6	178.5	6,364.1	6,231.2	47.908
17,000.0	9,408.1	14,980.0	9,388.5	144.5	0.0	-113.44	-1,410.6	178.5	6,464.0	6,329.5	48.052
17,100.0	9,409.1	14,980.0	9,388.5	146.4	0.0	-113.44	-1,410.6	178.5	6,564.0	6,427.8	48.192
17,200.0	9,410.1	14,980.0	9,388.5	148.2	0.0	-113.44	-1,410.6	178.5	6,663.9	6,526.0	48.329
17,300.0	9,411.1	14,980.0	9,388.5	150.0	0.0	-113.44	-1,410.6	178.5	6,763.9	6,624.3	48.462
17,400.0	9,412.1	14,980.0	9,388.5	151.8	0.0	-113.44	-1,410.6	178.5	6,863.8	6,722.6	48.593
17,500.0	9,413.1	14,980.0	9,388.5	153.6	0.0	-113.44	-1,410.6	178.5	6,963.8	6,820.9	48.719
17,600.0	9,414.1	14,980.0	9,388.5	155.4	0.0	-113.44	-1,410.6	178.5	7,063.7	6,919.1	48.843
17,700.0	9,415.1	14,980.0	9,388.5	157.2	0.0	-113.44	-1,410.6	178.5	7,163.7	7,017.4	48.964
17,800.0	9,416.1	14,980.0	9,388.5	159.0	0.0	-113.44	-1,410.6	178.5	7,263.7	7,115.7	49.082
17,900.0	9,417.2	14,980.0	9,388.5	160.8	0.0	-113.44	-1,410.6	178.5	7,363.6	7,214.0	49.197
18,000.0	9,418.2	14,980.0	9,388.5	162.6	0.0	-113.44	-1,410.6	178.5	7,463.6	7,312.2	49.310
18,100.0	9,419.2	14,980.0	9,388.5	164.4	0.0	-113.44	-1,410.6	178.5	7,563.6	7,410.5	49.420
18,200.0	9,420.2	14,980.0	9,388.5	166.2	0.0	-113.44	-1,410.6	178.5	7,663.5	7,508.8	49.528

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 31, T19S, R32E - Dirty Dozen State Com 4H - Wellbore #1 - Wellbore #1											Offset Site Error
Survey Program: 200											0.0 usft
Reference	Measured	Vertical	Offset	Semi-Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Between	Separation	Warning
Depth	Depth	Depth	Depth	Reference	Reference	Toolface	N-S	Between	Centres	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	Centres	Ellipses		
								(usft)	(usft)		
18,300.0	9,421.2	14,980.0	9,388.5	168.1	0.0	-113.44	-1,410.6	178.5	7,763.5	7,607.1	49.633
18,400.0	9,422.2	14,980.0	9,388.5	169.9	0.0	-113.44	-1,410.6	178.5	7,863.5	7,705.4	49.736
18,500.0	9,423.2	14,980.0	9,388.5	171.7	0.0	-113.44	-1,410.6	178.5	7,963.4	7,803.6	49.836
18,600.0	9,424.2	14,980.0	9,388.5	173.5	0.0	-113.44	-1,410.6	178.5	8,063.4	7,901.9	49.935
18,700.0	9,425.2	14,980.0	9,388.5	175.3	0.0	-113.44	-1,410.6	178.5	8,163.4	8,000.2	50.031
18,800.0	9,426.3	14,980.0	9,388.5	177.1	0.0	-113.44	-1,410.6	178.5	8,263.3	8,098.5	50.125
18,900.0	9,427.3	14,980.0	9,388.5	178.9	0.0	-113.44	-1,410.6	178.5	8,363.3	8,196.8	50.217
19,000.0	9,428.3	14,980.0	9,388.5	180.7	0.0	-113.44	-1,410.6	178.5	8,463.3	8,295.0	50.308
19,100.0	9,429.3	14,980.0	9,388.5	182.6	0.0	-113.44	-1,410.6	178.5	8,563.2	8,393.3	50.396
19,200.0	9,430.3	14,980.0	9,388.5	184.4	0.0	-113.44	-1,410.6	178.5	8,663.2	8,491.6	50.483
19,300.0	9,431.3	14,980.0	9,388.5	186.2	0.0	-113.44	-1,410.6	178.5	8,763.2	8,589.9	50.568
19,400.0	9,432.3	14,980.0	9,388.5	188.0	0.0	-113.44	-1,410.6	178.5	8,863.2	8,688.2	50.651
19,500.0	9,433.3	14,980.0	9,388.5	189.8	0.0	-113.44	-1,410.6	178.5	8,963.1	8,786.5	50.733
19,600.0	9,434.3	14,980.0	9,388.5	191.6	0.0	-113.44	-1,410.6	178.5	9,063.1	8,884.8	50.813
19,700.0	9,435.4	14,980.0	9,388.5	193.4	0.0	-113.44	-1,410.6	178.5	9,163.1	8,983.0	50.892
19,800.0	9,436.4	14,980.0	9,388.5	195.2	0.0	-113.44	-1,410.6	178.5	9,263.1	9,081.3	50.969
19,900.0	9,437.4	14,980.0	9,388.5	197.1	0.0	-113.44	-1,410.6	178.5	9,363.0	9,179.6	51.044
20,000.0	9,438.4	14,980.0	9,388.5	198.9	0.0	-113.44	-1,410.6	178.5	9,463.0	9,277.9	51.118
20,100.0	9,439.4	14,980.0	9,388.5	200.7	0.0	-113.44	-1,410.6	178.5	9,563.0	9,376.2	51.191
20,200.0	9,440.4	14,980.0	9,388.5	202.5	0.0	-113.44	-1,410.6	178.5	9,663.0	9,474.5	51.262
20,300.0	9,441.4	14,980.0	9,388.5	204.3	0.0	-113.44	-1,410.6	178.5	9,763.0	9,572.8	51.332
20,400.0	9,442.4	14,980.0	9,388.5	206.1	0.0	-113.44	-1,410.6	178.5	9,862.9	9,671.1	51.401
20,500.0	9,443.4	14,980.0	9,388.5	208.0	0.0	-113.44	-1,410.6	178.5	9,962.9	9,769.3	51.469

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0'usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0'usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - Nightcap 6 Federal 2H - Wellbore #1 - Design #1												Offset Site Error:
Survey Program: MWD default												0.0'usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-140.17	-120.0	-100.1	156.3			
100.0	100.0	100.0	100.0	0.1	0.1	-140.17	-120.0	-100.1	156.3	156.1	1,007.610	
200.0	200.0	200.0	200.0	0.3	0.3	-140.17	-120.0	-100.1	156.3	155.7	258.458	
300.0	300.0	300.0	300.0	0.5	0.5	-140.17	-120.0	-100.1	156.3	155.2	148.241	
400.0	400.0	400.0	400.0	0.8	0.8	-140.17	-120.0	-100.1	156.3	154.8	103.924	
500.0	500.0	500.0	500.0	1.0	1.0	-140.17	-120.0	-100.1	156.3	154.3	80.006	
600.0	600.0	600.0	600.0	1.2	1.2	-140.17	-120.0	-100.1	156.3	153.9	65.038	
700.0	700.0	700.0	700.0	1.4	1.4	-140.17	-120.0	-100.1	156.3	153.4	54.787	
800.0	800.0	800.0	800.0	1.7	1.7	-140.17	-120.0	-100.1	156.3	153.0	47.328	
900.0	900.0	900.0	900.0	1.9	1.9	-140.17	-120.0	-100.1	156.3	152.5	41.657	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	-140.17	-120.0	-100.1	156.3	152.1	37.199	
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.3	-140.17	-120.0	-100.1	156.3	151.6	33.603	
1,200.0	1,200.0	1,200.0	1,200.0	2.5	2.5	-140.17	-120.0	-100.1	156.3	151.2	30.641	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	-140.17	-120.0	-100.1	156.3	150.7	28.159	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	-140.17	-120.0	-100.1	156.3	150.3	26.049	
1,500.0	1,500.0	1,500.0	1,500.0	3.2	3.2	-140.17	-120.0	-100.1	156.3	149.8	24.233	
1,600.0	1,600.0	1,600.0	1,600.0	3.4	3.4	-140.17	-120.0	-100.1	156.3	149.4	22.654	
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	-140.17	-120.0	-100.1	156.3	148.9	21.268	
1,800.0	1,800.0	1,800.0	1,800.0	3.9	3.9	-140.17	-120.0	-100.1	156.3	148.5	20.042	
1,900.0	1,900.0	1,900.0	1,900.0	4.1	4.1	-140.17	-120.0	-100.1	156.3	148.0	18.949	
2,000.0	2,000.0	2,000.0	2,000.0	4.3	4.3	-140.17	-120.0	-100.1	156.3	147.6	17.970	
2,100.0	2,100.0	2,100.0	2,100.0	4.6	4.6	-140.17	-120.0	-100.1	156.3	147.1	17.087	
2,200.0	2,200.0	2,200.0	2,200.0	4.8	4.8	-140.17	-120.0	-100.1	156.3	146.7	16.286	
2,300.0	2,300.0	2,300.0	2,300.0	5.0	5.0	-140.17	-120.0	-100.1	156.3	146.2	15.557	
2,400.0	2,400.0	2,400.0	2,400.0	5.2	5.2	-140.17	-120.0	-100.1	156.3	145.8	14.891	
2,500.0	2,500.0	2,500.0	2,500.0	5.5	5.5	-140.17	-120.0	-100.1	156.3	145.3	14.279	
2,600.0	2,600.0	2,600.0	2,600.0	5.7	5.7	-140.17	-120.0	-100.1	156.3	144.9	13.716	
2,700.0	2,700.0	2,700.0	2,700.0	5.9	5.9	-140.17	-120.0	-100.1	156.3	144.4	13.195	
2,800.0	2,800.0	2,800.0	2,800.0	6.1	6.1	-140.17	-120.0	-100.1	156.3	144.0	12.713	
2,900.0	2,900.0	2,900.0	2,900.0	6.4	6.4	-140.17	-120.0	-100.1	156.3	143.5	12.264	
3,000.0	3,000.0	3,000.0	3,000.0	6.6	6.6	-140.17	-120.0	-100.1	156.3	143.1	11.846	
3,100.0	3,100.0	3,100.0	3,100.0	6.8	6.8	-140.17	-120.0	-100.1	156.3	142.6	11.456	
3,200.0	3,200.0	3,200.0	3,200.0	7.0	7.0	-140.17	-120.0	-100.1	156.3	142.2	11.090	
3,300.0	3,300.0	3,300.0	3,300.0	7.3	7.3	-140.17	-120.0	-100.1	156.3	141.7	10.747	
3,400.0	3,400.0	3,400.0	3,400.0	7.5	7.5	-140.17	-120.0	-100.1	156.3	141.3	10.425	
3,500.0	3,500.0	3,500.0	3,500.0	7.7	7.7	-140.17	-120.0	-100.1	156.3	140.8	10.122	
3,600.0	3,600.0	3,600.0	3,600.0	7.9	7.9	-140.17	-120.0	-100.1	156.3	140.4	9.835	
3,700.0	3,700.0	3,700.0	3,700.0	8.2	8.2	-140.17	-120.0	-100.1	156.3	139.9	9.565	
3,800.0	3,800.0	3,800.0	3,800.0	8.4	8.4	-140.17	-120.0	-100.1	156.3	139.5	9.309	
3,900.0	3,900.0	3,900.0	3,900.0	8.6	8.6	-140.17	-120.0	-100.1	156.3	139.0	9.066	
4,000.0	4,000.0	4,000.0	4,000.0	8.8	8.8	-140.17	-120.0	-100.1	156.3	138.6	8.835	
4,100.0	4,100.0	4,100.0	4,100.0	9.1	9.1	-140.17	-120.0	-100.1	156.3	138.1	8.616	
4,200.0	4,200.0	4,200.0	4,200.0	9.3	9.3	-140.17	-120.0	-100.1	156.3	137.7	8.408	
4,300.0	4,300.0	4,300.0	4,300.0	9.5	9.5	-140.17	-120.0	-100.1	156.3	137.2	8.209	
4,400.0	4,400.0	4,400.0	4,400.0	9.7	9.7	-140.17	-120.0	-100.1	156.3	136.8	8.020	
4,500.0	4,500.0	4,500.0	4,500.0	10.0	10.0	-140.17	-120.0	-100.1	156.3	136.3	7.839	
4,600.0	4,600.0	4,600.0	4,600.0	10.2	10.2	-140.17	-120.0	-100.1	156.3	135.9	7.666	
4,700.0	4,700.0	4,700.0	4,700.0	10.4	10.4	-140.17	-120.0	-100.1	156.3	135.4	7.501	
4,800.0	4,800.0	4,800.0	4,800.0	10.6	10.6	-140.17	-120.0	-100.1	156.3	135.0	7.342	
4,900.0	4,900.0	4,900.0	4,900.0	10.9	10.9	-140.17	-120.0	-100.1	156.3	134.5	7.191	
5,000.0	5,000.0	5,000.0	5,000.0	11.1	11.1	-140.17	-120.0	-100.1	156.3	134.1	7.045	
5,100.0	5,100.0	5,100.0	5,100.0	11.3	11.3	-140.17	-120.0	-100.1	156.3	133.6	6.905	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 31, T19S, R32E - Nightcap 6 Federal 2H - Wellbore #1 - Design #1													Offset Site Error
Survey Program: 0-MWD default													0.0 usft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Reference	Offset	Highside	Offset Wellbore Centre	Distance	Between	Between	Separation	Warning
Measured	Depth	Measured	Depth	Reference	Offset	Toolface	N/S	E/W	Centres	Ellipses	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)			
5,200.0	5,200.0	5,200.0	5,200.0	11.5	11.5	-140.17	-120.0	-100.1	156.3	133.2		6.770	
5,300.0	5,300.0	5,300.0	5,300.0	11.8	11.8	-140.17	-120.0	-100.1	156.3	132.7		6.641	
5,400.0	5,400.0	5,400.0	5,400.0	12.0	12.0	-140.17	-120.0	-100.1	156.3	132.3		6.517	
5,500.0	5,500.0	5,500.0	5,500.0	12.2	12.2	-140.17	-120.0	-100.1	156.3	131.8		6.397	
5,600.0	5,600.0	5,600.0	5,600.0	12.4	12.4	-140.17	-120.0	-100.1	156.3	131.4		6.281	
5,700.0	5,700.0	5,700.0	5,700.0	12.7	12.7	-140.17	-120.0	-100.1	156.3	130.9		6.170	
5,800.0	5,800.0	5,800.0	5,800.0	12.9	12.9	-140.17	-120.0	-100.1	156.3	130.5		6.062	
5,900.0	5,900.0	5,900.0	5,900.0	13.1	13.1	-140.17	-120.0	-100.1	156.3	130.0		5.958	
6,000.0	6,000.0	6,000.0	6,000.0	13.3	13.3	-140.17	-120.0	-100.1	156.3	129.6		5.858	
6,100.0	6,100.0	6,100.0	6,100.0	13.6	13.6	-140.17	-120.0	-100.1	156.3	129.1		5.761	
6,200.0	6,200.0	6,200.0	6,200.0	13.8	13.8	-140.17	-120.0	-100.1	156.3	128.7		5.667	
6,300.0	6,300.0	6,300.0	6,300.0	14.0	14.0	-140.17	-120.0	-100.1	156.3	128.2		5.576	
6,400.0	6,400.0	6,400.0	6,400.0	14.2	14.2	-140.17	-120.0	-100.1	156.3	127.8		5.488	
6,500.0	6,500.0	6,500.0	6,500.0	14.5	14.5	-140.17	-120.0	-100.1	156.3	127.3		5.403	
6,600.0	6,600.0	6,600.0	6,600.0	14.7	14.7	-140.17	-120.0	-100.1	156.3	126.9		5.320	
6,700.0	6,700.0	6,700.0	6,700.0	14.9	14.9	-140.17	-120.0	-100.1	156.3	126.4		5.240	
6,800.0	6,800.0	6,800.0	6,800.0	15.1	15.1	-140.17	-120.0	-100.1	156.3	126.0		5.162	
6,900.0	6,900.0	6,900.0	6,900.0	15.4	15.4	-140.17	-120.0	-100.1	156.3	125.5		5.086	
7,000.0	7,000.0	7,000.0	7,000.0	15.6	15.6	-140.17	-120.0	-100.1	156.3	125.1		5.013	
7,100.0	7,100.0	7,100.0	7,100.0	15.8	15.8	-140.17	-120.0	-100.1	156.3	124.6		4.942	
7,200.0	7,200.0	7,200.0	7,200.0	16.0	16.0	-140.17	-120.0	-100.1	156.3	124.2		4.872	
7,300.0	7,300.0	7,300.0	7,300.0	16.3	16.3	-140.17	-120.0	-100.1	156.3	123.7		4.805	
7,400.0	7,400.0	7,400.0	7,400.0	16.5	16.5	-140.17	-120.0	-100.1	156.3	123.3		4.740	
7,500.0	7,500.0	7,500.0	7,500.0	16.7	16.7	-140.17	-120.0	-100.1	156.3	122.8		4.676	
7,600.0	7,600.0	7,600.0	7,600.0	16.9	16.9	-140.17	-120.0	-100.1	156.3	122.4		4.614	
7,700.0	7,700.0	7,700.0	7,700.0	17.2	17.2	-140.17	-120.0	-100.1	156.3	121.9		4.553	
7,800.0	7,800.0	7,800.0	7,800.0	17.4	17.4	-140.17	-120.0	-100.1	156.3	121.5		4.494	
7,900.0	7,900.0	7,900.0	7,900.0	17.6	17.6	-140.17	-120.0	-100.1	156.3	121.1		4.437	
8,000.0	8,000.0	8,000.0	8,000.0	17.8	17.8	-140.17	-120.0	-100.1	156.3	120.6		4.381	
8,100.0	8,100.0	8,100.0	8,100.0	18.1	18.1	-140.17	-120.0	-100.1	156.3	120.2		4.327	
8,200.0	8,200.0	8,200.0	8,200.0	18.3	18.3	-140.17	-120.0	-100.1	156.3	119.7		4.273	
8,300.0	8,300.0	8,300.0	8,300.0	18.5	18.5	-140.17	-120.0	-100.1	156.3	119.3		4.222	
8,400.0	8,400.0	8,400.0	8,400.0	18.7	18.7	-140.17	-120.0	-100.1	156.3	118.8		4.171	
8,500.0	8,500.0	8,500.0	8,500.0	19.0	19.0	-140.17	-120.0	-100.1	156.3	118.4		4.121	
8,600.0	8,600.0	8,600.0	8,600.0	19.2	19.2	-140.17	-120.0	-100.1	156.3	117.9		4.073	
8,700.0	8,700.0	8,700.0	8,700.0	19.4	19.4	-140.17	-120.0	-100.1	156.3	117.5		4.026	
8,800.0	8,800.0	8,800.0	8,800.0	19.6	19.6	-140.17	-120.0	-100.1	156.3	117.0		3.980	
8,835.9	8,835.9	8,835.9	8,835.9	19.7	19.7	-140.17	-120.0	-100.1	156.3	116.8		3.964	CC
8,855.8	8,855.8	8,852.2	8,852.2	19.8	19.7	-140.17	-120.0	-100.1	156.3	116.8		3.957	ES
8,875.0	8,875.0	8,869.4	8,869.4	19.8	19.8	39.67	-120.2	-100.3	156.4	116.8		3.953	
8,900.0	8,899.9	8,888.2	8,888.2	19.8	19.8	39.95	-121.0	-101.0	156.5	116.9		3.956	
8,925.0	8,924.8	8,907.0	8,906.8	19.9	19.9	40.46	-122.4	-102.1	156.6	117.1		3.966	
8,950.0	8,949.4	8,925.0	8,924.7	19.9	19.9	41.16	-124.3	-103.6	156.7	117.4		3.981	
8,975.0	8,973.8	8,944.3	8,943.7	20.0	19.9	42.13	-126.8	-105.8	156.9	117.7		4.002	
9,000.0	8,997.8	8,962.9	8,961.9	20.0	19.9	43.28	-129.8	-108.3	157.2	118.2		4.028	
9,025.0	9,021.5	8,981.3	8,979.7	20.0	20.0	44.62	-133.3	-111.2	157.6	118.8		4.061	
9,050.0	9,044.7	9,000.0	8,997.7	20.1	20.0	46.17	-137.4	-114.6	158.2	119.6		4.099	
9,075.0	9,067.4	9,017.7	9,014.4	20.1	20.0	47.80	-141.8	-118.3	159.0	120.6		4.143	
9,100.0	9,089.5	9,035.7	9,031.2	20.2	20.1	49.60	-146.8	-122.4	160.2	122.0		4.192	
9,125.0	9,111.0	9,053.6	9,047.7	20.2	20.1	51.50	-152.2	-126.9	161.7	123.6		4.248	
9,150.0	9,131.7	9,071.2	9,063.6	20.2	20.1	53.48	-158.0	-131.7	163.7	125.7		4.311	
9,175.0	9,151.7	9,088.7	9,079.2	20.3	20.2	55.50	-164.1	-136.8	166.2	128.3		4.381	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum:

Offset Design: Sec 31, T19S, R32E - Nightcap 6 Federal 2H - Wellbore #1 - Design #1													Offset Site Error
Survey Program: 0-MWD default													0.0 usft
Reference	Offset	Semi-Major Axis	Reference	Offset	Highside	Offset Wellbore Centre	Distance	Distance	Separation	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Reference Depth (usft)	Vertical Depth (usft)	Reference Depth (usft)	Toolface (°)	N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Factor			
9,200.0	9,171.0	9,106.0	9,094.2	20.3	20.2	57.54	-170.7	-142.2	169.3	131.4	4.459		
9,225.0	9,189.3	9,125.0	9,110.4	20.4	20.2	59.83	-178.3	-148.6	173.1	135.0	4.542		
9,250.0	9,206.7	9,140.0	9,122.9	20.5	20.3	61.53	-184.7	-153.9	177.4	139.2	4.644		
9,275.0	9,223.2	9,156.7	9,136.5	20.5	20.3	63.43	-192.2	-160.1	182.5	144.1	4.754		
9,300.0	9,238.6	9,175.0	9,151.0	20.6	20.4	65.50	-200.8	-167.2	188.4	149.7	4.870		
9,325.0	9,253.0	9,189.5	9,162.1	20.7	20.4	66.93	-207.9	-173.2	194.9	156.0	5.012		
9,350.0	9,266.4	9,205.6	9,174.2	20.8	20.4	68.49	-216.1	-180.0	202.1	163.0	5.163		
9,375.0	9,278.6	9,221.5	9,185.8	20.9	20.5	69.91	-224.5	-187.0	210.1	170.7	5.327		
9,400.0	9,289.6	9,237.3	9,196.9	21.0	20.5	71.19	-233.1	-194.1	218.8	179.1	5.507		
9,425.0	9,299.4	9,252.9	9,207.5	21.1	20.6	72.32	-241.9	-201.4	228.1	188.1	5.700		
9,450.0	9,308.1	9,268.3	9,217.6	21.2	20.6	73.30	-250.8	-208.9	238.1	197.8	5.907		
9,475.0	9,315.5	9,283.6	9,227.2	21.3	20.7	74.12	-259.9	-216.4	248.7	208.1	6.126		
9,500.0	9,321.6	9,300.0	9,237.2	21.5	20.7	74.99	-270.0	-224.8	259.8	218.9	6.352		
9,525.0	9,326.4	9,313.7	9,245.1	21.6	20.8	75.34	-278.5	-231.9	271.5	230.4	6.599		
9,550.0	9,330.0	9,328.6	9,253.4	21.8	20.8	75.75	-288.1	-239.8	283.7	242.3	6.850		
9,575.0	9,332.3	9,343.4	9,261.2	21.9	20.9	76.03	-297.7	-247.9	296.3	254.6	7.110		
9,601.0	9,333.2	9,358.7	9,268.9	22.1	21.0	76.19	-307.9	-256.3	309.9	267.9	7.388		
9,700.0	9,334.2	9,420.6	9,295.5	22.8	21.3	82.85	-350.8	-292.0	366.4	322.5	8.353		
9,800.0	9,335.3	9,490.1	9,316.6	23.7	21.7	87.25	-401.7	-334.3	428.1	382.7	9.431		
9,900.0	9,336.3	9,564.4	9,328.2	24.6	22.2	89.25	-458.1	-381.2	491.3	444.4	10.481		
10,000.0	9,337.3	9,641.0	9,330.1	25.7	22.9	89.51	-516.9	-430.2	554.9	506.4	11.440		
10,100.0	9,338.3	9,718.1	9,330.9	26.8	23.6	89.59	-576.2	-479.5	618.5	568.3	12.305		
10,200.0	9,339.3	9,795.3	9,331.6	28.0	24.4	89.64	-635.6	-528.8	682.2	630.0	13.078		
10,300.0	9,340.3	9,872.4	9,332.4	29.3	25.3	89.69	-694.9	-578.1	745.8	691.6	13.765		
10,400.0	9,341.3	9,949.5	9,333.2	30.6	26.2	89.73	-754.2	-627.4	809.4	753.1	14.376		
10,500.0	9,342.3	10,026.7	9,334.0	32.0	27.2	89.77	-813.5	-676.8	873.0	814.5	14.920		
10,600.0	9,343.3	10,103.8	9,334.8	33.4	28.3	89.80	-872.8	-726.1	936.7	875.9	15.404		
10,700.0	9,344.4	10,181.0	9,335.5	34.8	29.4	89.82	-932.1	-775.4	1,000.3	937.1	15.830		
10,800.0	9,345.4	10,258.1	9,336.3	36.3	30.5	89.85	-991.5	-824.7	1,063.9	998.3	16.209		
10,900.0	9,346.4	10,335.3	9,337.1	37.8	31.7	89.87	-1,050.8	-874.1	1,127.6	1,059.4	16.546		
11,000.0	9,347.4	10,412.4	9,337.9	39.4	32.9	89.89	-1,110.1	-923.4	1,191.2	1,120.5	16.846		
11,100.0	9,348.4	10,489.6	9,338.7	41.0	34.2	89.90	-1,169.4	-972.7	1,254.8	1,181.5	17.113		
11,200.0	9,349.4	10,566.7	9,339.4	42.5	35.4	89.92	-1,228.7	-1,022.0	1,318.4	1,242.4	17.351		
11,258.5	9,350.0	10,611.9	9,339.9	43.5	36.2	89.92	-1,263.4	-1,050.9	1,355.7	1,278.1	17.479		
11,300.0	9,350.4	10,643.9	9,340.2	44.2	36.7	89.93	-1,288.0	-1,071.3	1,382.1	1,303.4	17.563		
11,400.0	9,351.4	11,727.7	9,351.5	45.8	52.0	90.00	-2,279.0	-1,419.6	1,410.6	1,315.4	14.820		
11,500.0	9,352.4	11,827.7	9,352.5	47.4	53.2	90.00	-2,379.0	-1,419.1	1,409.7	1,311.5	14.352		
11,600.0	9,353.5	11,927.6	9,353.5	49.1	54.4	90.00	-2,479.0	-1,418.6	1,408.8	1,307.5	13.905		
11,700.0	9,354.5	12,027.6	9,354.6	50.7	55.7	90.00	-2,579.0	-1,418.1	1,407.6	1,303.4	13.481		
11,800.0	9,355.5	12,127.6	9,355.6	52.4	57.0	90.00	-2,679.0	-1,417.5	1,406.9	1,299.3	13.077		
11,900.0	9,356.5	12,227.6	9,356.6	54.1	58.3	90.00	-2,779.0	-1,417.0	1,406.0	1,295.2	12.692		
12,000.0	9,357.5	12,327.6	9,357.6	55.8	59.6	90.00	-2,879.0	-1,416.5	1,405.1	1,291.1	12.326		
12,100.0	9,358.5	12,427.6	9,358.6	57.5	61.0	90.00	-2,979.0	-1,415.9	1,404.1	1,286.9	11.977		
12,200.0	9,359.5	12,527.6	9,359.6	59.2	62.4	90.00	-3,079.0	-1,415.4	1,403.2	1,282.7	11.645		
12,300.0	9,360.5	12,627.6	9,360.6	60.9	63.8	90.00	-3,178.9	-1,414.9	1,402.3	1,278.5	11.328		
12,400.0	9,361.5	12,727.6	9,361.6	62.6	65.3	90.00	-3,278.9	-1,414.3	1,401.3	1,274.2	11.026		
12,500.0	9,362.6	12,827.6	9,362.6	64.3	66.7	90.00	-3,378.9	-1,413.8	1,400.4	1,270.0	10.737		
12,600.0	9,363.6	12,927.6	9,363.7	66.1	68.2	90.00	-3,478.9	-1,413.3	1,399.5	1,265.7	10.462		
12,700.0	9,364.6	13,027.6	9,364.7	67.8	69.7	90.00	-3,578.9	-1,412.7	1,398.6	1,261.4	10.199		
12,800.0	9,365.6	13,127.6	9,365.7	69.6	71.2	90.00	-3,678.9	-1,412.2	1,397.6	1,257.1	9.947		
12,900.0	9,366.6	13,227.6	9,366.7	71.3	72.7	90.00	-3,778.9	-1,411.7	1,396.7	1,252.8	9.706		
13,000.0	9,367.6	13,327.6	9,367.7	73.0	74.3	90.00	-3,878.9	-1,411.1	1,395.8	1,248.5	9.476		

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0' usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0' usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - Nightcap 6 Federal 2H - Wellbore #1 - Design #1												Offset Site Error:	0.0' usft
Survey Program: 0 MWD default												Offset Well Error:	0.0' usft
Measured Depth (usft)	Reference Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference Depth (usft)	Offset Depth (usft)	Highside Footcandle (ft)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
18,300.0	9,421.2	18,627.4	9,421.3	168.1	164.6	90.00	-9,178.3	-1,383.0	1,346.5	1,011.4	4.018		
18,400.0	9,422.2	18,727.4	9,422.3	169.9	166.4	90.00	-9,278.3	-1,382.5	1,345.6	1,006.9	3.972		
18,500.0	9,423.2	18,827.3	9,423.3	171.7	168.2	90.00	-9,378.3	-1,381.9	1,344.7	1,002.3	3.928		
18,600.0	9,424.2	18,927.3	9,424.3	173.5	170.0	90.00	-9,478.3	-1,381.4	1,343.8	997.8	3.884		
18,700.0	9,425.2	19,027.3	9,425.3	175.3	171.8	90.00	-9,578.3	-1,380.9	1,342.8	993.3	3.841		
18,800.0	9,426.3	19,127.3	9,426.3	177.1	173.5	90.00	-9,678.2	-1,380.3	1,341.9	988.7	3.799		
18,900.0	9,427.3	19,227.3	9,427.3	178.9	175.3	90.00	-9,778.2	-1,379.8	1,341.0	984.2	3.758		
19,000.0	9,428.3	19,327.3	9,428.3	180.7	177.1	90.00	-9,878.2	-1,379.3	1,340.0	979.6	3.718		
19,100.0	9,429.3	19,427.3	9,429.4	182.6	178.9	90.00	-9,978.2	-1,378.8	1,339.1	975.1	3.679		
19,200.0	9,430.3	19,527.3	9,430.4	184.4	180.7	90.00	-10,078.2	-1,378.2	1,338.2	970.6	3.640		
19,300.0	9,431.3	19,627.3	9,431.4	186.2	182.5	90.00	-10,178.2	-1,377.7	1,337.3	966.0	3.602		
19,400.0	9,432.3	19,727.3	9,432.4	188.0	184.2	90.00	-10,278.2	-1,377.2	1,336.3	961.5	3.565		
19,500.0	9,433.3	19,827.3	9,433.4	189.8	186.0	90.00	-10,378.2	-1,376.6	1,335.4	956.9	3.529		
19,600.0	9,434.3	19,927.3	9,434.4	191.6	187.8	90.00	-10,478.2	-1,376.1	1,334.5	952.4	3.493		
19,700.0	9,435.4	20,027.3	9,435.4	193.4	189.6	90.00	-10,578.1	-1,375.6	1,333.5	947.9	3.458		
19,800.0	9,436.4	20,127.3	9,436.4	195.2	191.4	90.00	-10,678.1	-1,375.0	1,332.6	943.3	3.423		
19,900.0	9,437.4	20,227.3	9,437.4	197.1	193.2	90.00	-10,778.1	-1,374.5	1,331.7	938.8	3.389		
20,000.0	9,438.4	20,327.3	9,438.4	198.9	195.0	90.00	-10,878.1	-1,374.0	1,330.8	934.2	3.356		
20,100.0	9,439.4	20,427.3	9,439.5	200.7	196.8	90.00	-10,978.1	-1,373.4	1,329.8	929.7	3.323		
20,200.0	9,440.4	20,527.3	9,440.5	202.5	198.6	90.00	-11,078.1	-1,372.9	1,328.9	925.1	3.291		
20,300.0	9,441.4	20,627.3	9,441.5	204.3	200.4	90.00	-11,178.1	-1,372.4	1,328.0	920.6	3.260		
20,400.0	9,442.4	20,727.3	9,442.5	206.1	202.2	90.00	-11,278.1	-1,371.8	1,327.0	916.0	3.229		
20,500.0	9,443.4	20,827.3	9,443.5	208.0	203.9	90.00	-11,378.1	-1,371.3	1,326.1	911.5	3.198		
20,600.0	9,444.5	20,927.3	9,444.5	209.8	205.7	90.00	-11,478.0	-1,370.8	1,325.2	906.9	3.168		
20,700.0	9,445.5	21,027.3	9,445.5	211.6	207.5	90.00	-11,578.0	-1,370.3	1,324.3	902.4	3.139		
20,800.0	9,446.5	21,127.2	9,446.5	213.4	209.3	90.00	-11,678.0	-1,369.7	1,323.3	897.8	3.110		
20,900.0	9,447.5	21,227.2	9,447.5	215.2	211.1	90.00	-11,778.0	-1,369.2	1,322.4	893.3	3.082		
21,000.0	9,448.5	21,327.2	9,448.6	217.0	212.9	90.00	-11,878.0	-1,368.7	1,321.5	888.7	3.054		
21,100.0	9,449.5	21,427.2	9,449.6	218.8	214.7	90.00	-11,978.0	-1,368.1	1,320.5	884.2	3.026		
21,149.5	9,450.0	21,470.2	9,450.0	219.7	215.5	90.00	-12,021.0	-1,367.9	1,320.1	882.1	3.014 SF		

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap-6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid:
Reference Well:	Nightcap-6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - String Bean Federal Com 2H - Wellbore #1 - Wellbore #1												Offset Site Error:
Survey Program: 200 Good gyro 8800 MWD default												Offset Well Error: 0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference Depth (usft)	Offset Depth (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-29.15	179.3	-100.0	205.5			
100.0	100.0	92.1	92.1	0.1	0.0	-29.15	179.3	-100.0	205.3	205.2	1,700.576	
200.0	200.0	192.2	192.2	0.3	0.1	-29.14	179.2	-99.9	205.2	204.8	522.922	
300.0	300.0	292.2	292.2	0.5	0.1	-29.14	179.1	-99.9	205.1	204.4	306.532	
400.0	400.0	392.1	392.1	0.8	0.2	-29.12	179.1	-99.8	205.0	204.1	216.693	
476.3	476.3	468.3	468.3	0.9	0.2	-29.11	179.1	-99.7	205.0	203.8	177.095	
500.0	500.0	492.0	492.0	1.0	0.2	-29.11	179.1	-99.7	205.0	203.8	167.599	
600.0	600.0	591.8	591.8	1.2	0.3	-29.11	179.1	-99.8	205.1	203.6	136.679	
700.0	700.0	691.6	691.6	1.4	0.4	-29.12	179.2	-99.8	205.2	203.4	115.444	
800.0	800.0	791.4	791.4	1.7	0.4	-29.11	179.4	-99.9	205.4	203.3	99.984	
900.0	900.0	891.5	891.5	1.9	0.5	-29.09	179.7	-100.0	205.6	203.3	88.205	
1,000.0	1,000.0	991.7	991.7	2.1	0.5	-29.04	180.0	-99.9	205.8	203.2	78.905	
1,100.0	1,100.0	1,091.8	1,091.8	2.3	0.6	-28.96	180.2	-99.7	206.0	203.1	71.366	
1,200.0	1,200.0	1,192.0	1,192.0	2.5	0.6	-28.86	180.4	-99.4	206.0	202.8	65.123	
1,300.0	1,300.0	1,292.2	1,292.2	2.8	0.7	-28.75	180.6	-99.1	206.0	202.5	59.862	
1,400.0	1,400.0	1,392.4	1,392.4	3.0	0.7	-28.64	180.6	-98.6	205.8	202.1	55.361	
1,500.0	1,500.0	1,492.4	1,492.4	3.2	0.8	-28.49	180.7	-98.1	205.6	201.6	51.471	
1,600.0	1,600.0	1,592.3	1,592.3	3.4	0.8	-28.24	181.0	-97.2	205.5	201.2	48.089	
1,700.0	1,700.0	1,692.2	1,692.2	3.7	0.9	-27.91	181.4	-96.1	205.3	200.8	45.127	
1,800.0	1,800.0	1,792.1	1,792.0	3.9	0.9	-27.56	182.0	-95.0	205.3	200.5	42.520	
1,900.0	1,900.0	1,892.1	1,892.0	4.1	1.0	-27.16	182.6	-93.7	205.3	200.2	40.199	
2,000.0	2,000.0	1,992.1	1,992.1	4.3	1.0	-26.67	183.4	-92.1	205.2	199.9	38.116	
2,100.0	2,100.0	2,092.9	2,092.8	4.6	1.1	-26.09	184.1	-90.2	205.0	199.4	36.198	
2,200.0	2,200.0	2,193.7	2,193.6	4.8	1.1	-25.39	184.7	-87.7	204.5	198.5	34.396	
2,300.0	2,300.0	2,294.1	2,293.9	5.0	1.2	-24.58	185.1	-84.7	203.6	197.4	32.705	
2,400.0	2,400.0	2,394.5	2,394.3	5.2	1.3	-23.71	185.5	-81.4	202.6	196.1	31.133	
2,500.0	2,500.0	2,494.8	2,494.5	5.5	1.3	-22.80	185.6	-78.0	201.4	194.6	29.670	
2,600.0	2,600.0	2,595.0	2,594.7	5.7	1.4	-21.91	185.6	-74.7	200.1	193.0	28.305	
2,700.0	2,700.0	2,695.2	2,694.8	5.9	1.4	-21.07	185.4	-71.4	198.7	191.3	27.034	
2,800.0	2,800.0	2,795.3	2,794.9	6.1	1.5	-20.25	185.0	-68.3	197.3	189.6	25.849	
2,900.0	2,900.0	2,895.8	2,895.3	6.4	1.5	-19.40	184.5	-65.0	195.7	187.8	24.725	
3,000.0	3,000.0	2,996.2	2,995.6	6.6	1.6	-18.41	184.0	-61.2	193.9	185.7	23.654	
3,100.0	3,100.0	3,096.5	3,095.9	6.8	1.7	-17.44	183.1	-57.5	192.0	183.5	22.643	
3,200.0	3,200.0	3,196.8	3,196.2	7.0	1.7	-16.89	181.8	-54.5	189.9	181.1	21.678	
3,300.0	3,300.0	3,299.3	3,298.5	7.3	1.8	-16.00	179.7	-51.5	187.1	178.0	20.684	
3,400.0	3,400.0	3,401.6	3,400.7	7.5	1.8	-15.21	176.3	-47.9	182.9	173.6	19.613	
3,500.0	3,500.0	3,501.1	3,500.1	7.7	1.9	-14.44	172.4	-44.4	178.3	168.6	18.556	
3,600.0	3,600.0	3,600.6	3,599.5	7.9	2.0	-13.82	168.6	-41.5	173.8	163.9	17.584	
3,700.0	3,700.0	3,701.1	3,699.9	8.2	2.0	-13.32	164.6	-39.0	169.3	159.2	16.659	
3,800.0	3,800.0	3,801.6	3,800.2	8.4	2.1	-12.93	160.1	-36.8	164.5	154.1	15.750	
3,900.0	3,900.0	3,900.6	3,899.2	8.6	2.1	-12.64	155.7	-34.9	159.7	149.0	14.900	
4,000.0	4,000.0	4,000.0	3,998.4	8.8	2.2	-12.47	151.7	-33.6	155.5	144.5	14.139	
4,100.0	4,100.0	4,099.4	4,097.7	9.1	2.2	-12.41	148.0	-32.6	151.6	140.3	13.449	
4,200.0	4,200.0	4,199.0	4,197.3	9.3	2.3	-12.43	144.4	-31.8	147.9	136.4	12.808	
4,300.0	4,300.0	4,298.3	4,296.5	9.5	2.4	-12.54	141.1	-31.4	144.6	132.8	12.227	
4,400.0	4,400.0	4,397.5	4,395.7	9.7	2.4	-12.70	138.2	-31.1	141.7	129.6	11.713	
4,500.0	4,500.0	4,497.4	4,495.6	10.0	2.5	-12.92	135.6	-31.1	139.1	126.8	11.244	
4,600.0	4,600.0	4,597.3	4,595.4	10.2	2.5	-13.20	132.9	-31.2	136.6	123.9	10.799	
4,700.0	4,700.0	4,697.1	4,695.2	10.4	2.6	-13.49	130.4	-31.3	134.1	121.2	10.379	
4,800.0	4,800.0	4,796.9	4,795.0	10.6	2.6	-13.77	128.0	-31.4	131.8	118.6	9.987	
4,900.0	4,900.0	4,896.9	4,895.0	10.9	2.7	-14.03	125.6	-31.4	129.5	116.1	9.614	
5,000.0	5,000.0	4,996.9	4,994.9	11.1	2.7	-14.32	123.2	-31.5	127.2	113.5	9.254	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6, Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6, Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - String Bean Federal Com 2H - Wellbore #1 - Wellbore #1													Offset Site Error:
Survey Program: 200/Good, 1000, 8800, MWD default													Offset Well Error:
Reference	Measured	Offset	Reference	Offset	Semi Major Axis	Highside	Offset Wellbore Centre	Distance	Between	Between	Separation	Warning	
Depth	Depth	Depth	Depth	Depth	Reference	Tooface	+N/S	+E/W	Centres	Ellipses	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(ft)	(usft)	(usft)	(usft)	(usft)			
5,100.0	5,100.0	5,096.7	5,094.7	11.3	2.8	-14.64	120.9	-31.6	125.0	111.0	8.913		
5,200.0	5,200.0	5,196.5	5,194.4	11.5	2.8	-15.03	118.7	-31.9	122.9	108.6	8.598		
5,300.0	5,300.0	5,296.3	5,294.2	11.8	2.9	-15.45	116.6	-32.2	121.0	106.5	8.305		
5,400.0	5,400.0	5,396.1	5,394.1	12.0	2.9	-15.84	114.7	-32.6	119.2	104.4	8.030		
5,500.0	5,500.0	5,496.0	5,493.9	12.2	3.0	-16.24	112.8	-32.9	117.6	102.4	7.772		
5,600.0	5,600.0	5,595.9	5,593.8	12.4	3.0	-16.68	111.0	-33.3	115.9	100.5	7.529		
5,700.0	5,700.0	5,695.5	5,693.3	12.7	3.1	-17.12	109.5	-33.7	114.6	98.9	7.309		
5,800.0	5,800.0	5,795.0	5,792.9	12.9	3.1	-17.56	108.3	-34.3	113.6	97.6	7.122		
5,900.0	5,900.0	5,894.9	5,892.7	13.1	3.2	-17.99	107.4	-34.9	112.9	96.7	6.958		
6,000.0	6,000.0	5,994.8	5,992.6	13.3	3.2	-18.39	106.6	-35.4	112.3	95.8	6.806		
6,100.0	6,100.0	6,094.6	6,092.4	13.6	3.3	-18.78	105.9	-36.0	111.8	95.0	6.666		
6,200.0	6,200.0	6,194.4	6,192.3	13.8	3.3	-19.17	105.3	-36.6	111.5	94.5	6.540		
6,300.0	6,300.0	6,294.3	6,292.1	14.0	3.4	-19.56	104.9	-37.3	111.3	94.0	6.425		
6,400.0	6,400.0	6,394.2	6,392.0	14.2	3.4	-19.97	104.6	-38.0	111.3	93.7	6.321		
6,416.3	6,416.3	6,410.5	6,408.3	14.3	3.5	-20.03	104.5	-38.1	111.3	93.6	6.305	CC	
6,500.0	6,500.0	6,494.0	6,491.9	14.5	3.5	-20.38	104.3	-38.8	111.3	93.4	6.226		
6,600.0	6,600.0	6,593.9	6,591.7	14.7	3.5	-20.77	104.2	-39.5	111.5	93.3	6.141		
6,700.0	6,700.0	6,693.9	6,691.7	14.9	3.6	-21.13	104.2	-40.3	111.7	93.3	6.063	ES	
6,800.0	6,800.0	6,793.8	6,791.6	15.1	3.6	-21.41	104.3	-40.9	112.0	93.3	5.990		
6,900.0	6,900.0	6,893.8	6,891.6	15.4	3.7	-21.62	104.5	-41.4	112.4	93.4	5.920		
7,000.0	7,000.0	6,993.8	6,991.6	15.6	3.7	-21.78	104.6	-41.8	112.7	93.4	5.851		
7,100.0	7,100.0	7,093.7	7,091.5	15.8	3.8	-21.88	104.9	-42.1	113.1	93.5	5.788		
7,200.0	7,200.0	7,193.5	7,191.4	16.0	3.8	-21.87	105.4	-42.3	113.6	93.7	5.732		
7,300.0	7,300.0	7,293.6	7,291.4	16.3	3.9	-21.77	106.0	-42.3	114.1	94.0	5.680		
7,400.0	7,400.0	7,393.6	7,391.4	16.5	3.9	-21.55	106.6	-42.1	114.6	94.3	5.629		
7,500.0	7,500.0	7,493.9	7,491.7	16.7	4.0	-21.26	107.2	-41.7	115.0	94.4	5.572		
7,600.0	7,600.0	7,594.2	7,592.0	16.9	4.1	-20.94	107.5	-41.2	115.1	94.2	5.503		
7,645.4	7,645.4	7,639.6	7,637.4	17.0	4.1	-20.79	107.6	-40.9	115.1	94.1	5.470		
7,700.0	7,700.0	7,694.1	7,691.9	17.2	4.1	-20.59	107.8	-40.5	115.1	93.9	5.431		
7,800.0	7,800.0	7,794.0	7,791.8	17.4	4.2	-20.18	108.2	-39.8	115.3	93.8	5.367		
7,900.0	7,900.0	7,893.9	7,891.7	17.6	4.2	-19.74	108.7	-39.0	115.5	93.7	5.315		
8,000.0	8,000.0	7,993.9	7,991.7	17.8	4.2	-19.30	109.2	-38.3	115.7	93.7	5.268		
8,100.0	8,100.0	8,093.8	8,091.6	18.1	4.2	-18.86	109.8	-37.5	116.0	93.8	5.224		
8,200.0	8,200.0	8,193.8	8,191.6	18.3	4.2	-18.41	110.4	-36.8	116.4	93.9	5.183		
8,300.0	8,300.0	8,293.7	8,291.5	18.5	4.2	-17.96	111.1	-36.0	116.8	94.1	5.144		
8,400.0	8,400.0	8,393.7	8,391.4	18.7	4.2	-17.51	111.8	-35.3	117.2	94.3	5.109		
8,500.0	8,500.0	8,493.6	8,491.4	19.0	4.3	-17.05	112.5	-34.5	117.7	94.5	5.077		
8,600.0	8,600.0	8,593.6	8,591.3	19.2	4.3	-16.59	113.3	-33.8	118.2	94.8	5.047		
8,700.0	8,700.0	8,693.5	8,691.3	19.4	4.3	-16.14	114.2	-33.0	118.8	95.2	5.020		
8,800.0	8,800.0	8,793.4	8,791.2	19.6	4.3	-15.68	115.0	-32.3	119.5	95.6	4.996		
8,855.8	8,855.8	8,849.4	8,847.2	19.8	4.3	-15.52	115.4	-32.1	119.8	95.7	4.977	SF	
8,875.0	8,875.0	8,868.7	8,866.5	19.8	4.3	164.28	115.5	-32.1	120.3	96.2	4.995		
8,900.0	8,899.9	8,893.8	8,891.5	19.8	4.4	164.38	115.6	-32.2	122.0	97.9	5.066		
8,925.0	8,924.8	8,919.1	8,916.9	19.9	4.4	164.53	115.6	-32.5	124.9	100.8	5.196		
8,950.0	8,949.4	8,944.5	8,942.2	19.9	4.4	164.65	115.3	-33.1	128.9	105.0	5.384		
8,975.0	8,973.8	8,969.6	8,967.3	20.0	4.4	164.73	114.9	-33.9	134.0	110.2	5.630		
9,000.0	8,997.8	8,994.6	8,992.2	20.0	4.4	164.77	114.2	-35.0	140.3	116.6	5.938		
9,025.0	9,021.5	9,019.0	9,016.7	20.0	4.4	164.76	113.4	-36.4	147.6	124.2	6.309		
9,050.0	9,044.7	9,043.1	9,040.6	20.1	4.5	164.68	112.4	-38.0	156.0	132.9	6.748		
9,075.0	9,067.4	9,066.7	9,064.2	20.1	4.5	164.53	111.2	-40.0	165.6	142.8	7.258		
9,100.0	9,089.5	9,090.0	9,087.3	20.2	4.5	164.31	109.9	-42.2	176.2	153.7	7.845		
9,125.0	9,111.0	9,112.3	9,109.4	20.2	4.5	164.04	108.6	-44.6	187.9	165.8	8.512		

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nighcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nighcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - String Bean Federal Com 2H - Wellbore #1 - Wellbore #1												Offset Site Error:
Survey Program: 200 Good gyro, 8800 MWD default												0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Reference Offset (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centres N-S (usft)	E-W (usft)	Distance Between Centres (usft)	Separation Factor	Warning	Offset Well Error:
9,150.0	9,131.7	9,133.7	9,130.6	20.2	4.5	163.72	107.2	-47.2	200.7	179.0	9.269	0.0 usft
9,175.0	9,151.7	9,154.4	9,151.1	20.3	4.5	163.37	105.9	-49.8	214.5	193.3	10.122	0.0 usft
9,200.0	9,171.0	9,174.4	9,170.9	20.3	4.6	162.97	104.5	-52.5	229.4	208.7	11.077	0.0 usft
9,225.0	9,189.3	9,193.6	9,189.8	20.4	4.6	162.52	103.2	-55.3	245.3	225.1	12.140	0.0 usft
9,250.0	9,206.7	9,212.2	9,208.2	20.5	4.6	162.00	101.9	-58.1	262.2	242.5	13.315	0.0 usft
9,275.0	9,223.2	9,230.0	9,225.7	20.5	4.6	161.41	100.6	-61.0	279.9	260.7	14.603	0.0 usft
9,300.0	9,238.6	9,247.0	9,242.4	20.6	4.6	160.72	99.3	-63.8	298.4	279.8	16.006	0.0 usft
9,325.0	9,253.0	9,263.0	9,258.1	20.7	4.7	159.92	98.1	-66.6	317.8	299.7	17.514	0.0 usft
9,350.0	9,266.4	9,278.1	9,272.9	20.8	4.7	158.97	96.9	-69.3	337.9	320.2	19.106	0.0 usft
9,375.0	9,278.6	9,292.1	9,286.7	20.9	4.7	157.84	95.7	-71.9	358.7	341.4	20.746	0.0 usft
9,400.0	9,289.6	9,305.2	9,299.5	21.0	4.7	156.49	94.6	-74.4	380.2	363.2	22.369	0.0 usft
9,425.0	9,299.4	9,317.5	9,311.4	21.1	4.7	154.85	93.6	-76.8	402.2	385.4	23.885	0.0 usft
9,450.0	9,308.1	9,328.6	9,322.3	21.2	4.8	152.82	92.6	-79.0	424.8	407.9	25.174	0.0 usft
9,475.0	9,315.5	9,338.6	9,332.0	21.3	4.8	150.25	91.7	-81.1	447.8	430.6	26.094	0.0 usft
9,500.0	9,321.6	9,347.4	9,340.6	21.5	4.8	146.94	90.9	-83.0	471.3	453.5	26.516	0.0 usft
9,525.0	9,326.4	9,355.0	9,347.9	21.6	4.8	142.57	90.1	-84.7	495.1	476.3	28.352	0.0 usft
9,550.0	9,330.0	9,361.3	9,354.1	21.8	4.8	136.62	89.5	-86.1	519.2	498.9	25.600	0.0 usft
9,575.0	9,332.3	9,366.4	9,359.0	21.9	4.8	128.31	89.0	-87.2	543.6	521.3	24.351	0.0 usft
9,601.0	9,333.2	9,370.2	9,362.7	22.1	4.8	116.02	88.6	-88.1	569.1	544.2	22.897	0.0 usft
9,700.0	9,334.2	9,382.5	9,374.6	22.8	4.9	121.09	87.4	-90.9	666.7	642.1	27.032	0.0 usft
9,800.0	9,335.3	9,395.5	9,387.2	23.7	4.9	125.61	86.0	-94.0	765.5	741.0	31.236	0.0 usft
9,900.0	9,336.3	9,409.8	9,400.9	24.6	4.9	129.73	84.5	-97.5	864.4	840.0	35.470	0.0 usft
10,000.0	9,337.3	9,425.2	9,415.8	25.7	5.0	133.40	82.8	-101.4	963.3	939.1	39.683	0.0 usft
10,100.0	9,338.3	9,441.8	9,431.7	26.8	5.0	136.62	80.9	-105.5	1,062.3	1,038.0	43.807	0.0 usft
10,200.0	9,339.3	9,459.4	9,448.6	28.0	5.0	139.43	78.8	-110.1	1,161.2	1,136.9	47.801	0.0 usft
10,300.0	9,340.3	9,478.4	9,466.7	29.3	5.1	141.88	76.4	-115.1	1,260.1	1,235.7	51.632	0.0 usft
10,400.0	9,341.3	9,498.8	9,486.2	30.6	5.1	144.03	73.8	-120.5	1,359.0	1,334.4	55.277	0.0 usft
10,500.0	9,342.3	9,516.8	9,503.4	32.0	5.2	145.61	71.4	-125.5	1,457.8	1,432.9	58.422	0.0 usft
10,600.0	9,343.3	9,535.4	9,521.1	33.4	5.3	146.96	68.9	-130.6	1,556.6	1,531.3	61.322	0.0 usft
10,700.0	9,344.4	9,554.8	9,539.4	34.8	5.3	148.15	66.2	-136.2	1,655.4	1,629.6	64.002	0.0 usft
10,800.0	9,345.4	9,574.9	9,558.5	36.3	5.4	149.20	63.3	-142.0	1,754.2	1,727.8	66.472	0.0 usft
10,900.0	9,346.4	9,595.8	9,578.2	37.8	5.5	150.12	60.3	-148.2	1,852.9	1,825.9	68.714	0.0 usft
11,000.0	9,347.4	9,613.0	9,594.4	39.4	5.5	150.76	57.8	-153.4	1,951.6	1,923.9	70.554	0.0 usft
11,100.0	9,348.4	9,629.1	9,609.6	41.0	5.6	151.29	55.4	-158.4	2,050.3	2,021.9	72.192	0.0 usft
11,200.0	9,349.4	9,645.4	9,624.8	42.5	5.7	151.76	53.0	-163.5	2,149.0	2,119.8	73.689	0.0 usft
11,258.5	9,350.0	9,654.9	9,633.7	43.5	5.7	152.02	51.6	-166.5	2,206.7	2,177.1	74.505	0.0 usft
11,300.0	9,350.4	9,661.7	9,640.1	44.2	5.7	152.18	50.6	-168.7	2,247.7	2,217.7	75.058	0.0 usft
11,400.0	9,351.4	9,678.0	9,655.4	45.8	5.8	152.56	48.1	-174.0	2,346.4	2,315.6	76.312	0.0 usft
11,500.0	9,352.4	9,694.5	9,670.7	47.4	5.9	152.89	45.7	-179.4	2,445.1	2,413.5	77.460	0.0 usft
11,600.0	9,353.5	9,708.9	9,684.2	49.1	5.9	153.15	43.5	-184.2	2,543.8	2,511.4	78.469	0.0 usft
11,700.0	9,354.5	9,722.3	9,696.6	50.7	6.0	153.36	41.6	-188.7	2,642.5	2,609.2	79.376	0.0 usft
11,800.0	9,355.5	9,735.5	9,708.8	52.4	6.1	153.56	39.6	-193.2	2,741.2	2,707.0	80.211	0.0 usft
11,900.0	9,356.5	9,748.5	9,720.9	54.1	6.1	153.73	37.7	-197.7	2,840.0	2,804.9	80.982	0.0 usft
12,000.0	9,357.5	9,761.5	9,732.9	55.8	6.2	153.88	35.8	-202.2	2,938.7	2,902.7	81.693	0.0 usft
12,100.0	9,358.5	9,774.2	9,744.7	57.5	6.3	154.02	34.0	-206.8	3,037.5	3,000.6	82.352	0.0 usft
12,200.0	9,359.5	9,786.9	9,756.3	59.2	6.3	154.14	32.2	-211.3	3,136.3	3,098.5	82.961	0.0 usft
12,300.0	9,360.5	9,800.0	9,768.4	60.9	6.4	154.25	30.3	-216.1	3,235.1	3,196.4	83.532	0.0 usft
12,400.0	9,361.5	9,817.9	9,784.9	62.6	6.5	154.39	27.7	-222.6	3,333.9	3,294.3	84.115	0.0 usft
12,500.0	9,362.6	9,837.0	9,802.5	64.3	6.5	154.54	25.0	-229.5	3,432.7	3,392.2	84.681	0.0 usft
12,600.0	9,363.6	9,856.4	9,820.4	66.1	6.7	154.68	22.2	-236.5	3,531.5	3,490.0	85.222	0.0 usft
12,700.0	9,364.6	9,874.6	9,837.1	67.8	6.8	154.81	19.5	-243.0	3,630.2	3,587.9	85.726	0.0 usft
12,800.0	9,365.6	9,889.3	9,850.7	69.6	6.8	154.91	17.4	-248.3	3,729.0	3,685.7	86.181	0.0 usft

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31 T19S R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31 T19S R32E - String Bean Federal Com 2H - Wellbore #1 - Wellbore #1													Offset Site Error
Survey Program: 200 Good gyro 8800 MWD default													Offset Well Error
Measured Depth (usft)	Reference Depth (usft)	Vertical Measured Depth (usft)	Vertical Offset Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	Offset Wellbore Centre E/W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separations Factor	Warning	
12,900.0	9,366.6	9,900.0	9,880.6	71.3	6.9	154.98	15.8	-252.0	3,827.7	3,783.5	86.582		
13,000.0	9,367.6	9,917.9	9,877.1	73.0	7.0	155.11	13.2	-258.3	3,926.5	3,881.4	87.032		
13,100.0	9,368.6	9,931.9	9,890.1	74.8	7.1	155.20	11.2	-263.2	4,025.3	3,979.2	87.427		
13,200.0	9,369.6	9,945.8	9,902.9	76.6	7.1	155.28	9.2	-268.1	4,124.1	4,077.1	87.805		
13,300.0	9,370.6	9,959.6	9,915.7	78.3	7.2	155.37	7.2	-272.9	4,222.8	4,175.0	88.166		
13,400.0	9,371.7	9,973.4	9,928.5	80.1	7.3	155.45	5.2	-277.7	4,321.6	4,272.8	88.512		
13,500.0	9,372.7	9,987.1	9,941.2	81.8	7.3	155.53	3.2	-282.5	4,420.4	4,370.7	88.844		
13,600.0	9,373.7	10,000.9	9,954.0	83.6	7.4	155.60	1.2	-287.4	4,519.2	4,468.6	89.164		
13,700.0	9,374.7	10,019.5	9,971.2	85.4	7.5	155.70	-1.4	-293.8	4,618.0	4,566.5	89.502		
13,800.0	9,375.7	10,038.2	9,988.6	87.1	7.6	155.79	-4.1	-300.4	4,716.8	4,664.3	89.826		
13,900.0	9,376.7	10,057.2	10,006.1	88.9	7.7	155.88	-6.8	-307.0	4,815.6	4,762.2	90.135		
14,000.0	9,377.7	10,076.3	10,023.7	90.7	7.8	155.96	-9.6	-313.7	4,914.4	4,860.0	90.430		
14,100.0	9,378.7	10,095.5	10,041.6	92.5	7.9	156.04	-12.4	-320.4	5,013.2	4,957.9	90.713		
14,200.0	9,379.7	10,110.4	10,055.4	94.3	8.0	156.10	-14.6	-325.7	5,111.9	5,055.7	90.961		
14,300.0	9,380.8	10,123.9	10,067.8	96.0	8.1	156.15	-16.6	-330.4	5,210.7	5,153.5	91.193		
14,400.0	9,381.8	10,137.3	10,080.3	97.8	8.2	156.20	-18.5	-335.1	5,309.4	5,251.4	91.418		
14,500.0	9,382.8	10,150.7	10,092.6	99.6	8.3	156.25	-20.5	-339.7	5,408.2	5,349.2	91.637		
14,600.0	9,383.8	10,164.0	10,104.9	101.4	8.3	156.30	-22.4	-344.3	5,507.0	5,447.0	91.850		
14,700.0	9,384.8	10,177.2	10,117.2	103.2	8.4	156.35	-24.3	-348.9	5,605.8	5,544.9	92.056		
14,800.0	9,385.8	10,190.3	10,129.3	105.0	8.5	156.39	-26.2	-353.5	5,704.6	5,642.7	92.257		
14,900.0	9,386.8	10,200.0	10,138.3	106.8	8.5	156.43	-27.6	-356.8	5,803.4	5,740.6	92.436		
15,000.0	9,387.8	10,200.0	10,138.3	108.5	8.5	156.43	-27.6	-356.8	5,902.2	5,838.4	92.564		
15,100.0	9,388.8	10,221.6	10,158.4	110.3	8.7	156.50	-30.7	-364.2	6,001.0	5,936.3	92.792		
15,200.0	9,389.9	10,231.0	10,167.1	112.1	8.7	156.54	-32.0	-367.4	6,099.8	6,034.2	92.957		
15,300.0	9,390.9	10,240.2	10,175.7	113.9	8.8	156.57	-33.3	-370.6	6,198.7	6,132.1	93.118		
15,400.0	9,391.9	10,249.4	10,184.2	115.7	8.8	156.60	-34.5	-373.7	6,297.6	6,230.1	93.275		
15,500.0	9,392.9	10,258.4	10,192.6	117.5	8.9	156.63	-35.8	-376.8	6,396.5	6,328.0	93.428		
15,600.0	9,393.9	10,267.3	10,200.9	119.3	8.9	156.66	-37.0	-379.8	6,495.4	6,426.0	93.578		
15,700.0	9,394.9	10,500.0	10,416.8	121.1	10.4	157.28	-72.4	-459.0	6,594.2	6,524.5	94.519		
15,800.0	9,395.9	10,500.0	10,416.8	122.9	10.4	157.28	-72.4	-459.0	6,692.6	6,621.9	94.615		
15,900.0	9,396.9	10,500.0	10,416.8	124.7	10.4	157.28	-72.4	-459.0	6,791.1	6,719.4	94.709		
16,000.0	9,397.9	10,500.0	10,416.8	126.5	10.4	157.28	-72.4	-459.0	6,889.5	6,816.9	94.801		
16,100.0	9,399.0	10,531.6	10,446.1	128.3	10.5	157.35	-77.7	-469.6	6,987.9	6,914.3	94.985		
16,200.0	9,400.0	10,538.6	10,452.6	130.1	10.6	157.37	-78.8	-471.9	7,086.4	7,011.8	95.092		
16,300.0	9,401.0	10,545.5	10,459.0	131.9	10.6	157.38	-79.9	-474.2	7,184.9	7,109.4	95.197		
16,400.0	9,402.0	10,552.2	10,465.2	133.7	10.7	157.40	-81.0	-476.5	7,283.4	7,207.0	95.299		
16,500.0	9,403.0	10,558.9	10,471.4	135.5	10.7	157.41	-82.0	-478.7	7,382.0	7,304.6	95.399		
16,600.0	9,404.0	10,565.4	10,477.5	137.3	10.8	157.43	-83.1	-480.9	7,480.5	7,402.2	95.497		
16,700.0	9,405.0	10,600.0	10,509.6	139.1	11.0	157.50	-88.4	-492.5	7,579.3	7,500.0	95.671		
16,800.0	9,406.0	10,600.0	10,509.6	140.9	11.0	157.50	-88.4	-492.5	7,677.8	7,597.6	95.746		
16,900.0	9,407.0	10,600.0	10,509.6	142.7	11.0	157.50	-88.4	-492.5	7,776.4	7,695.3	95.820		
17,000.0	9,408.1	10,600.0	10,509.6	144.5	11.0	157.50	-88.4	-492.5	7,875.1	7,793.0	95.892		
17,100.0	9,409.1	10,600.0	10,509.6	146.4	11.0	157.50	-88.4	-492.5	7,973.8	7,890.7	95.962		
17,200.0	9,410.1	10,600.0	10,509.6	148.2	11.0	157.50	-88.4	-492.5	8,072.5	7,988.4	96.032		
17,300.0	9,411.1	10,600.0	10,509.6	150.0	11.0	157.50	-88.4	-492.5	8,171.2	8,086.2	96.100		
17,400.0	9,412.1	10,600.0	10,509.6	151.8	11.0	157.50	-88.4	-492.5	8,270.0	8,184.0	96.166		
17,500.0	9,413.1	10,600.0	10,509.6	153.6	11.0	157.50	-88.4	-492.5	8,368.8	8,281.8	96.232		
17,600.0	9,414.1	10,600.0	10,509.6	155.4	11.0	157.50	-88.4	-492.5	8,467.6	8,379.7	96.296		
17,700.0	9,415.1	10,600.0	10,509.6	157.2	11.0	157.50	-88.4	-492.5	8,566.4	8,477.5	96.358		
17,800.0	9,416.1	10,600.0	10,509.6	159.0	11.0	157.50	-88.4	-492.5	8,665.3	8,575.5	96.420		
17,900.0	9,417.2	10,600.0	10,509.6	160.8	11.0	157.50	-88.4	-492.5	8,764.2	8,673.4	96.481		
18,000.0	9,418.2	10,600.0	10,509.6	162.6	11.0	157.50	-88.4	-492.5	8,863.2	8,771.4	96.540		

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 31, T19S, R32E - String Bean Federal Com 2H - Wellbore #1 - Wellbore #1												Offset Site Error:	0.0 usft
Survey Program: 200-Goodygyro, 8800-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning	
18,100.0	9,419.2	10,600.0	10,509.6	164.4	11.0	157.50	-88.4	-492.5	8,962.1	8,869.3	96.598		
18,200.0	9,420.2	10,600.0	10,509.6	166.2	11.0	157.50	-88.4	-492.5	9,061.1	8,967.3	96.656		
18,300.0	9,421.2	10,600.0	10,509.6	168.1	11.0	157.50	-88.4	-492.5	9,160.1	9,065.4	96.712		
18,400.0	9,422.2	10,600.0	10,509.6	169.9	11.0	157.50	-88.4	-492.5	9,259.1	9,163.4	96.767		
18,500.0	9,423.2	10,641.2	10,548.0	171.7	11.2	157.58	-94.1	-506.3	9,357.7	9,261.1	96.937		
18,600.0	9,424.2	10,643.9	10,550.5	173.5	11.2	157.59	-94.5	-507.2	9,456.7	9,359.2	96.998		
18,700.0	9,425.2	10,646.6	10,553.0	175.3	11.2	157.59	-94.8	-508.1	9,555.7	9,457.2	97.058		
18,800.0	9,426.3	10,649.2	10,555.5	177.1	11.3	157.60	-95.2	-509.0	9,654.7	9,555.3	97.117		
18,900.0	9,427.3	10,651.7	10,557.9	178.9	11.3	157.60	-95.5	-509.8	9,753.8	9,653.4	97.175		
19,000.0	9,428.3	10,654.2	10,560.2	180.7	11.3	157.61	-95.8	-510.7	9,852.8	9,751.5	97.232		
19,100.0	9,429.3	10,656.7	10,562.5	182.6	11.3	157.62	-96.1	-511.5	9,951.9	9,849.6	97.289		

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to Well @ 3555.0usft (Ensign 772)

Offset Depths are relative to Offset Datum

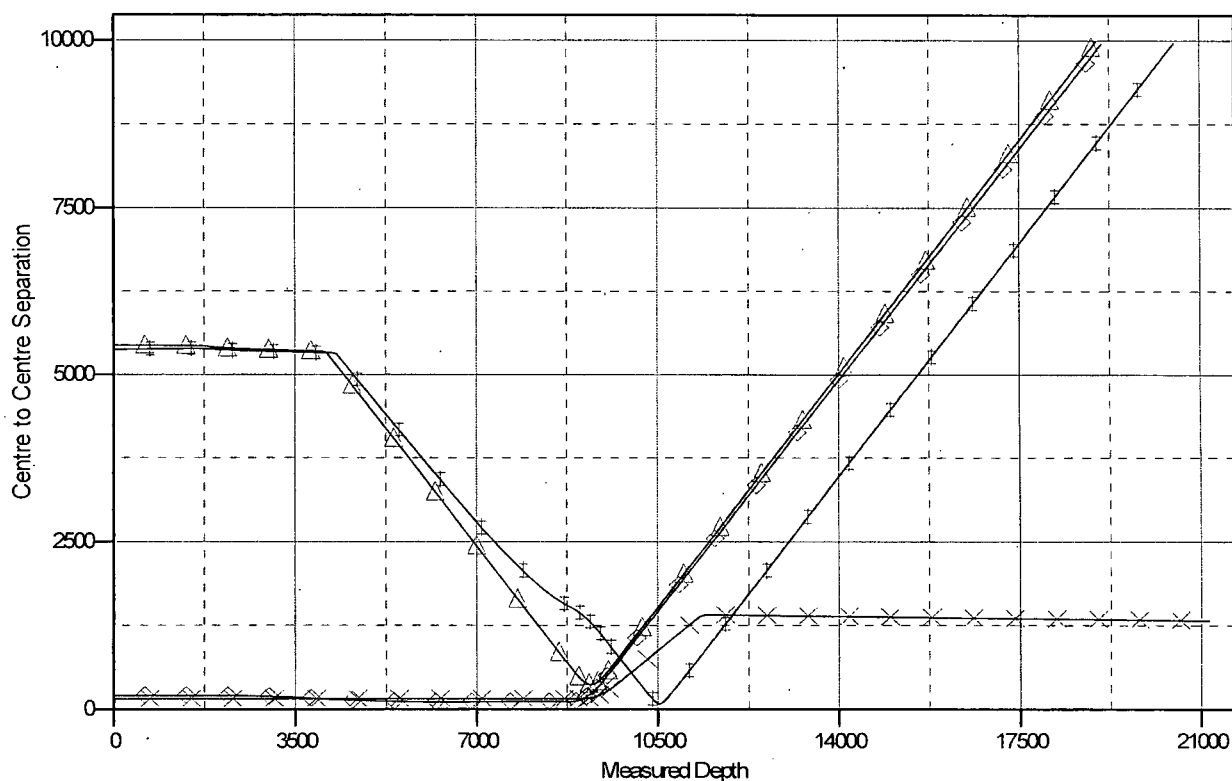
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Nightcap 6 Federal 1H

Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30

Grid Convergence at Surface is: 0.29°

Ladder Plot



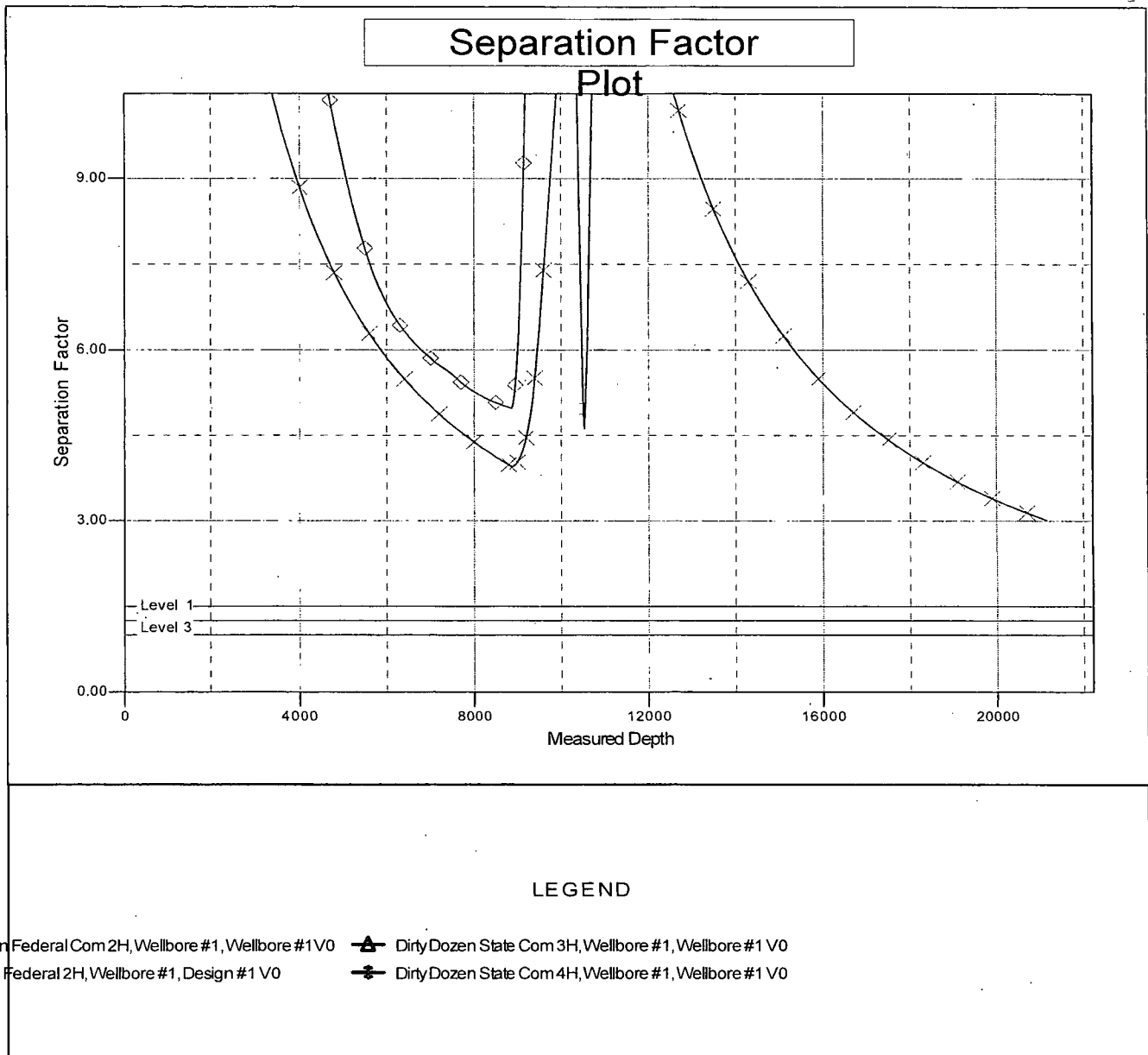
LEGEND

an Federal Com 2H, Wellbore #1, Wellbore #1 V0 Dirty Dozen State Com 3H, Wellbore #1, Wellbore #1 V0
6 Federal 2H, Wellbore #1, Design #1 V0 Dirty Dozen State Com 4H, Wellbore #1, Wellbore #1 V0

Company:	COG Operating, LLC	Local Coordinate Reference:	Well Nightcap 6 Federal 1H
Project:	Lea County, NM	TVD Reference:	Well @ 3555.0usft (Ensign 772)
Reference Site:	Sec 31, T19S, R32E	MD Reference:	Well @ 3555.0usft (Ensign 772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Nightcap 6 Federal 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

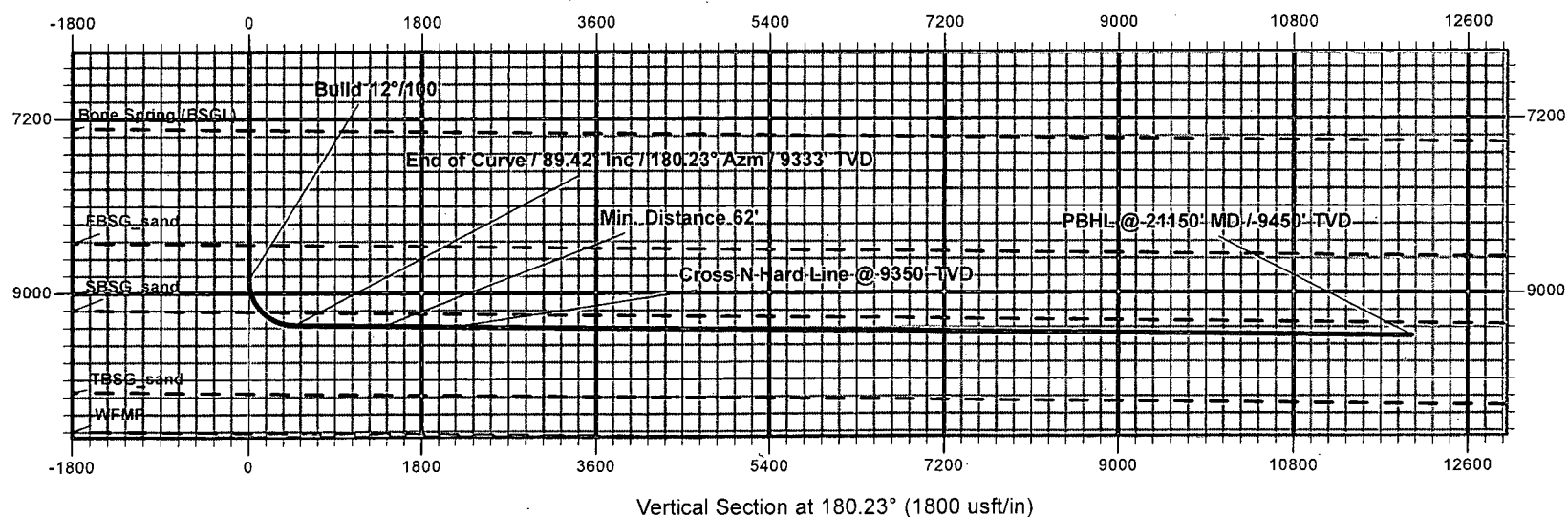
Reference Depths are relative to Well @ 3555.0usft (Ensign 772)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Nightcap 6 Federal 1H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.29°





Lea County, NM
Sec 31, T19S, R32E
Nightcap 6 Federal 1H
Design #1



Lea County, NM
Sec 31, T19S, R32E
Nightcap 6 Federal 1H
Design #1

