

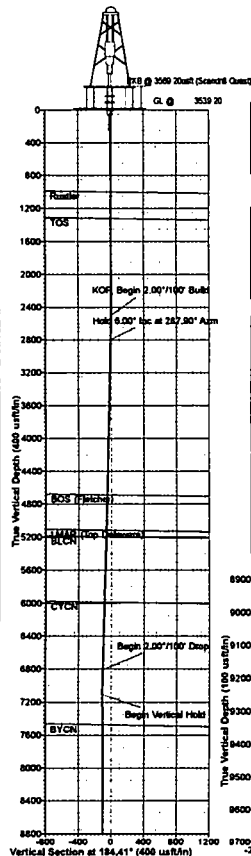


Project: Lea County, NM (NAD27 NME)
Site: Sopapilla State
Well: 3H
Wellbore: OH
Design: Plan 1 09-03-19
Rig: Scandril Quest

PHOENIX
TECHNOLOGY SERVICES



Acknowledge to Grid North
True North: -0.42°
Magnetic North: 6.18°
Magnetic Field
Strength: 47956.3nT
Dip Angle: 62.51°
Date: 10/12/2019
Model: MNVD

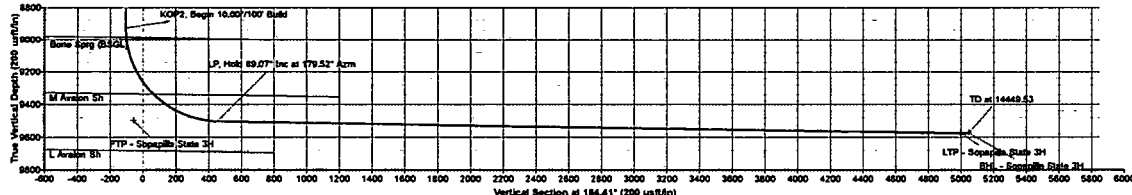
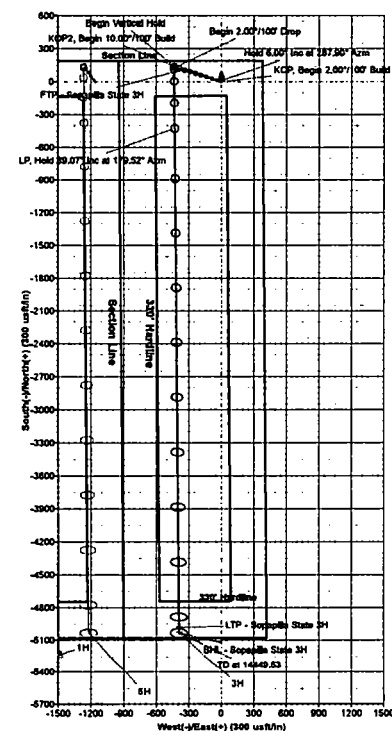
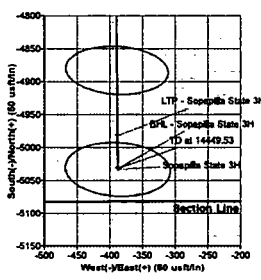
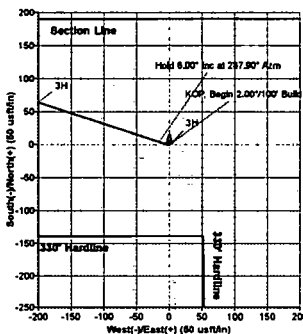
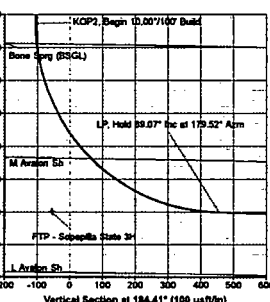


WELL DETAILS					
Ground Elevation 3539.30					
N-S	E-W	North	East	Latitude	Longitude
0.00	0.00	4884.20 45	7436.14 30	32° 20' 25.128036 N	103° 32' 38.051880 W

DESIGN TARGET DETAILS					
Name	TVD	N-S	E-W	North	East
FTP - Sopapilla State 3H	8500.00	85.74 13	-482.10	-388.10	4834.38 30
LTP - Sopapilla State 3H	8574.13	-482.10	-388.10	4834.38 30	7434.28 30
SH - Sopapilla State 3H	9575.00	-502.10	-387.70	4833.88 30	7434.28 30

SECTION DETAILS					
Sec	MD	Inc	Ad	TVD	N-S
1	0.00	0.00	0.00	0.00	0.00
2	2500.00	0.00	0.00	2500.00	0.00
3	3000.13	6.00	287.90	2799.58	4.83
4	6833.08	0.00	287.90	6833.08	134.44
5	7133.21	0.00	0.00	7133.21	138.27
6	8500.00	0.00	0.00	8500.00	-424.34
7	8574.13	0.00	0.00	8574.13	-424.34
8	9575.00	0.00	0.00	9575.00	-424.34

LEGEND
— 1H, OH / Job 1311084, Surveys (Ensign 153) VO
— SH, OH, Plan 1 09-03-19 VO
— 1H, ST01, Surveys VO
— Plan 1 09-03-19





PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Sopapilla State

3H

OH

Plan: Plan 1 09-03-19

Standard Planning Report

03 September, 2019





Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Sopapilla State
Well: 3H
Wellbore: OH
Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandrill Quest)
MD Reference: RKB @ 3569.20usft (Scandrill Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project: Lea County, NM (NAD27 NME)
Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001
System Datum: Mean Sea Level

Site: Sopapilla State

Site Position: Northing: 488,418.40 usft Latitude: 32° 20' 25.192653 N
From: Map Easting: 742,654.30 usft Longitude: 103° 32' 51.571947 W
Position Uncertainty: 0.00 usft Slot Radius: 13-3/16 " Grid Convergence: 0.42 °

Well: 3H
Well Position: +N/-S 2.00 usft Northing: 488,420.40 usft Latitude: 32° 20' 25.128037 N
+E/-W 1,160.00 usft Easting: 743,814.30 usft Longitude: 103° 32' 38.051680 W
Position Uncertainty: 1.00 usft Wellhead Elevation: Ground Level: 3,539.20 usft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	10/12/2019	6.57	60.01	47,956.28806297

Design: Plan 1 09-03-19

Audit Notes:

Version: Phase: PROTOTYPE Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	184.41

Plan Survey Tool Program Date 9/3/2019

Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	14,449.53 Plan 1 09-03-19 (OH)	MWD+HRGM	
			OWSG MWD + HRGM	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,800.13	6.00	287.90	2,799.58	4.83	-14.95	2.00	2.00	0.00	287.90	
6,833.08	6.00	287.90	6,810.42	134.44	-416.27	0.00	0.00	0.00	0.00	
7,133.21	0.00	0.00	7,110.00	139.27	-431.22	2.00	-2.00	0.00	180.00	
8,950.33	0.00	0.00	8,927.12	139.27	-431.22	0.00	0.00	0.00	0.00	
9,841.00	89.07	179.52	9,500.00	-424.34	-426.48	10.00	10.00	20.16	179.52	
14,449.53	89.07	179.52	9,575.00	-5,032.10	-387.70	0.00	0.00	0.00	0.00	BHL - Sopapilla Sta



Planning Report



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Local Co-ordinate Reference: Well 3H
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MD Reference: RKB @ 3569.20usft (Scandrill Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,005.20	0.00	0.00	1,005.20	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
1,326.20	0.00	0.00	1,326.20	0.00	0.00	0.00	0.00	0.00	0.00
TOS									
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 2.00°/100' Build									
2,600.00	2.00	287.90	2,599.98	0.54	-1.66	-0.41	2.00	2.00	0.00
2,700.00	4.00	287.90	2,699.84	2.14	-6.64	-1.63	2.00	2.00	0.00
2,800.00	6.00	287.90	2,799.45	4.82	-14.93	-3.66	2.00	2.00	0.00
2,800.13	6.00	287.90	2,799.58	4.83	-14.95	-3.67	2.00	2.00	0.00
Hold 6.00° Inc at 287.90° Azm									
2,900.00	6.00	287.90	2,898.90	8.04	-24.89	-6.10	0.00	0.00	0.00
3,000.00	6.00	287.90	2,998.36	11.25	-34.84	-8.54	0.00	0.00	0.00
3,100.00	6.00	287.90	3,097.81	14.46	-44.79	-10.98	0.00	0.00	0.00
3,200.00	6.00	287.90	3,197.26	17.68	-54.74	-13.42	0.00	0.00	0.00
3,300.00	6.00	287.90	3,296.71	20.89	-64.69	-15.86	0.00	0.00	0.00
3,400.00	6.00	287.90	3,396.16	24.11	-74.64	-18.30	0.00	0.00	0.00
3,500.00	6.00	287.90	3,495.61	27.32	-84.59	-20.74	0.00	0.00	0.00
3,600.00	6.00	287.90	3,595.07	30.53	-94.54	-23.18	0.00	0.00	0.00
3,700.00	6.00	287.90	3,694.52	33.75	-104.49	-25.62	0.00	0.00	0.00
3,800.00	6.00	287.90	3,793.97	36.96	-114.45	-28.06	0.00	0.00	0.00
3,900.00	6.00	287.90	3,893.42	40.18	-124.40	-30.50	0.00	0.00	0.00
4,000.00	6.00	287.90	3,992.87	43.39	-134.35	-32.94	0.00	0.00	0.00
4,100.00	6.00	287.90	4,092.32	46.60	-144.30	-35.38	0.00	0.00	0.00
4,200.00	6.00	287.90	4,191.78	49.82	-154.25	-37.82	0.00	0.00	0.00
4,300.00	6.00	287.90	4,291.23	53.03	-164.20	-40.26	0.00	0.00	0.00
4,400.00	6.00	287.90	4,390.68	56.25	-174.15	-42.70	0.00	0.00	0.00
4,500.00	6.00	287.90	4,490.13	59.46	-184.10	-45.14	0.00	0.00	0.00
4,600.00	6.00	287.90	4,589.58	62.67	-194.06	-47.58	0.00	0.00	0.00
4,700.00	6.00	287.90	4,689.03	65.89	-204.01	-50.02	0.00	0.00	0.00
4,704.38	6.00	287.90	4,693.39	66.03	-204.44	-50.13	0.00	0.00	0.00
BOS (Fletcher)									
4,800.00	6.00	287.90	4,788.49	69.10	-213.96	-52.46	0.00	0.00	0.00
4,900.00	6.00	287.90	4,887.94	72.31	-223.91	-54.90	0.00	0.00	0.00
5,000.00	6.00	287.90	4,987.39	75.53	-233.86	-57.34	0.00	0.00	0.00
5,100.00	6.00	287.90	5,086.84	78.74	-243.81	-59.78	0.00	0.00	0.00
5,133.56	6.00	287.90	5,120.22	79.82	-247.15	-60.60	0.00	0.00	0.00
LMAR (Top Delaware)									
5,200.00	6.00	287.90	5,186.29	81.96	-253.76	-62.22	0.00	0.00	0.00
5,212.96	6.00	287.90	5,199.19	82.37	-255.05	-62.54	0.00	0.00	0.00
BLCN									
5,300.00	6.00	287.90	5,285.75	85.17	-263.71	-64.66	0.00	0.00	0.00
5,400.00	6.00	287.90	5,385.20	88.38	-273.67	-67.10	0.00	0.00	0.00
5,500.00	6.00	287.90	5,484.65	91.60	-283.62	-69.54	0.00	0.00	0.00
5,600.00	6.00	287.90	5,584.10	94.81	-293.57	-71.98	0.00	0.00	0.00
5,700.00	6.00	287.90	5,683.55	98.03	-303.52	-74.42	0.00	0.00	0.00
5,800.00	6.00	287.90	5,783.00	101.24	-313.47	-76.86	0.00	0.00	0.00
5,900.00	6.00	287.90	5,882.46	104.45	-323.42	-79.30	0.00	0.00	0.00
6,000.00	6.00	287.90	5,981.91	107.67	-333.37	-81.74	0.00	0.00	0.00
6,010.02	6.00	287.90	5,991.87	107.99	-334.37	-81.99	0.00	0.00	0.00
CYCN									
6,100.00	6.00	287.90	6,081.36	110.88	-343.32	-84.18	0.00	0.00	0.00



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Sopapilla State
Well: 3H
Wellbore: OH
Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

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)
6,200.00	6.00	287.90	6,180.81	114.10	-353.27	-86.62	0.00	0.00	0.00
6,300.00	6.00	287.90	6,280.26	117.31	-363.23	-89.06	0.00	0.00	0.00
6,400.00	6.00	287.90	6,379.71	120.52	-373.18	-91.50	0.00	0.00	0.00
6,500.00	6.00	287.90	6,479.17	123.74	-383.13	-93.94	0.00	0.00	0.00
6,600.00	6.00	287.90	6,578.62	126.95	-393.08	-96.38	0.00	0.00	0.00
6,700.00	6.00	287.90	6,678.07	130.16	-403.03	-98.82	0.00	0.00	0.00
6,800.00	6.00	287.90	6,777.52	133.38	-412.98	-101.26	0.00	0.00	0.00
6,833.08	6.00	287.90	6,810.42	134.44	-416.27	-102.07	0.00	0.00	0.00
Begin 2.00°/100' Drop									
6,900.00	4.66	287.90	6,877.05	136.35	-422.19	-103.52	2.00	-2.00	0.00
7,000.00	2.66	287.90	6,976.84	138.32	-428.27	-105.01	2.00	-2.00	0.00
7,100.00	0.66	287.90	7,076.79	139.21	-431.04	-105.69	2.00	-2.00	0.00
7,133.21	0.00	0.00	7,110.00	139.27	-431.22	-105.74	2.00	-2.00	217.11
Begin Vertical Hold									
7,504.69	0.00	0.00	7,481.48	139.27	-431.22	-105.74	0.00	0.00	0.00
BYCN									
8,950.33	0.00	0.00	8,927.12	139.27	-431.22	-105.74	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build									
9,000.00	4.97	179.52	8,976.73	137.12	-431.20	-103.59	10.00	10.00	0.00
9,012.87	6.25	179.52	8,989.54	135.86	-431.19	-102.34	10.00	10.00	0.00
Bone Sprg (BSGL)									
9,100.00	14.97	179.52	9,075.09	119.83	-431.06	-86.37	10.00	10.00	0.00
9,200.00	24.97	179.52	9,168.96	85.73	-430.77	-52.39	10.00	10.00	0.00
9,300.00	34.97	179.52	9,255.49	35.84	-430.35	-2.68	10.00	10.00	0.00
9,400.00	44.97	179.52	9,332.03	-28.31	-429.81	61.24	10.00	10.00	0.00
9,410.39	46.01	179.52	9,339.31	-35.72	-429.75	68.62	10.00	10.00	0.00
M Avalon Sh									
9,500.00	54.97	179.52	9,396.27	-104.78	-429.17	137.43	10.00	10.00	0.00
9,600.00	64.97	179.52	9,446.26	-191.24	-428.44	223.58	10.00	10.00	0.00
9,700.00	74.97	179.52	9,480.47	-285.06	-427.65	317.07	10.00	10.00	0.00
9,800.00	84.97	179.52	9,497.87	-383.41	-426.82	415.06	10.00	10.00	0.00
9,841.00	89.07	179.52	9,500.00	-424.34	-426.48	455.85	10.00	10.00	0.00
LP, Hold 89.07° Inc at 179.52° Azm									
9,900.00	89.07	179.52	9,500.96	-483.33	-425.98	514.62	0.00	0.00	0.00
10,000.00	89.07	179.52	9,502.59	-583.31	-425.14	614.24	0.00	0.00	0.00
10,100.00	89.07	179.52	9,504.22	-683.30	-424.30	713.87	0.00	0.00	0.00
10,200.00	89.07	179.52	9,505.84	-783.28	-423.46	813.49	0.00	0.00	0.00
10,300.00	89.07	179.52	9,507.47	-883.26	-422.62	913.11	0.00	0.00	0.00
10,400.00	89.07	179.52	9,509.10	-983.25	-421.77	1,012.74	0.00	0.00	0.00
10,500.00	89.07	179.52	9,510.73	-1,083.23	-420.93	1,112.36	0.00	0.00	0.00
10,600.00	89.07	179.52	9,512.35	-1,183.21	-420.09	1,211.98	0.00	0.00	0.00
10,700.00	89.07	179.52	9,513.98	-1,283.20	-419.25	1,311.61	0.00	0.00	0.00
10,800.00	89.07	179.52	9,515.61	-1,383.18	-418.41	1,411.23	0.00	0.00	0.00
10,900.00	89.07	179.52	9,517.24	-1,483.16	-417.57	1,510.85	0.00	0.00	0.00
11,000.00	89.07	179.52	9,518.86	-1,583.15	-416.73	1,610.48	0.00	0.00	0.00
11,100.00	89.07	179.52	9,520.49	-1,683.13	-415.88	1,710.10	0.00	0.00	0.00
11,200.00	89.07	179.52	9,522.12	-1,783.11	-415.04	1,809.72	0.00	0.00	0.00
11,300.00	89.07	179.52	9,523.75	-1,883.10	-414.20	1,909.35	0.00	0.00	0.00
11,400.00	89.07	179.52	9,525.37	-1,983.08	-413.36	2,008.97	0.00	0.00	0.00
11,500.00	89.07	179.52	9,527.00	-2,083.06	-412.52	2,108.59	0.00	0.00	0.00
11,600.00	89.07	179.52	9,528.63	-2,183.04	-411.68	2,208.22	0.00	0.00	0.00
11,700.00	89.07	179.52	9,530.25	-2,283.03	-410.84	2,307.84	0.00	0.00	0.00
11,800.00	89.07	179.52	9,531.88	-2,383.01	-409.99	2,407.46	0.00	0.00	0.00



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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)
11,900.00	89.07	179.52	9,533.51	-2,482.99	-409.15	2,507.09	0.00	0.00	0.00
12,000.00	89.07	179.52	9,535.14	-2,582.98	-408.31	2,606.71	0.00	0.00	0.00
12,100.00	89.07	179.52	9,536.76	-2,682.96	-407.47	2,706.33	0.00	0.00	0.00
12,200.00	89.07	179.52	9,538.39	-2,782.94	-406.63	2,805.96	0.00	0.00	0.00
12,300.00	89.07	179.52	9,540.02	-2,882.93	-405.79	2,905.58	0.00	0.00	0.00
12,400.00	89.07	179.52	9,541.65	-2,982.91	-404.95	3,005.20	0.00	0.00	0.00
12,500.00	89.07	179.52	9,543.27	-3,082.89	-404.10	3,104.83	0.00	0.00	0.00
12,600.00	89.07	179.52	9,544.90	-3,182.88	-403.26	3,204.45	0.00	0.00	0.00
12,700.00	89.07	179.52	9,546.53	-3,282.86	-402.42	3,304.07	0.00	0.00	0.00
12,800.00	89.07	179.52	9,548.16	-3,382.84	-401.58	3,403.69	0.00	0.00	0.00
12,900.00	89.07	179.52	9,549.78	-3,482.83	-400.74	3,503.32	0.00	0.00	0.00
13,000.00	89.07	179.52	9,551.41	-3,582.81	-399.90	3,602.94	0.00	0.00	0.00
13,100.00	89.07	179.52	9,553.04	-3,682.79	-399.06	3,702.56	0.00	0.00	0.00
13,200.00	89.07	179.52	9,554.67	-3,782.78	-398.21	3,802.19	0.00	0.00	0.00
13,300.00	89.07	179.52	9,556.29	-3,882.76	-397.37	3,901.81	0.00	0.00	0.00
13,400.00	89.07	179.52	9,557.92	-3,982.74	-396.53	4,001.43	0.00	0.00	0.00
13,500.00	89.07	179.52	9,559.55	-4,082.73	-395.69	4,101.06	0.00	0.00	0.00
13,600.00	89.07	179.52	9,561.18	-4,182.71	-394.85	4,200.68	0.00	0.00	0.00
13,700.00	89.07	179.52	9,562.80	-4,282.69	-394.01	4,300.30	0.00	0.00	0.00
13,800.00	89.07	179.52	9,564.43	-4,382.68	-393.17	4,399.93	0.00	0.00	0.00
13,900.00	89.07	179.52	9,566.06	-4,482.66	-392.32	4,499.55	0.00	0.00	0.00
14,000.00	89.07	179.52	9,567.68	-4,582.64	-391.48	4,599.17	0.00	0.00	0.00
14,100.00	89.07	179.52	9,569.31	-4,682.63	-390.64	4,698.80	0.00	0.00	0.00
14,200.00	89.07	179.52	9,570.94	-4,782.61	-389.80	4,798.42	0.00	0.00	0.00
14,300.00	89.07	179.52	9,572.57	-4,882.59	-388.96	4,898.04	0.00	0.00	0.00
14,400.00	89.07	179.52	9,574.19	-4,982.58	-388.12	4,997.67	0.00	0.00	0.00
14,449.53	89.07	179.52	9,575.00	-5,032.10	-387.70	5,047.01	0.00	0.00	0.00

TD at 14449.53

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
FTP - Sopapilla State	0.00	0.00	9,500.00	89.30	-430.80	488,509.70	743,383.5012° 20'	26.043077 N 3° 32'	43.065104 W
- plan misses target center by 203.09usft at 9416.18usft MD (9343.32 TVD, -39.90 N, -429.71 E)									
- Point									
LTP - Sopapilla State	0.00	0.00	9,574.15	-4,982.10	-388.10	483,438.30	743,426.2012° 19'	35.857095 N 3° 32'	43.002276 W
- plan misses target center by 0.04usft at 14399.52usft MD (9574.19 TVD, -4982.10 N, -388.12 E)									
- Point									
BHL - Sopapilla State	0.00	0.00	9,575.00	-5,032.10	-387.70	483,388.30	743,426.6012° 19'	35.362302 N 3° 32'	43.001901 W
- plan hits target center									
- Point									



Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Sopapilla State
Well: 3H
Wellbore: OH
Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,005.20	1,005.20	Rustler		0.93	184.41
1,326.20	1,326.20	TOS		0.93	184.41
4,704.38	4,693.39	BOS (Fletcher)		0.93	184.41
5,133.56	5,120.22	LMAR (Top Delaware)		0.93	184.41
5,212.96	5,199.19	BLCN		0.93	184.41
6,010.02	5,991.87	CYCN		0.93	184.41
7,504.69	7,481.48	BYCN		0.93	184.41
9,012.87	8,989.54	Bone Sprg (BSGL)		0.93	184.41
9,410.39	9,339.31	M Avalon Sh		0.93	184.41

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,500.00	2,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2,800.13	2,799.58	4.83	-14.95	Hold 6.00° Inc at 287.90° Azm
6,833.08	6,810.42	134.44	-416.27	Begin 2.00°/100' Drop
7,133.21	7,110.00	139.27	-431.22	Begin Vertical Hold
8,950.33	8,927.12	139.27	-431.22	KOP2, Begin 10.00°/100' Build
9,841.00	9,500.00	-424.34	-426.48	LP, Hold 89.07° Inc at 179.52° Azm
14,449.53	9,575.00	-5,032.10	-387.70	TD at 14449.53



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Sopapilla State

3H

OH

Plan 1 09-03-19

Anticollision Report

03 September, 2019





Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference	Plan 1 09-03-19
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.00usft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 50,000.00 u
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Pedal Curve
Casing Method:	Not applied

Survey Tool Program Date 9/3/2019

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	14,449.53	Plan 1 09-03-19 (OH)	MWD+HRGM	OWSG MWD + HRGM

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						
Limestone 11-23-33 Fed						
1H - OH / Job 1311084 - Surveys (Ensign 153)	14,450.15	9,577.27	1,216.87	1,101.45	10.543	CC, ES, SF
Sopapilla State						
1H - ST01 - Surveys	14,312.34	9,557.70	1,371.49	1,276.06	14.373	CC, ES
1H - ST01 - Surveys	14,450.15	9,563.45	1,378.38	1,281.06	14.163	SF
5H - OH - Plan 1 09-03-19	7,190.41	7,178.45	834.64	782.68	16.065	CC
5H - OH - Plan 1 09-03-19	14,450.15	14,458.44	835.27	674.51	5.196	ES, SF

Offset Design Limestone 11-23-33 Fed - 1H - OH / Job 1311084 - Surveys (Ensign 153)												Offset Site Error:	0.00 usft
Survey Program: 150-												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	16.75	16.75	1.00	0.08	-163.34	-5,232.41	-1,566.29	5,461.81				
100.00	100.00	126.26	126.26	1.03	0.59	-163.34	-5,232.39	-1,565.93	5,461.70	5,460.35	1.34	4,065.106	
200.00	200.00	226.86	226.86	1.34	1.38	-163.35	-5,232.38	-1,565.17	5,461.47	5,459.35	2.12	2,578.714	
300.00	300.00	325.90	325.90	1.73	2.23	-163.36	-5,232.46	-1,564.20	5,461.28	5,458.23	3.04	1,795.606	
400.00	400.00	427.57	427.55	2.11	3.03	-163.37	-5,232.58	-1,563.07	5,461.07	5,457.09	3.98	1,372.803	
500.00	500.00	526.72	526.70	2.48	3.77	-163.38	-5,232.70	-1,561.89	5,460.84	5,455.95	4.89	1,117.700	
600.00	600.00	623.20	623.18	2.85	4.45	-163.39	-5,232.84	-1,560.80	5,460.66	5,454.90	5.76	947.645	
700.00	700.00	729.25	729.21	3.22	5.12	-163.40	-5,233.00	-1,559.68	5,460.50	5,453.90	6.60	826.957	
800.00	800.00	843.23	843.19	3.58	5.77	-163.42	-5,232.93	-1,558.38	5,460.12	5,452.70	7.41	736.399	
900.00	900.00	938.13	938.08	3.95	6.24	-163.43	-5,232.77	-1,557.34	5,459.65	5,451.57	8.08	675.748	
1,000.00	1,000.00	1,033.04	1,032.99	4.31	6.70	-163.43	-5,232.64	-1,556.57	5,459.28	5,450.55	8.74	624.788	
1,100.00	1,100.00	1,140.81	1,140.76	4.67	6.95	-163.44	-5,232.37	-1,555.88	5,458.86	5,449.47	9.39	581.259	
1,200.00	1,200.00	1,243.63	1,243.57	5.03	7.24	-163.45	-5,232.04	-1,555.23	5,458.37	5,448.33	10.04	543.782	
1,300.00	1,300.00	1,346.72	1,346.66	5.40	7.63	-163.45	-5,231.66	-1,554.52	5,457.82	5,447.12	10.70	510.266	
1,400.00	1,400.00	1,446.29	1,446.23	5.76	8.04	-163.46	-5,231.28	-1,553.76	5,457.24	5,445.89	11.35	480.758	
1,500.00	1,500.00	1,543.78	1,543.72	6.12	8.46	-163.46	-5,230.92	-1,553.11	5,456.69	5,444.69	12.01	454.528	
1,600.00	1,600.00	1,645.80	1,645.73	6.48	8.87	-163.47	-5,230.53	-1,552.52	5,456.16	5,443.48	12.68	430.164	
1,700.00	1,700.00	1,748.83	1,748.76	6.84	9.29	-163.47	-5,230.06	-1,551.98	5,455.58	5,442.21	13.37	408.051	
1,800.00	1,800.00	1,850.48	1,850.40	7.20	9.65	-163.48	-5,229.54	-1,551.51	5,454.95	5,440.86	14.08	387.321	
1,900.00	1,900.00	1,951.93	1,951.85	7.56	10.02	-163.48	-5,228.96	-1,551.10	5,454.29	5,439.48	14.81	368.217	
2,000.00	2,000.00	2,052.95	2,052.87	7.92	10.34	-163.48	-5,228.33	-1,550.80	5,453.61	5,438.03	15.58	350.100	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Limestone 11-23-33 Fed - 1H - OH / Job 1311084 - Surveys (Ensign 153)													Offset Site Error: 0.00 usft			
Survey Program: 150-Reference				Offset				Semi Major Axis				Distance				Offset Well Error: 0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning			
2,100.00	2,100.00	2,153.40	2,153.32	8.28	10.67	-163.48	-5,227.66	-1,550.61	5,452.91	5,436.56	16.35	333.481				
2,200.00	2,200.00	2,253.36	2,253.28	8.64	10.99	-163.48	-5,227.00	-1,550.39	5,452.22	5,435.09	17.13	318.250				
2,300.00	2,300.00	2,371.24	2,371.15	9.00	11.41	-163.48	-5,226.11	-1,549.98	5,451.40	5,433.45	17.95	303.717				
2,400.00	2,400.00	2,499.45	2,499.35	9.36	11.90	-163.49	-5,224.69	-1,549.06	5,450.14	5,431.36	18.78	290.219				
2,500.00	2,500.00	2,637.30	2,637.18	9.72	12.45	-163.50	-5,222.50	-1,547.29	5,448.25	5,428.64	19.62	277.728				
2,600.00	2,599.98	2,755.60	2,755.43	10.03	12.94	-91.48	-5,220.17	-1,545.15	5,445.89	5,425.53	20.37	267.390				
2,700.00	2,699.84	2,872.09	2,871.86	10.37	13.42	-91.61	-5,217.62	-1,542.53	5,443.30	5,422.20	21.10	257.977				
2,800.00	2,799.45	2,986.39	2,986.09	10.73	13.90	-91.80	-5,214.94	-1,539.44	5,440.53	5,418.70	21.83	249.272				
2,900.00	2,898.90	3,107.74	3,107.34	11.08	14.40	-91.96	-5,211.84	-1,535.55	5,437.51	5,414.94	22.58	240.863				
3,000.00	2,998.36	3,229.46	3,228.92	11.40	14.90	-92.13	-5,208.39	-1,531.02	5,434.11	5,410.78	23.33	232.945				
3,100.00	3,097.81	3,351.05	3,350.35	11.72	15.39	-92.30	-5,204.54	-1,526.05	5,430.33	5,406.24	24.08	225.476				
3,200.00	3,197.26	3,400.11	3,399.35	12.05	15.65	-92.37	-5,203.08	-1,524.17	5,426.83	5,402.21	24.62	220.416				
3,300.00	3,296.71	3,449.31	3,448.52	12.37	15.91	-92.44	-5,201.98	-1,522.69	5,424.27	5,399.12	25.16	215.606				
3,400.00	3,396.16	3,530.00	3,529.19	12.71	16.34	-92.54	-5,200.93	-1,521.16	5,422.84	5,397.04	25.81	210.121				
3,500.00	3,495.61	3,566.14	3,565.32	13.04	16.52	-92.58	-5,200.67	-1,520.72	5,421.93	5,395.64	26.29	206.206				
3,600.00	3,595.07	3,665.43	3,664.60	13.38	17.03	-92.71	-5,200.00	-1,519.42	5,421.41	5,394.41	27.00	200.797				
3,700.00	3,694.52	3,765.59	3,764.75	13.75	17.46	-92.83	-5,199.34	-1,518.00	5,420.91	5,393.20	27.70	195.672				
3,800.00	3,793.97	3,866.44	3,865.59	14.12	17.85	-92.95	-5,198.65	-1,516.57	5,420.40	5,392.00	28.41	190.801				
3,900.00	3,893.42	3,958.55	3,957.69	14.49	18.20	-93.07	-5,198.04	-1,515.32	5,419.96	5,390.88	29.09	186.336				
4,000.00	3,892.87	4,048.44	4,047.57	14.86	18.54	-93.17	-5,197.58	-1,514.20	5,419.72	5,389.96	29.76	182.116				
4,059.16	4,051.70	4,099.89	4,099.01	15.08	18.72	-93.24	-5,197.39	-1,513.57	5,419.67	5,389.51	30.16	179.695				
4,100.00	4,092.32	4,134.79	4,133.91	15.23	18.85	-93.28	-5,197.33	-1,513.07	5,419.69	5,389.25	30.44	178.059				
4,200.00	4,191.78	4,220.17	4,219.28	15.60	19.14	-93.39	-5,197.42	-1,511.51	5,419.95	5,388.83	31.12	174.179				
4,300.00	4,291.23	4,318.41	4,317.48	15.98	19.47	-93.52	-5,197.85	-1,509.16	5,420.40	5,388.53	31.87	170.086				
4,400.00	4,390.68	4,421.79	4,420.81	16.35	19.81	-93.67	-5,198.40	-1,505.98	5,420.82	5,388.17	32.65	166.028				
4,500.00	4,490.13	4,514.56	4,513.53	16.72	20.12	-93.81	-5,199.04	-1,502.64	5,421.29	5,387.90	33.39	162.358				
4,600.00	4,589.58	4,603.00	4,601.89	17.10	20.42	-93.94	-5,199.82	-1,499.18	5,421.92	5,387.80	34.12	158.927				
4,700.00	4,689.03	4,676.89	4,675.71	17.47	20.65	-94.06	-5,200.75	-1,496.20	5,422.92	5,388.13	34.79	155.865				
4,800.00	4,788.49	4,747.68	4,746.44	17.84	20.87	-94.17	-5,202.01	-1,493.38	5,424.47	5,389.01	35.46	152.990				
4,900.00	4,887.94	4,781.00	4,779.73	18.22	20.98	-94.22	-5,202.74	-1,492.07	5,426.75	5,390.79	35.96	150.914				
5,000.00	4,987.39	4,871.29	4,869.94	18.59	21.23	-94.35	-5,205.15	-1,489.27	5,429.48	5,392.74	36.73	147.808				
5,100.00	5,086.84	4,953.00	4,951.59	18.97	21.46	-94.46	-5,207.93	-1,486.00	5,433.19	5,395.73	37.47	145.017				
5,200.00	5,186.29	5,019.38	5,017.92	19.34	21.66	-94.55	-5,210.39	-1,487.46	5,437.34	5,399.25	38.09	142.756				
5,300.00	5,285.75	5,130.14	5,128.61	19.72	21.98	-94.69	-5,214.34	-1,486.57	5,441.50	5,402.60	38.89	139.914				
5,400.00	5,385.20	5,245.79	5,244.19	20.10	22.31	-94.83	-5,218.11	-1,485.72	5,445.40	5,405.69	39.72	137.110				
5,500.00	5,484.65	5,351.18	5,349.53	20.47	22.62	-94.96	-5,221.31	-1,485.01	5,449.12	5,408.60	40.52	134.482				
5,600.00	5,584.10	5,451.00	5,449.28	20.85	23.40	-95.29	-5,226.27	-1,482.50	5,452.31	5,410.38	41.93	130.034				
5,700.00	5,683.55	5,574.36	5,572.64	21.23	23.61	-95.36	-5,226.41	-1,481.86	5,453.33	5,410.83	42.50	128.325				
5,800.00	5,783.00	5,726.92	5,725.19	21.60	23.80	-95.42	-5,226.91	-1,481.79	5,455.23	5,412.19	43.04	126.754				
5,900.00	5,882.46	5,795.00	5,793.26	21.98	24.05	-95.49	-5,228.11	-1,482.37	5,458.05	5,414.42	43.63	125.099				
6,000.00	5,981.91	5,873.03	5,871.26	22.36	24.48	-95.57	-5,229.75	-1,483.57	5,461.39	5,417.15	44.25	123.431				
6,100.00	6,081.36	5,991.59	5,989.79	22.74	25.11	-95.68	-5,231.93	-1,485.75	5,464.63	5,419.63	45.01	121.422				
6,200.00	6,180.81	6,127.71	6,125.82	23.12	25.58	-95.78	-5,232.58	-1,490.48	5,466.73	5,420.84	45.89	119.133				
6,300.00	6,280.26	6,274.33	6,272.28	23.49	26.08	-95.87	-5,232.04	-1,497.08	5,468.25	5,421.36	46.89	116.618				
6,400.00	6,379.71	6,375.81	6,373.63	23.87	26.43	-95.93	-5,231.44	-1,501.96	5,469.74	5,422.07	47.67	114.737				
6,500.00	6,479.17	6,478.02	6,475.74	24.25	26.77	-95.99	-5,230.82	-1,506.73	5,471.20	5,422.80	48.41	113.021				
6,600.00	6,578.62	6,584.47	6,582.07	24.63	27.12	-96.06	-5,230.13	-1,511.54	5,472.60	5,423.44	49.16	111.314				
6,700.00	6,678.07	6,693.03	6,690.51	25.01	27.48	-96.12	-5,229.24	-1,516.52	5,473.85	5,423.93	49.93	109.635				
6,800.00	6,777.52	6,805.89	6,803.24	25.39	27.86	-96.19	-5,228.06	-1,521.84	5,474.91	5,424.20	50.71	107.957				
6,900.00	6,877.05	6,909.83	6,907.05	25.76	28.20	-96.25	-5,226.73	-1,526.89	5,475.69	5,424.23	51.46	106.409				
7,000.00	6,976.84	7,003.26	7,000.36	26.14	28.52	-96.27	-5,225.58	-1,531.47	5,476.18	5,424.02	52.16	104.981				
7,100.00	7,076.79	7,091.94	7,088.93	26.53	28.82	-96.26	-5,224.62	-1,535.86	5,476.43	5,423.59	52.84	103.642				

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandrill Quest)
MD Reference: RKB @ 3569.20usft (Scandrill Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Limestone 11-23-33 Fed - 1H - OH / Job 1311084 - Surveys (Ensign 153)													Offset Site Error: 0.00 usft
Survey Program: 150-Reference													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
7,200.00	7,176.79	7,176.55	7,173.43	26.87	29.11	-168.32	-5,223.91	-1,540.15	5,476.65	5,423.17	53.48	102.409	
7,300.00	7,276.79	7,266.29	7,263.05	27.21	29.42	-168.27	-5,223.37	-1,544.80	5,477.11	5,422.98	54.13	101.177	
7,400.00	7,376.79	7,362.93	7,359.55	27.55	29.75	-168.22	-5,222.87	-1,549.83	5,477.68	5,422.86	54.82	99.929	
7,500.00	7,476.79	7,458.06	7,454.56	27.89	30.08	-168.16	-5,222.46	-1,554.77	5,478.31	5,422.82	55.49	98.725	
7,600.00	7,576.79	7,552.10	7,548.47	28.23	30.41	-168.12	-5,222.18	-1,559.49	5,479.05	5,422.89	56.16	97.559	
7,700.00	7,676.79	7,663.08	7,659.34	28.57	30.80	-168.06	-5,221.95	-1,564.57	5,479.80	5,422.90	56.89	96.316	
7,800.00	7,776.79	7,780.48	7,776.67	28.91	31.22	-168.02	-5,221.62	-1,568.55	5,480.22	5,422.57	57.65	95.058	
7,900.00	7,876.79	7,888.92	7,885.07	29.25	31.59	-167.99	-5,221.20	-1,571.58	5,480.43	5,422.04	58.38	93.870	
8,000.00	7,976.79	7,991.97	7,988.08	29.60	31.95	-167.96	-5,220.71	-1,574.27	5,480.51	5,421.41	59.10	92.738	
8,100.00	8,076.79	8,090.20	8,086.28	29.94	32.30	-167.93	-5,220.24	-1,576.90	5,480.59	5,420.80	59.79	91.658	
8,200.00	8,176.79	8,190.52	8,186.55	30.28	32.65	-167.90	-5,219.76	-1,579.63	5,480.70	5,420.20	60.50	90.591	
8,300.00	8,276.79	8,291.70	8,287.70	30.63	33.01	-167.88	-5,219.29	-1,582.29	5,480.79	5,419.59	61.21	89.543	
8,400.00	8,376.79	8,420.74	8,416.71	30.97	33.41	-167.85	-5,218.58	-1,584.52	5,480.63	5,418.60	62.03	88.359	
8,500.00	8,476.79	8,532.44	8,528.42	31.31	33.75	-167.85	-5,217.82	-1,584.73	5,480.00	5,417.21	62.79	87.274	
8,600.00	8,576.79	8,630.12	8,626.09	31.66	34.05	-167.85	-5,217.16	-1,584.84	5,479.35	5,415.84	63.51	86.276	
8,700.00	8,676.79	8,728.76	8,724.72	32.01	34.36	-167.84	-5,216.50	-1,585.04	5,478.75	5,414.51	64.24	85.287	
8,800.00	8,776.79	8,827.72	8,823.69	32.35	34.66	-167.84	-5,215.86	-1,585.29	5,478.16	5,413.19	64.97	84.316	
8,900.00	8,876.79	8,923.92	8,919.88	32.70	34.96	-167.83	-5,215.26	-1,585.58	5,477.62	5,411.92	65.70	83.379	
9,000.00	8,976.73	9,013.00	9,008.96	33.06	35.25	12.71	-5,214.75	-1,585.93	5,475.05	5,408.65	66.40	82.452	
9,100.00	9,075.09	9,104.23	9,100.19	33.61	35.55	13.14	-5,214.36	-1,586.43	5,457.89	5,390.61	67.28	81.126	
9,200.00	9,168.96	9,192.00	9,187.96	34.11	35.85	14.06	-5,214.16	-1,587.10	5,424.57	5,356.49	68.08	79.677	
9,300.00	9,255.49	9,298.19	9,294.14	34.53	36.21	15.68	-5,213.76	-1,588.05	5,375.79	5,306.91	68.87	78.052	
9,400.00	9,332.03	9,400.22	9,396.16	34.87	36.56	18.35	-5,212.83	-1,589.02	5,312.76	5,243.21	69.56	76.380	
9,500.00	9,396.27	9,447.45	9,443.39	35.12	36.71	22.53	-5,212.43	-1,589.55	5,237.90	5,167.94	69.96	74.870	
9,600.00	9,446.26	9,491.82	9,487.75	35.30	36.86	29.86	-5,212.05	-1,590.08	5,153.51	5,083.26	70.26	73.353	
9,700.00	9,480.47	9,522.01	9,517.94	35.41	36.97	43.84	-5,211.81	-1,590.47	5,062.17	4,991.74	70.42	71.882	
9,800.00	9,497.87	9,537.05	9,532.98	35.49	37.02	71.50	-5,211.70	-1,590.67	4,966.63	4,896.15	70.48	70.473	
9,900.00	9,500.96	9,539.17	9,535.10	35.60	37.02	87.25	-5,211.69	-1,590.70	4,869.73	4,799.28	70.45	69.120	
10,000.00	9,502.59	9,539.97	9,535.90	35.78	37.03	87.28	-5,211.68	-1,590.71	4,772.91	4,702.48	70.43	67.772	
10,100.00	9,504.22	9,540.77	9,536.69	36.05	37.03	87.32	-5,211.67	-1,590.73	4,676.22	4,605.82	70.40	66.420	
10,200.00	9,505.84	9,549.00	9,544.93	36.42	37.06	87.71	-5,211.61	-1,590.84	4,579.68	4,509.27	70.41	65.041	
10,300.00	9,507.47	9,549.00	9,544.93	36.86	37.06	87.71	-5,211.61	-1,590.84	4,483.29	4,412.89	70.40	63.685	
10,400.00	9,509.10	9,549.00	9,544.93	37.37	37.06	87.71	-5,211.61	-1,590.84	4,387.05	4,316.66	70.39	62.326	
10,500.00	9,510.73	9,549.00	9,544.93	37.94	37.06	87.71	-5,211.61	-1,590.84	4,290.99	4,220.60	70.39	60.962	
10,600.00	9,512.35	9,549.00	9,544.93	38.56	37.06	87.71	-5,211.61	-1,590.84	4,195.11	4,124.72	70.39	59.594	
10,700.00	9,513.98	9,549.00	9,544.93	39.22	37.06	87.71	-5,211.61	-1,590.84	4,099.43	4,029.02	70.41	58.222	
10,800.00	9,515.61	9,549.00	9,544.93	39.93	37.06	87.71	-5,211.61	-1,590.84	4,003.96	3,933.52	70.44	56.846	
10,900.00	9,517.24	9,549.00	9,544.93	40.68	37.06	87.71	-5,211.61	-1,590.84	3,908.72	3,838.24	70.47	55.464	
11,000.00	9,518.86	9,549.00	9,544.93	41.47	37.06	87.71	-5,211.61	-1,590.84	3,813.72	3,743.19	70.52	54.078	
11,100.00	9,520.49	9,549.00	9,544.93	42.29	37.06	87.71	-5,211.61	-1,590.84	3,718.98	3,648.39	70.59	52.686	
11,200.00	9,522.12	9,549.00	9,544.93	43.14	37.06	87.71	-5,211.61	-1,590.84	3,624.52	3,553.86	70.67	51.289	
11,300.00	9,523.75	9,549.00	9,544.93	44.03	37.06	87.71	-5,211.61	-1,590.84	3,530.37	3,459.61	70.77	49.886	
11,400.00	9,525.37	9,549.00	9,544.93	44.94	37.06	87.71	-5,211.61	-1,590.84	3,436.56	3,365.67	70.89	48.478	
11,500.00	9,527.00	9,549.00	9,544.93	45.88	37.06	87.71	-5,211.61	-1,590.84	3,343.09	3,272.06	71.03	47.063	
11,600.00	9,528.63	9,549.00	9,544.93	46.85	37.06	87.71	-5,211.61	-1,590.84	3,250.02	3,178.82	71.21	45.642	
11,700.00	9,530.25	9,549.00	9,544.93	47.84	37.06	87.71	-5,211.61	-1,590.84	3,157.38	3,085.97	71.41	44.214	
11,800.00	9,531.88	9,549.00	9,544.93	48.86	37.06	87.71	-5,211.61	-1,590.84	3,065.19	2,993.54	71.65	42.781	
11,900.00	9,533.51	9,549.00	9,544.93	49.89	37.06	87.71	-5,211.61	-1,590.84	2,973.51	2,901.58	71.93	41.340	
12,000.00	9,535.14	9,556.33	9,552.25	50.94	37.08	88.06	-5,211.56	-1,590.94	2,882.37	2,810.10	72.27	39.881	
12,100.00	9,536.76	9,557.16	9,553.09	52.02	37.09	88.10	-5,211.56	-1,590.95	2,791.85	2,719.20	72.65	38.429	
12,200.00	9,538.39	9,558.00	9,553.92	53.11	37.09	88.14	-5,211.55	-1,590.97	2,702.00	2,628.91	73.08	36.971	
12,300.00	9,540.02	9,558.83	9,554.76	54.21	37.09	88.18	-5,211.54	-1,590.98	2,612.88	2,539.29	73.58	35.509	

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



Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3569.20usft (Scandril Quest)
Reference Site:	Sopapilla State	MD Reference:	RKB @ 3569.20usft (Scandril Quest)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	3H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 09-03-19	Offset TVD Reference:	Offset Datum

Offset Design Limestone 11-23-33 Fed - 1H - OH / Job 1311084 - Surveys (Ensign 153)													Offset Site Error:	0.00 usft
Survey Program: 150-Reference													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
12,400.00	9,541.65	9,559.67	9,555.60	55.33	37.09	88.22	-5,211.54	-1,590.99	2,524.58	2,450.42	74.16	34.044		
12,500.00	9,543.27	9,560.51	9,556.44	56.47	37.10	88.26	-5,211.53	-1,591.00	2,437.18	2,362.36	74.81	32.577		
12,600.00	9,544.90	9,561.36	9,557.28	57.62	37.10	88.30	-5,211.53	-1,591.02	2,350.78	2,275.22	75.56	31.111		
12,700.00	9,546.53	9,562.20	9,558.13	58.78	37.10	88.34	-5,211.52	-1,591.03	2,265.51	2,189.09	76.41	29.648		
12,800.00	9,548.16	9,563.05	9,558.97	59.96	37.11	88.38	-5,211.51	-1,591.04	2,181.48	2,104.10	77.38	28.191		
12,900.00	9,549.78	9,563.89	9,559.82	61.14	37.11	88.42	-5,211.51	-1,591.05	2,098.86	2,020.38	78.48	26.743		
13,000.00	9,551.41	9,564.74	9,560.67	62.34	37.11	88.46	-5,211.50	-1,591.06	2,017.81	1,938.09	79.72	25.310		
13,100.00	9,553.04	9,565.60	9,561.52	63.55	37.12	88.50	-5,211.50	-1,591.08	1,938.53	1,857.41	81.12	23.897		
13,200.00	9,554.67	9,566.45	9,562.37	64.76	37.12	88.54	-5,211.49	-1,591.09	1,861.24	1,778.55	82.69	22.509		
13,300.00	9,556.29	9,567.30	9,563.23	65.99	37.12	88.58	-5,211.48	-1,591.10	1,786.22	1,701.77	84.44	21.153		
13,400.00	9,557.92	9,568.16	9,564.09	67.22	37.12	88.62	-5,211.48	-1,591.12	1,713.74	1,627.35	86.39	19.837		
13,500.00	9,559.55	9,569.02	9,564.94	68.46	37.13	88.66	-5,211.47	-1,591.13	1,644.15	1,555.61	88.54	18.570		
13,600.00	9,561.18	9,569.88	9,565.80	69.71	37.13	88.70	-5,211.47	-1,591.14	1,577.84	1,486.94	90.89	17.359		
13,700.00	9,562.80	9,570.74	9,566.67	70.97	37.13	88.75	-5,211.46	-1,591.15	1,515.22	1,421.77	93.45	16.214		
13,800.00	9,564.43	9,571.61	9,567.53	72.23	37.14	88.79	-5,211.45	-1,591.17	1,456.79	1,360.59	96.20	15.144		
13,900.00	9,566.06	9,572.47	9,568.40	73.50	37.14	88.83	-5,211.45	-1,591.18	1,403.05	1,303.95	99.10	14.157		
14,000.00	9,567.68	9,573.34	9,569.26	74.78	37.14	88.87	-5,211.44	-1,591.19	1,354.58	1,252.44	102.14	13.263		
14,100.00	9,569.31	9,574.21	9,570.13	76.06	37.15	88.91	-5,211.44	-1,591.21	1,311.95	1,206.72	105.23	12.467		
14,200.00	9,570.94	9,575.08	9,571.00	77.35	37.15	88.95	-5,211.43	-1,591.22	1,275.75	1,167.43	108.32	11.778		
14,300.00	9,572.57	9,575.95	9,571.88	78.64	37.15	88.99	-5,211.42	-1,591.23	1,246.53	1,135.23	111.30	11.199		
14,400.00	9,574.19	9,576.83	9,572.75	79.94	37.15	89.03	-5,211.42	-1,591.25	1,224.81	1,110.72	114.09	10.735		
14,450.15	9,575.01	9,577.27	9,573.19	80.60	37.16	89.06	-5,211.41	-1,591.25	1,216.87	1,101.45	115.42	10.543 CC, ES, SF		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Sopapilla State - 1H - ST01 - Surveys													Offset Site Error: 0.00 usft
Survey Program: 100-, 9760-													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.00	0.00	17.31	17.31	1.00	0.01	-159.41	-4,894.11	-1,839.08	5,228.24				
100.00	100.00	131.61	131.60	1.03	0.14	-159.42	-4,894.27	-1,837.78	5,227.97	5,226.82	1.15	4,547.613	
200.00	200.00	225.18	225.16	1.34	0.31	-159.44	-4,894.67	-1,835.99	5,227.70	5,226.10	1.59	3,282.371	
300.00	300.00	320.79	320.74	1.73	0.49	-159.46	-4,895.28	-1,833.89	5,227.52	5,225.40	2.12	2,464.436	
400.00	400.00	415.59	415.50	2.11	0.67	-159.49	-4,896.07	-1,831.55	5,227.44	5,224.79	2.65	1,974.852	
449.29	449.29	463.19	463.09	2.29	0.76	-159.50	-4,896.46	-1,830.50	5,227.43	5,224.53	2.91	1,799.300	
500.00	500.00	514.49	514.39	2.48	0.85	-159.51	-4,896.80	-1,829.61	5,227.44	5,224.26	3.18	1,644.233	
600.00	600.00	628.41	628.30	2.85	1.07	-159.53	-4,897.05	-1,828.43	5,227.28	5,223.55	3.74	1,398.564	
700.00	700.00	745.11	744.99	3.22	1.28	-159.54	-4,896.97	-1,827.31	5,226.88	5,222.58	4.30	1,215.114	
800.00	800.00	911.82	911.67	3.58	1.59	-159.56	-4,895.88	-1,824.79	5,225.81	5,220.85	4.96	1,054.511	
900.00	900.00	990.26	990.08	3.95	1.74	-159.58	-4,895.39	-1,822.56	5,224.21	5,218.76	5.45	957.950	
1,000.00	1,000.00	1,062.70	1,062.49	4.31	1.88	-159.60	-4,895.30	-1,820.27	5,223.00	5,217.06	5.94	879.334	
1,100.00	1,100.00	1,148.41	1,148.18	4.67	2.04	-159.62	-4,895.33	-1,818.47	5,222.28	5,215.83	6.45	809.678	
1,200.00	1,200.00	1,251.89	1,251.65	5.03	2.22	-159.63	-4,894.91	-1,817.55	5,221.59	5,214.60	7.00	746.429	
1,300.00	1,300.00	1,342.56	1,342.32	5.40	2.38	-159.63	-4,894.30	-1,817.35	5,220.90	5,213.38	7.51	694.777	
1,400.00	1,400.00	1,429.30	1,429.06	5.76	2.51	-159.62	-4,893.85	-1,817.68	5,220.53	5,212.50	8.03	650.215	
1,500.00	1,500.00	1,536.23	1,535.98	6.12	2.68	-159.61	-4,893.09	-1,818.59	5,220.17	5,211.59	8.58	608.675	
1,600.00	1,600.00	1,633.19	1,632.92	6.48	2.83	-159.59	-4,892.16	-1,819.87	5,219.73	5,210.62	9.11	573.259	
1,700.00	1,700.00	1,716.82	1,716.54	6.84	2.96	-159.58	-4,891.39	-1,821.40	5,219.51	5,209.90	9.61	543.130	
1,712.47	1,712.47	1,726.55	1,726.27	6.88	2.98	-159.57	-4,891.31	-1,821.61	5,219.50	5,209.83	9.67	539.675	
1,800.00	1,800.00	1,800.00	1,799.70	7.20	3.10	-159.55	-4,890.82	-1,823.34	5,219.67	5,209.56	10.11	516.152	
1,900.00	1,900.00	1,885.47	1,885.13	7.56	3.23	-159.53	-4,890.37	-1,825.71	5,220.13	5,209.51	10.62	491.610	
2,000.00	2,000.00	1,975.58	1,975.20	7.92	3.38	-159.50	-4,889.92	-1,828.57	5,220.77	5,209.64	11.13	468.978	
2,100.00	2,100.00	2,067.49	2,067.05	8.28	3.53	-159.46	-4,889.57	-1,831.67	5,221.60	5,209.95	11.65	448.244	
2,200.00	2,200.00	2,163.41	2,162.94	8.64	3.69	-159.43	-4,889.49	-1,834.46	5,222.54	5,210.37	12.17	429.047	
2,300.00	2,300.00	2,272.00	2,271.49	9.00	3.87	-159.41	-4,889.55	-1,837.18	5,223.47	5,210.76	12.72	410.718	
2,400.00	2,400.00	2,475.40	2,474.82	9.36	4.23	-159.36	-4,887.43	-1,841.38	5,223.16	5,209.73	13.43	388.858	
2,500.00	2,500.00	2,696.77	2,696.11	9.72	4.63	-159.34	-4,881.94	-1,840.38	5,220.49	5,206.31	14.19	368.028	
2,600.00	2,599.98	2,822.26	2,821.48	10.03	4.85	-87.37	-4,878.03	-1,836.69	5,216.41	5,201.65	14.75	353.589	
2,700.00	2,699.84	2,877.84	2,877.02	10.37	4.95	-87.49	-4,876.56	-1,834.97	5,212.61	5,197.42	15.19	343.263	
2,800.00	2,799.45	2,935.03	2,934.18	10.73	5.05	-87.61	-4,875.47	-1,833.45	5,209.50	5,193.88	15.62	333.429	
2,900.00	2,898.90	3,000.00	2,999.13	11.08	5.17	-87.70	-4,874.67	-1,832.11	5,207.14	5,191.06	16.08	323.797	
3,000.00	2,998.36	3,068.54	3,067.66	11.40	5.29	-87.79	-4,874.21	-1,830.88	5,205.43	5,188.88	16.55	314.549	
3,100.00	3,097.81	3,144.19	3,143.29	11.72	5.43	-87.89	-4,874.05	-1,829.44	5,204.19	5,187.16	17.03	305.587	
3,200.00	3,197.26	3,225.52	3,224.61	12.05	5.57	-88.00	-4,874.30	-1,827.87	5,203.42	5,185.90	17.52	296.959	
3,300.00	3,296.71	3,323.49	3,322.54	12.37	5.75	-88.14	-4,874.95	-1,825.27	5,202.80	5,184.75	18.04	288.330	
3,400.00	3,396.16	3,410.95	3,409.95	12.71	5.90	-88.28	-4,875.90	-1,822.32	5,202.35	5,183.80	18.55	280.447	
3,500.00	3,495.61	3,500.00	3,498.91	13.04	6.06	-88.42	-4,877.26	-1,818.81	5,202.17	5,183.11	19.06	272.930	
3,504.51	3,500.09	3,500.00	3,498.91	13.05	6.06	-88.42	-4,877.26	-1,818.81	5,202.16	5,183.09	19.08	272.702	
3,600.00	3,595.07	3,551.88	3,550.74	13.38	6.15	-88.51	-4,878.37	-1,816.71	5,202.56	5,183.05	19.51	266.709	
3,700.00	3,694.52	3,610.33	3,609.13	13.75	6.25	-88.60	-4,880.10	-1,814.58	5,203.86	5,183.90	19.96	260.651	
3,800.00	3,793.97	3,730.92	3,729.63	14.12	6.46	-88.78	-4,883.39	-1,811.53	5,205.39	5,184.86	20.53	253.540	
3,900.00	3,893.42	3,835.00	3,833.69	14.49	6.64	-88.92	-4,885.18	-1,810.40	5,206.45	5,185.38	21.07	247.111	
4,000.00	3,992.87	3,900.00	3,898.67	14.86	6.75	-89.01	-4,886.49	-1,810.05	5,208.00	5,186.46	21.54	241.765	
4,100.00	4,092.32	3,966.92	3,965.57	15.23	6.87	-89.09	-4,888.19	-1,809.99	5,210.22	5,188.20	22.02	236.636	
4,200.00	4,191.78	4,054.44	4,053.05	15.60	7.02	-89.20	-4,890.81	-1,810.21	5,212.99	5,190.46	22.53	231.368	
4,300.00	4,291.23	4,184.02	4,182.56	15.98	7.24	-89.37	-4,894.88	-1,809.08	5,215.60	5,192.48	23.12	225.584	
4,400.00	4,390.68	4,404.31	4,402.75	16.35	7.64	-89.69	-4,899.10	-1,804.50	5,216.65	5,192.78	23.87	218.516	
4,408.22	4,398.85	4,385.15	4,383.60	16.38	7.60	-89.66	-4,898.87	-1,804.91	5,216.64	5,192.78	23.87	218.548	
4,500.00	4,490.13	4,483.70	4,482.13	16.72	7.78	-89.80	-4,899.86	-1,802.83	5,216.86	5,192.48	24.38	213.982	
4,600.00	4,589.58	4,563.83	4,562.24	17.10	7.92	-89.91	-4,900.92	-1,801.12	5,217.43	5,192.55	24.89	209.633	
4,700.00	4,689.03	4,670.22	4,668.58	17.47	8.12	-90.07	-4,902.66	-1,798.61	5,218.27	5,192.83	25.44	205.089	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandrill Quest)
MD Reference: RKB @ 3569.20usft (Scandrill Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Sopapilla State - 1H - ST01 - Surveys													Offset Site Error:	0.00 usft
Survey Program: 100-, 9760-													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance				Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)		Minimum Separation (usft)	Separation Factor	
4,800.00	4,788.49	4,824.68	4,822.92	17.84	8.40	-90.31	-4,904.67	-1,793.05	5,218.46	5,192.38	26.09	200.051		
4,900.00	4,887.94	4,949.37	4,947.53	18.22	8.63	-90.50	-4,905.12	-1,788.77	5,217.83	5,191.15	26.68	195.599		
5,000.00	4,987.39	5,061.08	5,059.22	18.59	8.83	-90.65	-4,904.83	-1,786.02	5,216.95	5,189.70	27.24	191.484		
5,100.00	5,086.84	5,176.42	5,174.51	18.97	9.04	-90.81	-4,904.18	-1,783.20	5,215.81	5,187.99	27.82	187.480		
5,200.00	5,186.29	5,293.25	5,291.30	19.34	9.26	-90.98	-4,903.21	-1,780.09	5,214.39	5,185.99	28.40	183.605		
5,300.00	5,285.75	5,406.71	5,404.70	19.72	9.46	-91.14	-4,902.01	-1,776.63	5,212.67	5,183.70	28.97	179.908		
5,400.00	5,385.20	5,500.00	5,497.94	20.10	9.63	-91.27	-4,900.99	-1,773.74	5,210.93	5,181.42	29.51	176.563		
5,500.00	5,484.65	5,592.20	5,590.10	20.47	9.80	-91.40	-4,900.05	-1,771.02	5,209.35	5,179.30	30.05	173.351		
5,600.00	5,584.10	5,693.99	5,691.84	20.85	9.99	-91.55	-4,899.02	-1,768.16	5,207.84	5,177.23	30.61	170.156		
5,700.00	5,683.55	5,794.43	5,792.24	21.23	10.17	-91.69	-4,897.91	-1,765.48	5,206.31	5,175.15	31.16	167.085		
5,800.00	5,783.00	5,887.23	5,885.00	21.60	10.35	-91.82	-4,896.87	-1,763.20	5,204.86	5,173.16	31.70	164.190		
5,900.00	5,882.46	5,979.01	5,976.76	21.98	10.51	-91.94	-4,895.89	-1,761.22	5,203.57	5,171.33	32.24	161.404		
6,000.00	5,981.91	6,071.31	6,069.04	22.36	10.68	-92.06	-4,894.95	-1,759.54	5,202.46	5,169.68	32.78	158.708		
6,100.00	6,081.36	6,160.60	6,158.31	22.74	10.85	-92.17	-4,894.07	-1,758.32	5,201.52	5,168.20	33.32	156.126		
6,200.00	6,180.81	15,596.00	11,118.41	23.12	80.63	-40.93	-162.03	-1,877.51	5,161.72	5,103.29	58.43	88.336		
6,300.00	6,280.26	15,596.00	11,118.41	23.49	80.63	-40.93	-162.03	-1,877.51	5,064.13	5,005.34	58.79	86.146		
6,400.00	6,379.71	15,596.00	11,118.41	23.87	80.63	-40.93	-162.03	-1,877.51	4,966.64	4,907.49	59.15	83.968		
6,500.00	6,479.17	15,596.00	11,118.41	24.25	80.63	-40.93	-162.03	-1,877.51	4,869.25	4,809.72	59.52	81.805		
6,600.00	6,578.62	15,596.00	11,118.41	24.63	80.63	-40.93	-162.03	-1,877.51	4,771.96	4,712.06	59.91	79.655		
6,700.00	6,678.07	15,596.00	11,118.41	25.01	80.63	-40.93	-162.03	-1,877.51	4,674.80	4,614.49	60.31	77.519		
6,800.00	6,777.52	15,596.00	11,118.41	25.39	80.63	-40.93	-162.03	-1,877.51	4,577.75	4,517.04	60.72	75.397		
6,900.00	6,877.05	15,596.00	11,118.41	25.76	80.63	-37.73	-162.03	-1,877.51	4,480.99	4,419.84	61.15	73.284		
7,000.00	6,976.84	15,596.00	11,118.41	26.14	80.63	-33.77	-162.03	-1,877.51	4,385.09	4,323.46	61.63	71.157		
7,100.00	7,076.79	15,596.00	11,118.41	26.53	80.63	-30.59	-162.03	-1,877.51	4,290.26	4,228.10	62.16	69.018		
7,200.00	7,176.79	15,596.00	11,118.41	26.87	80.63	-101.77	-162.03	-1,877.51	4,196.46	4,133.73	62.74	66.891		
7,300.00	7,276.79	15,596.00	11,118.41	27.21	80.63	-101.77	-162.03	-1,877.51	4,103.01	4,039.67	63.34	64.777		
7,400.00	7,376.79	15,596.00	11,118.41	27.55	80.63	-101.77	-162.03	-1,877.51	4,009.88	3,945.91	63.97	62.683		
7,500.00	7,476.79	15,596.00	11,118.41	27.89	80.63	-101.77	-162.03	-1,877.51	3,917.09	3,852.46	64.63	60.609		
7,600.00	7,576.79	15,596.00	11,118.41	28.23	80.63	-101.77	-162.03	-1,877.51	3,824.66	3,759.34	65.32	58.555		
7,700.00	7,676.79	15,596.00	11,118.41	28.57	80.63	-101.77	-162.03	-1,877.51	3,732.62	3,666.59	66.04	56.524		
7,800.00	7,776.79	15,596.00	11,118.41	28.91	80.63	-101.77	-162.03	-1,877.51	3,641.00	3,574.21	66.79	54.515		
7,900.00	7,876.79	15,596.00	11,118.41	29.25	80.63	-101.77	-162.03	-1,877.51	3,549.84	3,482.26	67.58	52.529		
8,000.00	7,976.79	15,596.00	11,118.41	29.60	80.63	-101.77	-162.03	-1,877.51	3,459.16	3,390.75	68.41	50.568		
8,100.00	8,076.79	15,596.00	11,118.41	29.94	80.63	-101.77	-162.03	-1,877.51	3,369.01	3,299.73	69.27	48.632		
8,200.00	8,176.79	15,596.00	11,118.41	30.28	80.63	-101.77	-162.03	-1,877.51	3,279.43	3,209.24	70.19	46.723		
8,300.00	8,276.79	15,596.00	11,118.41	30.63	80.63	-101.77	-162.03	-1,877.51	3,190.47	3,119.32	71.15	44.841		
8,400.00	8,376.79	15,596.00	11,118.41	30.97	80.63	-101.77	-162.03	-1,877.51	3,102.18	3,030.02	72.16	42.989		
8,500.00	8,476.79	15,596.00	11,118.41	31.31	80.63	-101.77	-162.03	-1,877.51	3,014.62	2,941.39	73.23	41.166		
8,600.00	8,576.79	15,596.00	11,118.41	31.66	80.63	-101.77	-162.03	-1,877.51	2,927.87	2,853.51	74.36	39.376		
8,700.00	8,676.79	15,596.00	11,118.41	32.01	80.63	-101.77	-162.03	-1,877.51	2,841.98	2,766.43	75.55	37.619		
8,800.00	8,776.79	15,596.00	11,118.41	32.35	80.63	-101.77	-162.03	-1,877.51	2,757.04	2,680.24	76.80	35.898		
8,900.00	8,876.79	15,596.00	11,118.41	32.70	80.63	-101.77	-162.03	-1,877.51	2,673.15	2,595.01	78.13	34.214		
9,000.00	8,976.73	15,596.00	11,118.41	33.06	80.63	85.99	-162.03	-1,877.51	2,590.21	2,510.68	79.53	32.568		
9,100.00	9,075.09	15,596.00	11,118.41	33.61	80.63	100.31	-162.03	-1,877.51	2,508.11	2,427.11	81.00	30.966		
9,200.00	9,168.96	15,596.00	11,118.41	34.11	80.63	112.61	-162.03	-1,877.51	2,429.23	2,346.73	82.50	29.446		
9,300.00	9,255.49	15,596.00	11,118.41	34.53	80.63	122.06	-162.03	-1,877.51	2,356.41	2,272.41	84.01	28.050		
9,400.00	9,332.03	15,596.00	11,118.41	34.87	80.63	128.84	-162.03	-1,877.51	2,292.54	2,207.06	85.48	26.820		
9,500.00	9,396.27	15,596.00	11,118.41	35.12	80.63	133.46	-162.03	-1,877.51	2,240.40	2,153.54	86.86	25.793		
9,600.00	9,446.26	15,534.52	11,117.98	35.30	79.64	135.88	-223.50	-1,876.56	2,201.54	2,114.28	87.26	25.228		
9,700.00	9,480.47	15,451.00	11,117.31	35.41	78.31	137.22	-307.02	-1,875.83	2,175.31	2,088.13	87.17	24.954		
9,800.00	9,497.87	15,371.78	11,116.92	35.49	77.04	137.84	-386.23	-1,875.67	2,162.40	2,075.49	86.91	24.882		
9,900.00	9,500.96	15,276.66	11,116.84	35.60	75.53	137.86	-481.35	-1,875.79	2,160.70	2,074.57	86.13	25.086		

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandrill Quest)
MD Reference: RKB @ 3569.20usft (Scandrill Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Sopapilla State - 1H - ST01 - Surveys													Offset Site Error: 0.00 usft
Survey Program: 100-, 9760-													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
9,993.87	9,502.49	15,194.67	11,116.75	35.77	74.22	137.81	-563.35	-1,876.30	2,160.41	2,074.94	85.47	25.277	
10,000.00	9,502.59	15,189.40	11,116.75	35.78	74.14	137.81	-568.61	-1,878.35	2,160.41	2,074.99	85.43	25.290	
10,100.00	9,504.22	15,090.03	11,116.68	38.05	72.56	137.74	-667.97	-1,877.55	2,160.54	2,075.92	84.62	25.532	
10,200.00	9,505.84	14,997.91	11,116.85	36.42	71.10	137.68	-760.09	-1,878.39	2,160.66	2,076.71	83.94	25.740	
10,300.00	9,507.47	14,864.29	11,116.74	36.86	68.99	137.61	-893.70	-1,878.86	2,160.16	2,077.40	82.76	26.102	
10,400.00	9,509.10	14,763.93	11,115.59	37.37	67.41	137.53	-994.05	-1,879.26	2,158.94	2,076.87	82.08	26.303	
10,500.00	9,510.73	14,669.14	11,114.26	37.94	65.92	137.45	-1,088.83	-1,880.28	2,158.00	2,076.47	81.53	26.470	
10,600.00	9,512.35	14,564.23	11,112.13	38.56	64.27	137.33	-1,193.70	-1,882.04	2,157.02	2,076.11	80.91	26.661	
10,700.00	9,513.98	14,459.16	11,109.51	39.22	62.63	137.19	-1,298.73	-1,883.92	2,155.77	2,075.44	80.33	26.837	
10,800.00	9,515.61	14,363.95	11,108.04	39.93	61.14	137.11	-1,393.92	-1,884.54	2,154.47	2,074.58	79.88	26.970	
10,900.00	9,517.24	14,262.72	11,106.54	40.68	59.56	137.02	-1,495.13	-1,885.51	2,153.42	2,074.02	79.41	27.119	
11,000.00	9,518.86	14,173.03	11,105.64	41.47	58.17	136.95	-1,584.82	-1,885.90	2,152.38	2,073.28	79.10	27.212	
11,091.63	9,520.35	14,096.30	11,105.61	42.22	56.98	136.91	-1,661.55	-1,886.24	2,152.07	2,073.18	78.89	27.280	
11,100.00	9,520.49	14,089.25	11,105.66	42.29	56.87	136.91	-1,668.60	-1,886.25	2,152.07	2,073.20	78.87	27.287	
11,200.00	9,522.12	14,025.88	11,106.66	43.14	55.89	136.90	-1,731.96	-1,886.27	2,152.76	2,073.85	78.90	27.283	
11,300.00	9,523.75	13,968.74	11,109.97	44.03	55.01	136.94	-1,789.00	-1,885.90	2,155.76	2,076.76	79.00	27.287	
11,400.00	9,525.37	13,745.57	11,119.84	44.94	51.56	137.15	-2,011.77	-1,878.87	2,155.70	2,078.83	76.87	28.043	
11,500.00	9,527.00	13,636.57	11,118.88	45.88	49.89	137.11	-2,120.76	-1,877.42	2,153.53	2,077.10	76.44	28.175	
11,600.00	9,528.63	13,486.00	11,113.96	46.85	47.60	136.96	-2,271.24	-1,876.99	2,150.49	2,074.94	75.56	28.463	
11,700.00	9,530.25	13,409.66	11,111.86	47.84	46.44	136.92	-2,347.53	-1,875.24	2,146.31	2,070.70	75.61	28.386	
11,800.00	9,531.88	13,333.77	11,111.49	48.86	45.30	136.93	-2,423.37	-1,872.92	2,143.25	2,067.58	75.67	28.322	
11,900.00	9,533.51	13,221.38	11,112.24	49.89	43.58	136.97	-2,535.70	-1,869.06	2,140.82	2,065.57	75.25	28.450	
12,000.00	9,535.14	13,123.86	11,112.87	50.94	42.11	137.02	-2,633.11	-1,864.79	2,137.70	2,062.66	75.03	28.491	
12,100.00	9,536.76	13,050.82	11,112.45	52.02	41.03	137.00	-2,706.14	-1,863.33	2,135.31	2,060.11	75.20	28.395	
12,200.00	9,538.39	12,980.33	11,112.54	53.11	40.00	136.98	-2,776.63	-1,862.83	2,134.30	2,058.88	75.42	28.299	
12,223.12	9,538.77	12,964.03	11,112.63	53.36	39.76	136.98	-2,792.93	-1,862.84	2,134.26	2,058.79	75.47	28.279	
12,300.00	9,540.02	12,909.93	11,113.15	54.21	38.97	136.95	-2,847.02	-1,863.19	2,134.67	2,059.01	75.66	28.214	
12,400.00	9,541.65	12,832.00	11,114.84	55.33	37.86	136.93	-2,924.92	-1,864.19	2,136.46	2,060.61	75.85	28.165	
12,500.00	9,543.27	12,723.54	11,116.96	56.47	36.31	136.87	-3,033.33	-1,866.71	2,138.90	2,063.16	75.75	28.238	
12,600.00	9,544.90	12,547.55	11,116.18	57.62	33.86	136.77	-3,209.31	-1,867.01	2,137.52	2,062.54	74.98	28.508	
12,700.00	9,546.53	9,494.43	9,491.76	58.78	16.59	86.04	-4,905.41	-1,758.50	2,115.73	2,054.58	61.15	34.597	
12,800.00	9,548.16	9,500.00	9,497.33	59.96	16.60	86.27	-4,905.54	-1,758.63	2,040.68	1,978.15	62.53	32.635	
12,900.00	9,549.78	9,500.00	9,497.33	61.14	16.60	86.27	-4,905.54	-1,758.63	1,967.83	1,903.78	64.05	30.722	
13,000.00	9,551.41	9,505.69	9,503.01	62.34	16.61	86.51	-4,905.68	-1,758.75	1,897.45	1,831.72	65.73	28.867	
13,100.00	9,553.04	9,509.48	9,506.81	63.55	16.61	86.67	-4,905.77	-1,758.84	1,829.83	1,762.26	67.57	27.082	
13,200.00	9,554.67	9,513.30	9,510.63	64.76	16.62	86.83	-4,905.86	-1,758.92	1,765.27	1,695.71	69.56	25.378	
13,300.00	9,556.29	9,517.15	9,514.47	65.99	16.63	86.99	-4,905.95	-1,759.01	1,704.14	1,632.43	71.71	23.765	
13,400.00	9,557.92	9,521.03	9,518.35	67.22	16.63	87.15	-4,906.05	-1,759.10	1,646.79	1,572.80	74.00	22.255	
13,500.00	9,559.55	9,524.93	9,522.25	68.46	16.64	87.31	-4,906.15	-1,759.18	1,593.66	1,517.25	76.41	20.856	
13,600.00	9,561.18	9,528.86	9,526.18	69.71	16.65	87.48	-4,906.25	-1,759.27	1,545.17	1,466.24	78.92	19.578	
13,700.00	9,562.82	9,532.82	9,530.14	70.97	16.65	87.64	-4,906.34	-1,759.36	1,501.76	1,420.27	81.50	18.427	
13,800.00	9,564.43	9,536.81	9,534.12	72.23	16.66	87.81	-4,906.45	-1,759.45	1,463.90	1,379.82	84.09	17.409	
13,900.00	9,566.06	9,540.83	9,538.14	73.50	16.67	87.98	-4,906.55	-1,759.54	1,432.03	1,345.39	86.64	16.529	
14,000.00	9,567.68	9,544.87	9,542.18	74.78	16.67	88.15	-4,906.65	-1,759.63	1,406.54	1,317.46	89.09	15.788	
14,100.00	9,569.31	9,548.95	9,546.25	76.06	16.68	88.32	-4,906.75	-1,759.73	1,387.80	1,296.42	91.37	15.188	
14,200.00	9,570.94	9,553.05	9,550.35	77.35	16.69	88.49	-4,906.86	-1,759.82	1,376.07	1,282.64	93.44	14.727	
14,300.00	9,572.57	9,557.19	9,554.49	78.64	16.69	88.66	-4,906.97	-1,759.91	1,371.54	1,276.32	95.22	14.403	
14,312.34	9,572.77	9,557.70	9,555.00	78.80	16.70	88.68	-4,906.98	-1,759.93	1,371.49	1,276.06	95.42	14.373 CC, ES	
14,400.00	9,574.19	9,561.35	9,558.65	79.94	16.70	88.83	-4,907.08	-1,760.01	1,374.28	1,277.59	96.69	14.213	
14,450.15	9,575.01	9,563.45	9,560.75	80.60	16.70	88.92	-4,907.13	-1,760.06	1,378.38	1,281.06	97.33	14.163 SF	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandrill Quest)
MD Reference: RKB @ 3569.20usft (Scandrill Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Sopapilla State - 5H - OH - Plan 1 09-03-19														Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM														Offset Well Error: 1.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
0.00	0.00	3.90	3.90	1.00	1.00	-90.10	-2.00	-1,160.00	1,160.00					
100.00	100.00	103.90	103.90	1.03	1.04	-90.10	-2.00	-1,160.00	1,160.00	1,157.96	2.04	568.276		
200.00	200.00	203.90	203.90	1.34	1.36	-90.10	-2.00	-1,160.00	1,160.00	1,157.53	2.47	468.808		
300.00	300.00	303.90	303.90	1.73	1.75	-90.10	-2.00	-1,160.00	1,160.00	1,156.92	3.08	376.397		
400.00	400.00	403.90	403.90	2.11	2.12	-90.10	-2.00	-1,160.00	1,160.00	1,156.27	3.73	311.143		
500.00	500.00	503.90	503.90	2.48	2.50	-90.10	-2.00	-1,160.00	1,160.00	1,155.61	4.40	263.851		
600.00	600.00	603.90	603.90	2.85	2.87	-90.10	-2.00	-1,160.00	1,160.00	1,154.92	5.08	228.439		
700.00	700.00	703.90	703.90	3.22	3.23	-90.10	-2.00	-1,160.00	1,160.00	1,154.23	5.77	201.108		
800.00	800.00	803.90	803.90	3.58	3.60	-90.10	-2.00	-1,160.00	1,160.00	1,153.54	6.46	179.456		
900.00	900.00	903.90	903.90	3.95	3.96	-90.10	-2.00	-1,160.00	1,160.00	1,152.84	7.16	161.919		
1,000.00	1,000.00	1,003.90	1,003.90	4.31	4.32	-90.10	-2.00	-1,160.00	1,160.00	1,152.13	7.87	147.448		
1,100.00	1,100.00	1,103.90	1,103.90	4.67	4.69	-90.10	-2.00	-1,160.00	1,160.00	1,151.43	8.57	135.315		
1,200.00	1,200.00	1,203.90	1,203.90	5.03	5.05	-90.10	-2.00	-1,160.00	1,160.00	1,150.72	9.28	125.003		
1,300.00	1,300.00	1,303.90	1,303.90	5.40	5.41	-90.10	-2.00	-1,160.00	1,160.00	1,150.01	9.99	116.135		
1,400.00	1,400.00	1,403.90	1,403.90	5.76	5.77	-90.10	-2.00	-1,160.00	1,160.00	1,149.30	10.70	108.431		
1,500.00	1,500.00	1,503.90	1,503.90	6.12	6.13	-90.10	-2.00	-1,160.00	1,160.00	1,148.59	11.41	101.678		
1,600.00	1,600.00	1,603.90	1,603.90	6.48	6.49	-90.10	-2.00	-1,160.00	1,160.00	1,147.88	12.12	95.710		
1,700.00	1,700.00	1,703.90	1,703.90	6.84	6.85	-90.10	-2.00	-1,160.00	1,160.00	1,147.17	12.83	90.400		
1,800.00	1,800.00	1,803.90	1,803.90	7.20	7.21	-90.10	-2.00	-1,160.00	1,160.00	1,146.46	13.54	85.644		
1,900.00	1,900.00	1,903.90	1,903.90	7.56	7.57	-90.10	-2.00	-1,160.00	1,160.00	1,145.74	14.26	81.362		
2,000.00	2,000.00	2,003.90	2,003.90	7.92	7.93	-90.10	-2.00	-1,160.00	1,160.00	1,145.03	14.97	77.485		
2,100.00	2,100.00	2,103.90	2,103.90	8.28	8.29	-90.10	-2.00	-1,160.00	1,160.00	1,144.32	15.68	73.959		
2,200.00	2,200.00	2,203.90	2,203.90	8.64	8.65	-90.10	-2.00	-1,160.00	1,160.00	1,143.60	16.40	70.739		
2,300.00	2,300.00	2,303.90	2,303.90	9.00	9.01	-90.10	-2.00	-1,160.00	1,160.00	1,142.89	17.11	67.787		
2,400.00	2,400.00	2,403.90	2,403.90	9.36	9.37	-90.10	-2.00	-1,160.00	1,160.00	1,142.17	17.83	65.070		
2,500.00	2,500.00	2,500.00	2,500.00	9.72	9.72	-90.10	-2.00	-1,160.00	1,160.01	1,141.48	18.53	62.610		
2,515.72	2,515.72	2,515.77	2,515.77	9.76	9.77	-18.00	-1.97	-1,160.03	1,159.99	1,141.36	18.64	62.241		
2,600.00	2,599.98	2,583.49	2,583.48	10.03	10.02	-17.98	-1.03	-1,160.74	1,159.26	1,140.09	19.17	60.487		
2,700.00	2,699.84	2,663.81	2,663.72	10.37	10.32	-17.92	1.73	-1,162.83	1,156.88	1,136.90	19.99	57.881		
2,800.00	2,799.45	2,744.07	2,743.77	10.73	10.62	-17.82	6.27	-1,166.29	1,152.89	1,132.11	20.78	55.474		
2,900.00	2,898.90	2,842.47	2,841.80	11.08	10.95	-17.64	13.10	-1,171.47	1,148.21	1,126.72	21.50	53.413		
3,000.00	2,998.36	2,942.29	2,941.24	11.40	11.30	-17.45	20.02	-1,176.73	1,143.55	1,121.39	22.16	51.607		
3,100.00	3,097.81	3,042.11	3,040.68	11.72	11.65	-17.26	26.95	-1,181.99	1,138.91	1,116.08	22.83	49.896		
3,200.00	3,197.26	3,141.93	3,140.12	12.05	12.01	-17.07	33.87	-1,187.25	1,134.27	1,110.77	23.50	48.274		
3,300.00	3,296.71	3,241.75	3,239.56	12.37	12.37	-16.88	40.80	-1,192.51	1,129.65	1,105.47	24.17	46.735		
3,400.00	3,396.16	3,341.57	3,339.00	12.71	12.72	-16.69	47.72	-1,197.77	1,125.03	1,100.18	24.85	45.274		
3,500.00	3,495.61	3,441.39	3,438.45	13.04	13.08	-16.49	54.65	-1,203.03	1,120.44	1,094.91	25.53	43.885		
3,600.00	3,595.07	3,541.21	3,537.89	13.38	13.44	-16.29	61.57	-1,208.29	1,115.85	1,089.64	26.22	42.564		
3,700.00	3,694.52	3,641.03	3,637.33	13.75	13.80	-16.10	68.50	-1,213.55	1,111.28	1,084.38	26.90	41.307		
3,800.00	3,793.97	3,740.85	3,736.77	14.12	14.17	-15.90	75.42	-1,218.81	1,106.72	1,079.13	27.59	40.110		
3,900.00	3,893.42	3,840.68	3,836.21	14.49	14.53	-15.69	82.35	-1,224.07	1,102.18	1,073.89	28.28	38.967		
4,000.00	3,992.87	3,940.50	3,935.65	14.86	14.89	-15.49	89.27	-1,229.33	1,097.65	1,068.67	28.98	37.878		
4,100.00	4,092.32	4,040.32	4,035.09	15.23	15.25	-15.29	96.20	-1,234.59	1,093.13	1,063.46	29.68	36.837		
4,200.00	4,191.78	4,140.14	4,134.54	15.60	15.62	-15.08	103.12	-1,239.85	1,088.63	1,058.26	30.37	35.842		
4,300.00	4,291.23	4,239.96	4,233.98	15.98	15.98	-14.87	110.05	-1,245.11	1,084.14	1,053.07	31.07	34.890		
4,400.00	4,390.68	4,339.78	4,333.42	16.35	16.35	-14.66	116.97	-1,250.37	1,079.67	1,047.89	31.77	33.979		
4,500.00	4,490.13	4,439.60	4,432.88	16.72	16.71	-14.45	123.90	-1,255.64	1,075.21	1,042.73	32.48	33.106		
4,600.00	4,589.58	4,547.21	4,540.07	17.10	17.10	-14.22	131.22	-1,261.20	1,070.68	1,037.46	33.21	32.255		
4,700.00	4,689.03	4,679.28	4,671.94	17.47	17.62	-14.12	136.80	-1,265.44	1,064.01	1,029.95	34.06	31.241		
4,800.00	4,788.49	4,799.73	4,792.39	17.84	18.08	-14.24	137.83	-1,266.22	1,054.51	1,019.68	34.82	30.281		
4,900.00	4,887.94	4,899.19	4,891.84	18.22	18.42	-14.38	137.83	-1,266.22	1,044.37	1,008.84	35.53	29.398		
5,000.00	4,987.39	4,998.64	4,991.29	18.59	18.77	-14.52	137.83	-1,266.22	1,034.24	998.01	36.23	28.545		

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



Anticollision Report



Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Reference Site: Sopapilla State
 Site Error: 0.00 usft
 Reference Well: 3H
 Well Error: 1.00 usft
 Reference Wellbore: OH
 Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
 TVD Reference: RKB @ 3569.20usft (Scandrill Quest)
 MD Reference: RKB @ 3569.20usft (Scandrill Quest)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: USA Compass
 Offset TVD Reference: Offset Datum

Offset Design Sopapilla State - 5H - OH - Plan 1 09-03-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 1.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
5,100.00	5,086.84	5,098.09	5,090.74	18.97	19.12	-14.67	137.83	-1,266.22	1,024.12	987.18	36.94	27.724	
5,200.00	5,186.29	5,197.54	5,190.19	19.34	19.47	-14.82	137.83	-1,266.22	1,014.00	976.35	37.65	26.934	
5,300.00	5,285.75	5,296.99	5,289.65	19.72	19.82	-14.97	137.83	-1,266.22	1,003.89	965.53	38.36	26.172	
5,400.00	5,385.20	5,396.44	5,389.10	20.10	20.17	-15.13	137.83	-1,266.22	993.79	954.72	39.07	25.438	
5,500.00	5,484.65	5,495.90	5,488.55	20.47	20.52	-15.28	137.83	-1,266.22	983.69	943.92	39.78	24.731	
5,600.00	5,584.10	5,595.35	5,588.00	20.85	20.87	-15.45	137.83	-1,266.22	973.60	933.12	40.49	24.048	
5,700.00	5,683.55	5,694.80	5,687.45	21.23	21.22	-15.61	137.83	-1,266.22	963.52	922.33	41.20	23.388	
5,800.00	5,783.00	5,794.25	5,786.90	21.60	21.57	-15.78	137.83	-1,266.22	953.45	911.54	41.91	22.750	
5,900.00	5,882.46	5,893.70	5,886.36	21.98	21.92	-15.95	137.83	-1,266.22	943.39	900.77	42.62	22.134	
6,000.00	5,981.91	5,993.15	5,985.81	22.36	22.28	-16.13	137.83	-1,266.22	933.34	890.00	43.33	21.538	
6,100.00	6,081.36	6,092.61	6,085.26	22.74	22.63	-16.31	137.83	-1,266.22	923.29	879.24	44.05	20.962	
6,200.00	6,180.81	6,192.06	6,184.71	23.12	22.98	-16.49	137.83	-1,266.22	913.25	868.49	44.76	20.404	
6,300.00	6,280.26	6,291.51	6,284.16	23.49	23.33	-16.68	137.83	-1,266.22	903.23	857.75	45.47	19.863	
6,400.00	6,379.71	6,390.96	6,383.61	23.87	23.69	-16.88	137.83	-1,266.22	893.21	847.02	46.19	19.339	
6,500.00	6,479.17	6,490.41	6,483.07	24.25	24.04	-17.07	137.83	-1,266.22	883.20	836.30	46.90	18.831	
6,600.00	6,578.62	6,589.86	6,582.52	24.63	24.39	-17.27	137.83	-1,266.22	873.21	825.59	47.62	18.338	
6,700.00	6,678.07	6,689.32	6,681.97	25.01	24.75	-17.48	137.83	-1,266.22	863.22	814.89	48.33	17.860	
6,800.00	6,777.52	6,788.77	6,781.42	25.39	25.10	-17.69	137.83	-1,266.22	853.25	804.20	49.05	17.396	
6,900.00	6,877.05	6,888.30	6,880.95	25.76	25.45	-17.85	137.83	-1,266.22	844.03	794.26	49.77	16.960	
7,000.00	6,976.84	6,988.09	6,980.74	26.14	25.81	-17.95	137.83	-1,266.22	837.95	787.41	50.53	16.582	
7,100.00	7,076.79	7,088.04	7,080.69	26.53	26.16	-17.99	137.83	-1,266.22	835.18	783.87	51.32	16.274	
7,190.41	7,167.20	7,178.45	7,171.10	26.84	26.49	-18.01	137.83	-1,266.22	834.64	782.68	51.95	16.065 CC	
7,200.00	7,176.79	7,188.04	7,180.69	26.87	26.52	-90.10	137.83	-1,266.22	835.00	782.98	52.02	16.051	
7,300.00	7,276.79	7,288.04	7,280.69	27.21	26.88	-90.10	137.83	-1,266.22	835.00	782.28	52.73	15.837	
7,400.00	7,376.79	7,388.04	7,380.69	27.55	27.23	-90.10	137.83	-1,266.22	835.00	781.57	53.43	15.627	
7,500.00	7,476.79	7,488.04	7,480.69	27.89	27.59	-90.10	137.83	-1,266.22	835.00	780.86	54.14	15.423	
7,600.00	7,576.79	7,588.04	7,580.69	28.23	27.94	-90.10	137.83	-1,266.22	835.00	780.16	54.85	15.225	
7,700.00	7,676.79	7,688.04	7,680.69	28.57	28.30	-90.10	137.83	-1,266.22	835.00	779.45	55.55	15.031	
7,800.00	7,776.79	7,788.04	7,780.69	28.91	28.66	-90.10	137.83	-1,266.22	835.00	778.74	56.26	14.842	
7,900.00	7,876.79	7,888.04	7,880.69	29.25	29.01	-90.10	137.83	-1,266.22	835.00	778.03	56.97	14.657	
8,000.00	7,976.79	7,988.04	7,980.69	29.60	29.37	-90.10	137.83	-1,266.22	835.00	777.33	57.68	14.478	
8,100.00	8,076.79	8,088.04	8,080.69	29.94	29.73	-90.10	137.83	-1,266.22	835.00	776.62	58.38	14.302	
8,200.00	8,176.79	8,188.04	8,180.69	30.28	30.08	-90.10	137.83	-1,266.22	835.00	775.91	59.09	14.130	
8,300.00	8,276.79	8,288.04	8,280.69	30.63	30.44	-90.10	137.83	-1,266.22	835.00	775.20	59.80	13.963	
8,400.00	8,376.79	8,388.04	8,380.69	30.97	30.80	-90.10	137.83	-1,266.22	835.00	774.49	60.51	13.799	
8,500.00	8,476.79	8,488.04	8,480.69	31.31	31.16	-90.10	137.83	-1,266.22	835.00	773.78	61.22	13.640	
8,600.00	8,576.79	8,588.04	8,580.69	31.66	31.51	-90.10	137.83	-1,266.22	835.00	773.07	61.93	13.483	
8,700.00	8,676.79	8,688.04	8,680.69	32.01	31.87	-90.10	137.83	-1,266.22	835.00	772.36	62.64	13.331	
8,800.00	8,776.79	8,788.04	8,780.69	32.35	32.23	-90.10	137.83	-1,266.22	835.00	771.65	63.35	13.181	
8,900.00	8,876.79	8,888.04	8,880.69	32.70	32.58	-90.10	137.83	-1,266.22	835.00	770.94	64.06	13.035	
9,000.00	8,976.73	8,988.34	8,980.98	33.06	32.94	90.48	137.11	-1,266.21	835.01	770.27	64.74	12.897	
9,100.00	9,075.09	9,089.84	9,081.37	33.61	33.41	90.72	123.07	-1,266.10	835.05	769.70	65.35	12.778	
9,200.00	9,168.96	9,191.96	9,178.28	34.11	33.90	90.94	91.31	-1,265.83	835.10	769.18	65.92	12.669	
9,300.00	9,255.49	9,294.63	9,268.49	34.53	34.34	91.13	42.57	-1,265.42	835.15	768.70	66.45	12.569	
9,400.00	9,332.03	9,397.79	9,348.92	34.87	34.69	91.29	-21.80	-1,264.88	835.19	768.25	66.95	12.476	
9,500.00	9,396.27	9,501.33	9,416.74	35.12	34.95	91.40	-99.84	-1,264.22	835.23	767.80	67.43	12.386	
9,600.00	9,446.26	9,605.13	9,469.55	35.30	35.12	91.47	-189.04	-1,263.47	835.26	767.33	67.93	12.296	
9,700.00	9,480.47	9,709.06	9,505.45	35.41	35.22	91.50	-286.43	-1,262.65	835.27	766.83	68.44	12.204	
9,800.00	9,497.87	9,813.00	9,523.20	35.49	35.27	91.47	-388.69	-1,261.79	835.26	766.29	68.97	12.110	
9,900.00	9,500.96	9,914.39	9,526.05	35.60	35.32	91.45	-490.01	-1,260.94	835.25	765.72	69.53	12.013	
10,000.00	9,502.59	10,014.39	9,527.68	35.78	35.41	91.45	-590.00	-1,260.10	835.25	765.05	70.20	11.899	
10,100.00	9,504.22	10,114.39	9,529.30	36.05	35.65	91.45	-689.98	-1,259.25	835.25	764.27	70.98	11.768	

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



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Offset Design Sopapilla State - 5H - OH - Plan 1 09-03-19													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 1.00 usft
Reference		Offset		Semi Major Axis			Distance						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	9,505.84	10,214.39	9,530.93	36.42	36.02	91.45	-789.96	-1,258.41	835.25	763.39	71.87	11.622	
10,300.00	9,507.47	10,314.39	9,532.56	36.86	36.49	91.45	-889.95	-1,257.57	835.25	762.40	72.86	11.464	
10,400.00	9,509.10	10,414.39	9,534.18	37.37	37.02	91.45	-989.93	-1,256.73	835.25	761.31	73.94	11.296	
10,500.00	9,510.73	10,514.39	9,535.81	37.94	37.61	91.45	-1,089.91	-1,255.89	835.25	760.12	75.13	11.118	
10,600.00	9,512.35	10,614.39	9,537.44	38.56	38.24	91.45	-1,189.90	-1,255.05	835.25	758.85	76.40	10.932	
10,700.00	9,513.98	10,714.39	9,539.07	39.22	38.92	91.45	-1,289.88	-1,254.21	835.25	757.49	77.76	10.741	
10,800.00	9,515.61	10,814.39	9,540.69	39.93	39.64	91.45	-1,389.86	-1,253.36	835.25	756.05	79.20	10.546	
10,900.00	9,517.24	10,914.39	9,542.32	40.68	40.40	91.45	-1,489.84	-1,252.52	835.25	754.53	80.72	10.348	
11,000.00	9,518.86	11,014.39	9,543.95	41.47	41.19	91.45	-1,589.83	-1,251.68	835.25	752.94	82.31	10.148	
11,100.00	9,520.49	11,114.39	9,545.58	42.29	42.02	91.45	-1,689.81	-1,250.84	835.25	751.28	83.97	9.947	
11,200.00	9,522.12	11,214.39	9,547.20	43.14	42.89	91.45	-1,789.79	-1,250.00	835.25	749.56	85.69	9.747	
11,300.00	9,523.75	11,314.39	9,548.83	44.03	43.78	91.45	-1,889.78	-1,249.16	835.25	747.77	87.48	9.548	
11,400.00	9,525.37	11,414.39	9,550.46	44.94	44.70	91.45	-1,989.76	-1,248.31	835.25	745.93	89.32	9.352	
11,500.00	9,527.00	11,514.39	9,552.09	45.88	45.65	91.45	-2,089.74	-1,247.47	835.25	744.04	91.21	9.157	
11,600.00	9,528.63	11,614.39	9,553.71	46.85	46.62	91.45	-2,189.73	-1,246.63	835.25	742.09	93.16	8.966	
11,700.00	9,530.25	11,714.39	9,555.34	47.84	47.62	91.45	-2,289.71	-1,245.79	835.25	740.10	95.15	8.778	
11,800.00	9,531.88	11,814.39	9,556.97	48.86	48.64	91.45	-2,389.69	-1,244.95	835.25	738.06	97.19	8.594	
11,900.00	9,533.51	11,914.39	9,558.60	49.89	49.68	91.45	-2,489.68	-1,244.11	835.25	735.99	99.26	8.414	
12,000.00	9,535.14	12,014.39	9,560.22	50.94	50.74	91.45	-2,589.66	-1,243.27	835.25	733.87	101.38	8.239	
12,100.00	9,536.76	12,114.39	9,561.85	52.02	51.82	91.45	-2,689.64	-1,242.42	835.25	731.71	103.54	8.067	
12,200.00	9,538.39	12,214.39	9,563.48	53.11	52.91	91.45	-2,789.63	-1,241.58	835.25	729.53	105.72	7.900	
12,300.00	9,540.02	12,314.39	9,565.11	54.21	54.02	91.45	-2,889.61	-1,240.74	835.25	727.31	107.95	7.738	
12,400.00	9,541.65	12,414.39	9,566.73	55.33	55.15	91.45	-2,989.59	-1,239.90	835.25	725.05	110.20	7.580	
12,500.00	9,543.27	12,514.39	9,568.36	56.47	56.29	91.45	-3,089.58	-1,239.06	835.25	722.77	112.48	7.426	
12,600.00	9,544.90	12,614.39	9,569.99	57.62	57.44	91.45	-3,189.56	-1,238.22	835.25	720.47	114.78	7.277	
12,700.00	9,546.53	12,714.39	9,571.62	58.78	58.61	91.45	-3,289.54	-1,237.38	835.25	718.14	117.11	7.132	
12,800.00	9,548.16	12,814.39	9,573.24	59.96	59.79	91.45	-3,389.53	-1,236.53	835.25	715.78	119.47	6.991	
12,900.00	9,549.78	12,914.39	9,574.87	61.14	60.98	91.45	-3,489.51	-1,235.69	835.25	713.40	121.85	6.855	
13,000.00	9,551.41	13,014.39	9,576.50	62.34	62.18	91.45	-3,589.49	-1,234.85	835.25	711.00	124.25	6.722	
13,100.00	9,553.04	13,114.39	9,578.13	63.55	63.39	91.45	-3,689.48	-1,234.01	835.25	708.58	126.67	6.594	
13,200.00	9,554.67	13,214.39	9,579.75	64.76	64.61	91.45	-3,789.46	-1,233.17	835.25	706.15	129.10	6.470	
13,300.00	9,556.29	13,314.39	9,581.38	65.99	65.83	91.45	-3,889.44	-1,232.33	835.25	703.69	131.56	6.349	
13,400.00	9,557.92	13,414.39	9,583.01	67.22	67.07	91.45	-3,989.43	-1,231.49	835.25	701.22	134.03	6.232	
13,500.00	9,559.55	13,514.39	9,584.64	68.46	68.32	91.45	-4,089.41	-1,230.64	835.25	698.73	136.52	6.118	
13,600.00	9,561.18	13,614.39	9,586.26	69.71	69.57	91.45	-4,189.39	-1,229.80	835.25	696.22	139.02	6.008	
13,700.00	9,562.80	13,714.39	9,587.89	70.97	70.83	91.45	-4,289.37	-1,228.96	835.25	693.71	141.54	5.901	
13,800.00	9,564.43	13,814.39	9,589.52	72.23	72.09	91.45	-4,389.36	-1,228.12	835.25	691.18	144.07	5.797	
13,900.00	9,566.06	13,914.39	9,591.15	73.50	73.37	91.45	-4,489.34	-1,227.28	835.25	688.63	146.62	5.697	
14,000.00	9,567.68	14,014.39	9,592.77	74.78	74.64	91.45	-4,589.32	-1,226.44	835.25	686.08	149.17	5.599	
14,100.00	9,569.31	14,114.39	9,594.40	76.06	75.93	91.45	-4,689.31	-1,225.60	835.25	683.51	151.74	5.504	
14,200.00	9,570.94	14,214.39	9,596.03	77.35	77.22	91.45	-4,789.29	-1,224.75	835.25	680.93	154.32	5.412	
14,300.00	9,572.57	14,314.39	9,597.66	78.64	78.51	91.45	-4,889.27	-1,223.91	835.25	678.34	156.91	5.323	
14,400.00	9,574.19	14,414.39	9,599.28	79.94	79.81	91.45	-4,989.26	-1,223.07	835.25	675.74	159.51	5.236	
14,443.18	9,574.90	14,457.57	9,599.99	80.51	80.37	91.45	-5,032.43	-1,222.71	835.25	674.62	160.63	5.200	
14,450.15	9,575.01	14,458.44	9,600.00	80.60	80.38	91.45	-5,033.30	-1,222.70	835.27	674.51	160.76	5.196 ES, SF	

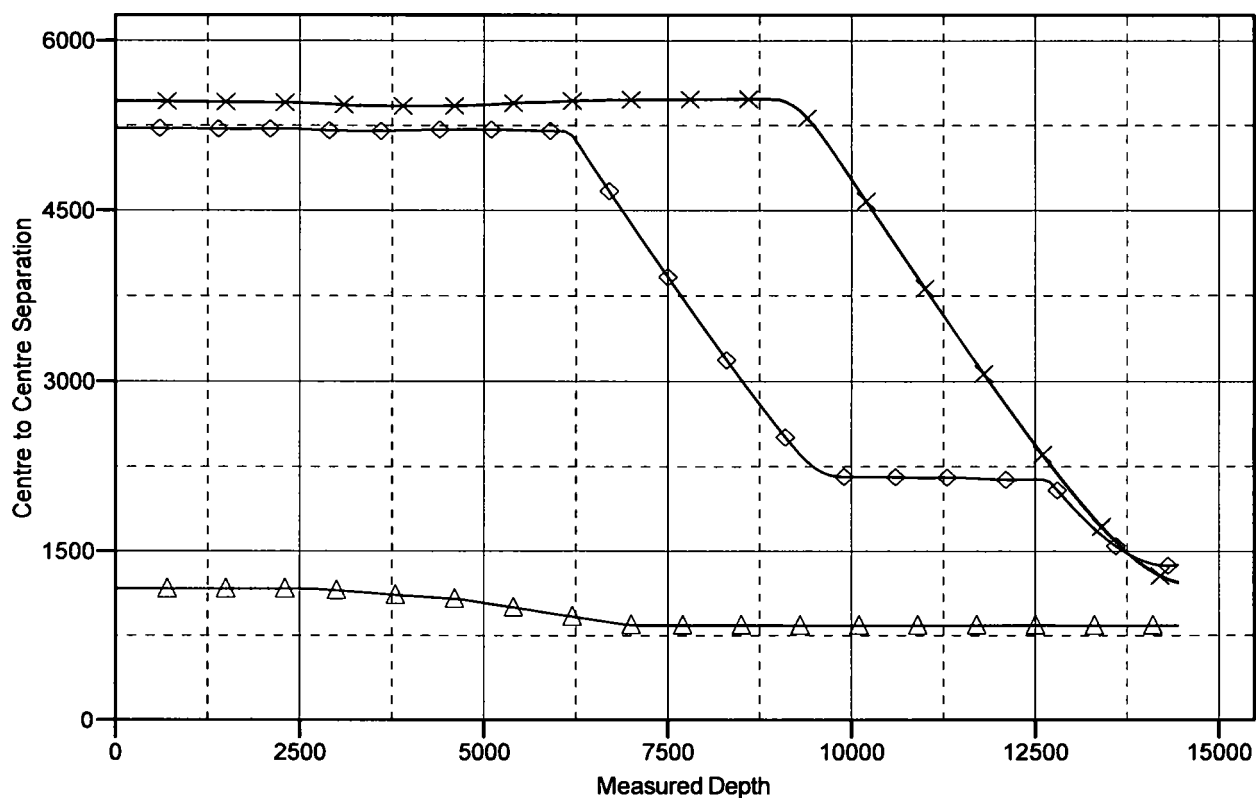
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 3H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 3H
TVD Reference: RKB @ 3569.20usft (Scandril Quest)
MD Reference: RKB @ 3569.20usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB @ 3569.20usft (Scandril Quest) Coordinates are relative to: 3H
Offset Depths are relative to Offset Datum Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.000000 W Grid Convergence at Surface is: 0.42°

Ladder Plot



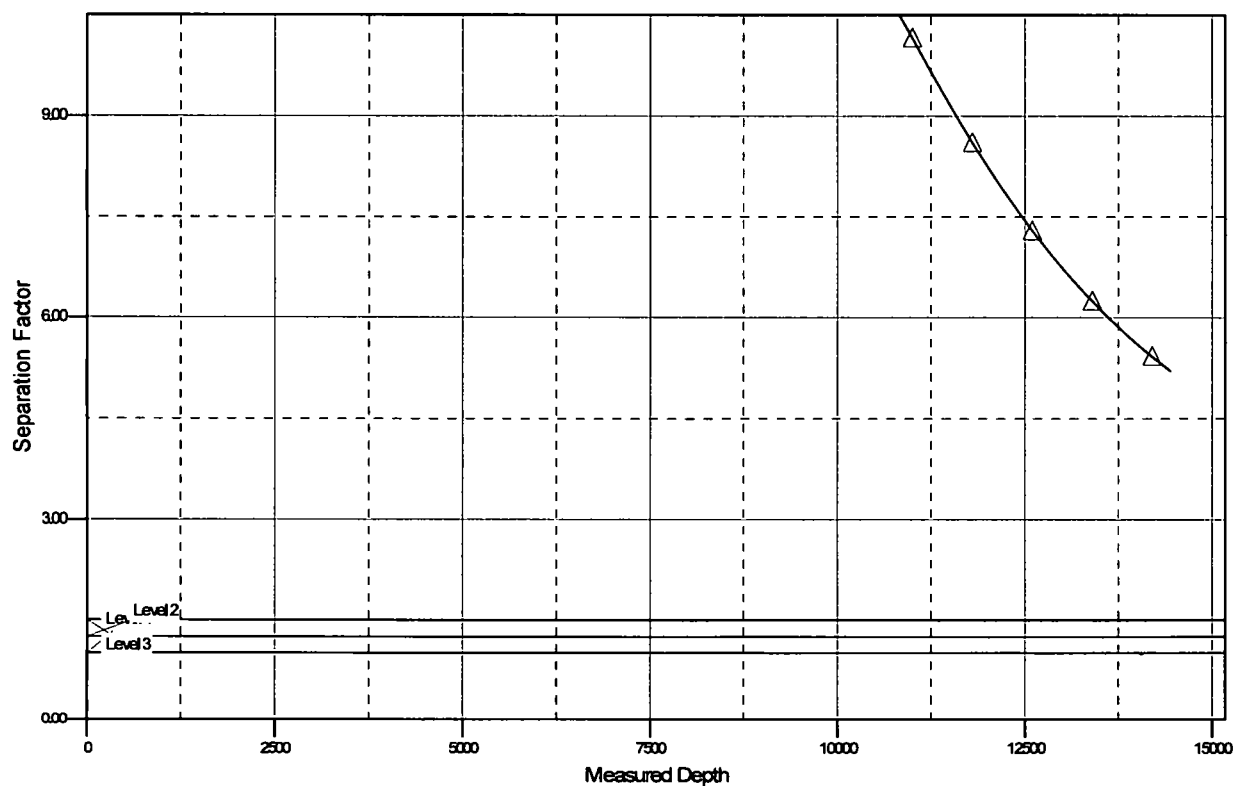
LEGEND

1H, OH / Job 1311084, Surveys (Ensign 153) V0 5H, OH, Plan 1 09-03-19 V0 1H, ST01, Surveys V0

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 3H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3569.20usft (Scandril Quest)
Reference Site:	Sopapilla State	MD Reference:	RKB @ 3569.20usft (Scandril Quest)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	3H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 09-03-19	Offset TVD Reference:	Offset Datum

Reference Depths are relative to RKB @ 3569.20usft (Scandril Quest) Coordinates are relative to: 3H
Offset Depths are relative to Offset Datum Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.000000 W Grid Convergence at Surface is: 0.42°

Separation Factor Plot



LEGEND

✱ 1H, OH/Job 1311084, Surveys (Ensign 153) V0 ▲ 5H, OH, Plan 1 09-03-19 V0 ◆ 1H, ST01, Surveys V0