

HOBBS OCD
SEP 06 2019
RECEIVED



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

PHOENIX
TECHNOLOGY SERVICES



Azimuth to Grid North
True North: -0.42°
Magnetic North: 6.18°
Magnetic Field
Strength: 47967.1 nT
Dip Angle: 60.01°
Date: 10/12/2019
Model: IIGW

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well SH, Grid North
Latitude: 32° 20' 25.192653 N
Longitude: 103° 32' 51.571947 W

Grid East: 742854.30
Grid North: 438418.40
Scale Factor: 1.000

Geomagnetic Model: IIGW
Sample Date: 12-Oct-19
Magnetic Declination: 6.57°
Dip Angle from Horizontal: 60.01°
Magnetic Field Strength: 47967.08459781 nT
To convert a Magnetic Direction to a Grid Direction, Add 6.15°
To convert a Magnetic Direction to a True Direction, Add 6.57° East
To convert a True Direction to a Grid Direction, Subtract 0.42°

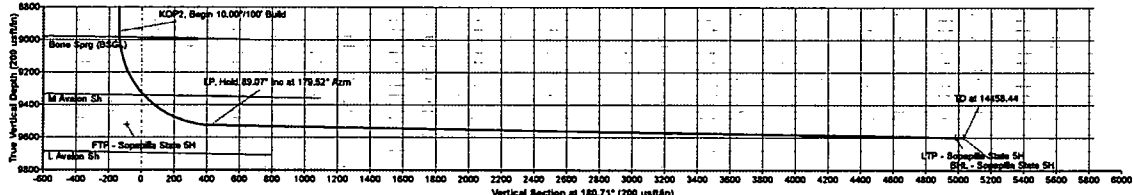
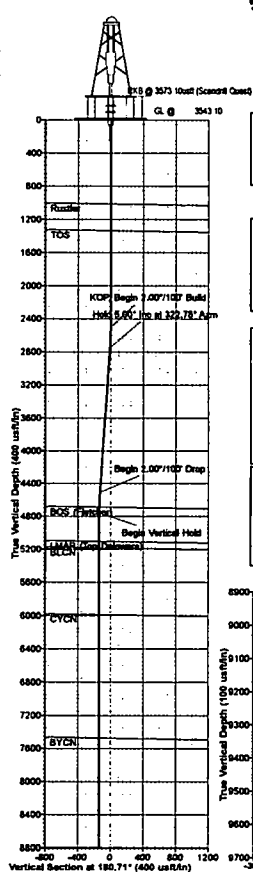
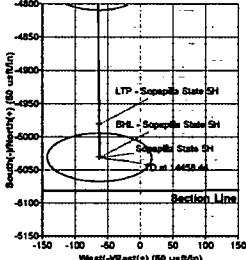
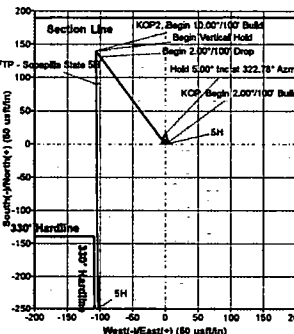
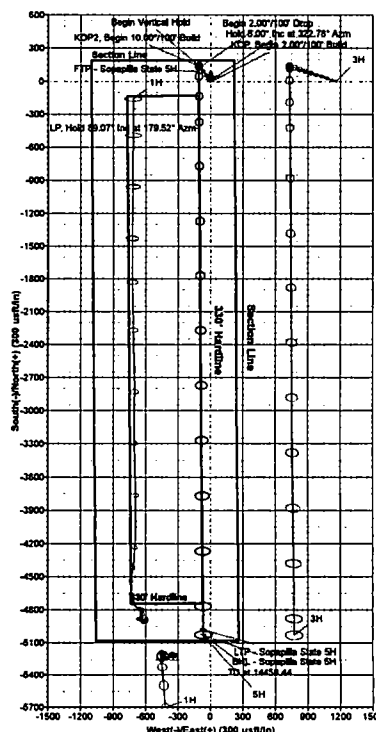
WELL DETAILS		Ground Elevation		3543 10	
N/S	E/W	Northing	Easting	Latitude	Longitude
0.00	0.00	438418.40	742854.30	32° 20' 25.192653 N	103° 32' 51.571947 W

DESIGN TARGET DETAILS		TVD		N/S		E/W		Northing		Easting		Latitude		Longitude	
Name															
FTP - Sopapilla State SH		9035.00	89.80	-105.80	48808.30	742544.50	32° 20' 26.088018 N	103° 32' 52.707301 W							
LTP - Sopapilla State SH		8598.10	-4981.30	-43.10	483437.10	742981.20	32° 19' 35.002802 N	103° 32' 52.723054 W							
SH - Sopapilla State SH		9000.00	-5031.30	-42.70	483387.10	742981.80	32° 19' 35.411088 N	103° 32' 52.732854 W							

SECTION DETAILS																	Annotations
Sec	MD	Inc	Azi	TVD	N/S	E/W	Chg	IFCA	Vsct	Target							Annotations
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							KOP, Begin 2.00°/100' Build
2	2500.00	0.00	0.00	2500.00	0.00	0.00	0.00	0.00	0.00	0.00							Hold 5.00° Inc at 322.78° Azm
3	2743.80	5.00	322.78	1743.50	8.67	4.58	2.00	322.78	-4.58								Begin 2.00°/100' Drop
4	4315.44	5.00	322.78	4508.41	131.18	-80.83	0.00	0.00	-129.91								KOP2, Begin 10.00°/100' Build
5	4765.25	0.00	0.00	4765.00	138.83	-100.22	2.00	180.00	-138.50								Begin Vertical Hold
6	8800.47	0.00	0.00	8802.17	138.83	-102.22	0.00	0.00	-138.50								KOP2, Begin 10.00°/100' Build
7	8800.14	89.07	179.52	8825.00	-423.78	-101.48	10.00	179.52	425.61								LP, Hold 89.07° Inc at 179.52° Azm
8	14658.44	89.07	179.52	8825.00	-5031.30	-42.70	0.00	0.00	5031.88	SH - Sopapilla State SH							SH 14658.44

LEGEND	
—	1H, OH / Job 1311084, Surveys (Ensign 153) VO
—	2H, OH, Plan 1 09-03-19 VO
—	1H, STD1, Surveys VO
—	Plan 1 09-03-19

FORMATION TOP DETAILS									
TVDPath	MDPath	Formation	DipAngle	DipDir					
1019.10	1019.10	Rustler	0.93	180.71					
1342.10	1342.10	TOC	0.93	180.71					
4987.88	4705.20	BOS (Fletcher)	0.93	180.71					
5112.85	5120.20	LMAR (Top Decks)	0.93	180.71					
5180.85	5188.20	BLCA	0.93	180.71					
5882.85	6000.20	CYNH	0.93	180.71					
7479.85	7487.20	BYCH	0.93	180.71					
8888.87	8897.20	Bone Sprng (BSGL)	0.93	180.71					
8345.39	8302.10	M Audion SA	0.93	180.71					





Planning Report



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Sopapilla State
Well: 5H
Wellbore: OH
Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (Scandril Quest)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project	Lea County, NM (NAD27 NME)		
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 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 5H
Well Position +N/-S 0.00 usft Northing: 488,418.40 usft Latitude: 32° 20' 25.192653 N
 +E/-W 0.00 usft Easting: 742,654.30 usft Longitude: 103° 32' 51.571947 W
Position Uncertainty 0.00 usft **Wellhead Elevation:** **Ground Level:** 3,543.10 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	10/12/2019	6.57	60.01	47,957.08459780

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	180.71

Plan Survey Tool Program **Date** 9/3/2019

Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1 0.00	14,458.32	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	
2,749.90	5.00	322.78	2,749.59	8.67	-6.59	2.00	2.00	0.00	322.78	
4,515.44	5.00	322.78	4,508.41	131.16	-99.63	0.00	0.00	0.00	0.00	
4,765.35	0.00	0.00	4,758.00	139.83	-106.22	2.00	-2.00	0.00	180.00	
8,959.47	0.00	0.00	8,952.12	139.83	-106.22	0.00	0.00	0.00	0.00	
9,850.14	89.07	179.52	9,525.00	-423.78	-101.48	10.00	10.00	20.16	179.52	
14,458.44	89.07	179.52	9,600.00	-5,031.30	-62.70	0.00	0.00	0.00	0.00	BHL - Sopapilla Sta



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Local Co-ordinate Reference: Well 5H
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MD Reference: RKB @ 3573.10usft (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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,019.10	0.00	0.00	1,019.10	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
1,342.10	0.00	0.00	1,342.10	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	322.78	2,599.98	1.39	-1.06	-1.38	2.00	2.00	0.00
2,700.00	4.00	322.78	2,699.84	5.56	-4.22	-5.50	2.00	2.00	0.00
2,749.90	5.00	322.78	2,749.59	8.67	-6.59	-8.59	2.00	2.00	0.00
Hold 5.00° Inc at 322.78° Azm									
2,800.00	5.00	322.78	2,799.49	12.15	-9.23	-12.03	0.00	0.00	0.00
2,900.00	5.00	322.78	2,899.11	19.09	-14.50	-18.91	0.00	0.00	0.00
3,000.00	5.00	322.78	2,998.73	26.02	-19.77	-25.78	0.00	0.00	0.00
3,100.00	5.00	322.78	3,098.35	32.96	-25.04	-32.65	0.00	0.00	0.00
3,200.00	5.00	322.78	3,197.97	39.90	-30.31	-39.52	0.00	0.00	0.00
3,300.00	5.00	322.78	3,297.59	46.84	-35.58	-46.39	0.00	0.00	0.00
3,400.00	5.00	322.78	3,397.21	53.78	-40.85	-53.26	0.00	0.00	0.00
3,500.00	5.00	322.78	3,496.83	60.71	-46.12	-60.13	0.00	0.00	0.00
3,600.00	5.00	322.78	3,596.45	67.65	-51.39	-67.00	0.00	0.00	0.00
3,700.00	5.00	322.78	3,696.07	74.59	-56.66	-73.88	0.00	0.00	0.00
3,800.00	5.00	322.78	3,795.69	81.53	-61.93	-80.75	0.00	0.00	0.00
3,900.00	5.00	322.78	3,895.31	88.46	-67.20	-87.62	0.00	0.00	0.00
4,000.00	5.00	322.78	3,994.93	95.40	-72.47	-94.49	0.00	0.00	0.00
4,100.00	5.00	322.78	4,094.55	102.34	-77.74	-101.36	0.00	0.00	0.00
4,200.00	5.00	322.78	4,194.17	109.28	-83.01	-108.23	0.00	0.00	0.00
4,300.00	5.00	322.78	4,293.79	116.21	-88.28	-115.10	0.00	0.00	0.00
4,400.00	5.00	322.78	4,393.41	123.15	-93.55	-121.98	0.00	0.00	0.00
4,500.00	5.00	322.78	4,493.03	130.09	-98.82	-128.85	0.00	0.00	0.00
4,515.44	5.00	322.78	4,508.41	131.16	-99.63	-129.91	0.00	0.00	0.00
Begin 2.00°/100' Drop									
4,600.00	3.31	322.78	4,592.75	136.04	-103.34	-134.74	2.00	-2.00	0.00
4,700.00	1.31	322.78	4,692.66	139.24	-105.77	-137.91	2.00	-2.00	0.00
4,705.20	1.20	322.78	4,697.86	139.33	-105.84	-138.00	2.00	-2.00	0.00
BOS (Fletcher)									
4,765.35	0.00	0.00	4,758.00	139.83	-106.22	-138.50	2.00	-2.00	61.89
Begin Vertical Hold									
5,120.20	0.00	0.00	5,112.85	139.83	-106.22	-138.50	0.00	0.00	0.00
LMAR (Top Delaware)									
5,198.20	0.00	0.00	5,190.85	139.83	-106.22	-138.50	0.00	0.00	0.00
BLCN									
6,000.20	0.00	0.00	5,992.85	139.83	-106.22	-138.50	0.00	0.00	0.00
CYCN									
7,487.20	0.00	0.00	7,479.85	139.83	-106.22	-138.50	0.00	0.00	0.00
BYCN									
8,959.47	0.00	0.00	8,952.12	139.83	-106.22	-138.50	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build									
8,997.25	3.78	179.52	8,989.87	138.59	-106.21	-137.25	10.00	10.00	0.00
Bone Sprg (BSGL)									
9,000.00	4.05	179.52	8,992.62	138.40	-106.21	-137.07	10.00	10.00	0.00
9,100.00	14.05	179.52	9,091.25	122.69	-106.08	-121.35	10.00	10.00	0.00
9,200.00	24.05	179.52	9,185.65	90.08	-105.80	-88.76	10.00	10.00	0.00
9,300.00	34.05	179.52	9,272.96	41.58	-105.39	-40.27	10.00	10.00	0.00



Planning Report



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Local Co-ordinate Reference: Well 5H
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MD Reference: RKB @ 3573.10usft (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)
9,392.91	43.34	179.52	9,345.39	-16.44	-104.91	17.75	10.00	10.00	0.00
M Avalon Sh									
9,400.00	44.05	179.52	9,350.51	-21.34	-104.86	22.64	10.00	10.00	0.00
9,500.00	54.05	179.52	9,415.97	-96.77	-104.23	98.06	10.00	10.00	0.00
9,600.00	64.05	179.52	9,467.32	-182.42	-103.51	183.70	10.00	10.00	0.00
9,700.00	74.05	179.52	9,503.03	-275.69	-102.72	276.95	10.00	10.00	0.00
9,800.00	84.05	179.52	9,521.99	-373.75	-101.90	374.99	10.00	10.00	0.00
9,850.14	89.07	179.52	9,525.00	-423.78	-101.48	425.01	10.00	10.00	0.00
LP, Hold 89.07° Inc at 179.52° Azm									
9,900.00	89.07	179.52	9,525.81	-473.63	-101.06	474.85	0.00	0.00	0.00
10,000.00	89.07	179.52	9,527.44	-573.61	-100.22	574.82	0.00	0.00	0.00
10,100.00	89.07	179.52	9,529.07	-673.60	-99.38	674.78	0.00	0.00	0.00
10,200.00	89.07	179.52	9,530.70	-773.58	-98.53	774.75	0.00	0.00	0.00
10,300.00	89.07	179.52	9,532.32	-873.56	-97.69	874.71	0.00	0.00	0.00
10,400.00	89.07	179.52	9,533.95	-973.55	-96.85	974.68	0.00	0.00	0.00
10,500.00	89.07	179.52	9,535.58	-1,073.53	-96.01	1,074.64	0.00	0.00	0.00
10,600.00	89.07	179.52	9,537.21	-1,173.51	-95.17	1,174.61	0.00	0.00	0.00
10,700.00	89.07	179.52	9,538.83	-1,273.49	-94.33	1,274.57	0.00	0.00	0.00
10,800.00	89.07	179.52	9,540.46	-1,373.48	-93.48	1,374.54	0.00	0.00	0.00
10,900.00	89.07	179.52	9,542.09	-1,473.46	-92.64	1,474.50	0.00	0.00	0.00
11,000.00	89.07	179.52	9,543.72	-1,573.44	-91.80	1,574.47	0.00	0.00	0.00
11,100.00	89.07	179.52	9,545.34	-1,673.43	-90.96	1,674.43	0.00	0.00	0.00
11,200.00	89.07	179.52	9,546.97	-1,773.41	-90.12	1,774.40	0.00	0.00	0.00
11,300.00	89.07	179.52	9,548.60	-1,873.39	-89.28	1,874.36	0.00	0.00	0.00
11,400.00	89.07	179.52	9,550.23	-1,973.38	-88.44	1,974.33	0.00	0.00	0.00
11,500.00	89.07	179.52	9,551.85	-2,073.36	-87.59	2,074.29	0.00	0.00	0.00
11,600.00	89.07	179.52	9,553.48	-2,173.34	-86.75	2,174.26	0.00	0.00	0.00
11,700.00	89.07	179.52	9,555.11	-2,273.33	-85.91	2,274.22	0.00	0.00	0.00
11,800.00	89.07	179.52	9,556.74	-2,373.31	-85.07	2,374.19	0.00	0.00	0.00
11,900.00	89.07	179.52	9,558.36	-2,473.29	-84.23	2,474.15	0.00	0.00	0.00
12,000.00	89.07	179.52	9,559.99	-2,573.28	-83.39	2,574.12	0.00	0.00	0.00
12,100.00	89.07	179.52	9,561.62	-2,673.26	-82.55	2,674.08	0.00	0.00	0.00
12,200.00	89.07	179.52	9,563.25	-2,773.24	-81.70	2,774.05	0.00	0.00	0.00
12,300.00	89.07	179.52	9,564.87	-2,873.23	-80.86	2,874.01	0.00	0.00	0.00
12,400.00	89.07	179.52	9,566.50	-2,973.21	-80.02	2,973.98	0.00	0.00	0.00
12,500.00	89.07	179.52	9,568.13	-3,073.19	-79.18	3,073.94	0.00	0.00	0.00
12,600.00	89.07	179.52	9,569.75	-3,173.18	-78.34	3,173.91	0.00	0.00	0.00
12,700.00	89.07	179.52	9,571.38	-3,273.16	-77.50	3,273.87	0.00	0.00	0.00
12,800.00	89.07	179.52	9,573.01	-3,373.14	-76.66	3,373.84	0.00	0.00	0.00
12,900.00	89.07	179.52	9,574.64	-3,473.13	-75.81	3,473.80	0.00	0.00	0.00
13,000.00	89.07	179.52	9,576.26	-3,573.11	-74.97	3,573.77	0.00	0.00	0.00
13,100.00	89.07	179.52	9,577.89	-3,673.09	-74.13	3,673.73	0.00	0.00	0.00
13,200.00	89.07	179.52	9,579.52	-3,773.08	-73.29	3,773.70	0.00	0.00	0.00
13,300.00	89.07	179.52	9,581.15	-3,873.06	-72.45	3,873.66	0.00	0.00	0.00
13,400.00	89.07	179.52	9,582.77	-3,973.04	-71.61	3,973.63	0.00	0.00	0.00
13,500.00	89.07	179.52	9,584.40	-4,073.02	-70.76	4,073.59	0.00	0.00	0.00
13,600.00	89.07	179.52	9,586.03	-4,173.01	-69.92	4,173.56	0.00	0.00	0.00
13,700.00	89.07	179.52	9,587.66	-4,272.99	-69.08	4,273.52	0.00	0.00	0.00
13,800.00	89.07	179.52	9,589.28	-4,372.97	-68.24	4,373.49	0.00	0.00	0.00
13,900.00	89.07	179.52	9,590.91	-4,472.96	-67.40	4,473.45	0.00	0.00	0.00
14,000.00	89.07	179.52	9,592.54	-4,572.94	-66.56	4,573.42	0.00	0.00	0.00
14,100.00	89.07	179.52	9,594.17	-4,672.92	-65.72	4,673.38	0.00	0.00	0.00
14,200.00	89.07	179.52	9,595.79	-4,772.91	-64.87	4,773.35	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: 5H
Wellbore: OH
Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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)
14,300.00	89.07	179.52	9,597.42	-4,872.89	-64.03	4,873.31	0.00	0.00	0.00
14,400.00	89.07	179.52	9,599.05	-4,972.87	-63.19	4,973.28	0.00	0.00	0.00
14,458.44	89.07	179.52	9,600.00	-5,031.30	-62.70	5,031.69	0.00	0.00	0.00
TD at 14458.44									

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
FTP - Sopapilla State	- plan misses target center by 202.85usft at 9430.37usft MD (9371.77 TVD, -43.02 N, -104.68 E)	0.00	0.00	9,525.00	89.90	-105.80	488,508.30	742,548.50	12° 20' 26.089916 N	3° 32' 52.797391 W
LTP - Sopapilla State	- plan misses target center by 8.43usft at 14400.00usft MD (9599.05 TVD, -4972.87 N, -63.19 E)	0.00	0.00	9,599.19	-4,981.30	-63.10	483,437.10	742,591.20	12° 19' 35.905892 N	3° 32' 52.733055 W
BHL - Sopapilla State	- plan hits target center	0.00	0.00	9,600.00	-5,031.30	-62.70	483,387.10	742,591.60	12° 19' 35.411098 N	3° 32' 52.732664 W

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,019.10	1,019.10	Rustler		0.93	180.71
1,342.10	1,342.10	TOS		0.93	180.71
4,705.20	4,697.86	BOS (Fletcher)		0.93	180.71
5,120.20	5,112.85	LMAR (Top Delaware)		0.93	180.71
5,198.20	5,190.85	BLCN		0.93	180.71
6,000.20	5,992.85	CYCN		0.93	180.71
7,487.20	7,479.85	BYCN		0.93	180.71
8,997.25	8,989.87	Bone Sprg (BSGL)		0.93	180.71
9,392.91	9,345.39	M Avalon Sh		0.93	180.71

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
2,749.90	2,749.59	8.67	-6.59	Hold 5.00° Inc at 322.78° Azm
4,515.44	4,508.41	131.16	-99.63	Begin 2.00°/100' Drop
4,765.35	4,758.00	139.83	-106.22	Begin Vertical Hold
8,959.47	8,952.12	139.83	-106.22	KOP2, Begin 10.00°/100' Build
9,850.14	9,525.00	-423.78	-101.48	LP, Hold 89.07° Inc at 179.52° Azm
14,458.44	9,600.00	-5,031.30	-62.70	TD at 14458.44



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Sopapilla State

5H

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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	14,458.44	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)	14,458.44	9,610.45	409.75	300.05	3.735	CC, ES, SF
Sopapilla State						
1H - ST01 - Surveys	14,328.45	9,597.91	537.22	441.75	5.627	CC, ES, SF
3H - OH - Plan 1 09-03-19	8,900.00	8,911.96	835.00	770.86	13.018	CC
3H - OH - Plan 1 09-03-19	14,458.44	14,444.05	835.25	674.60	5.199	ES, SF

Offset Design Limestone 11-23-33 Fed - 1H - OH / Job 1311084 - Surveys (Ensign 153)

Survey Program: 150-

Offset Site Error: 0.00 usft

Offset Well Error: 0.00 usft

Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Offset 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)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	11.79	11.79	1.00	0.06	-175.56	-5,230.41	-406.30	5,246.16				
100.00	100.00	115.19	115.19	1.03	0.54	-175.56	-5,230.39	-405.99	5,246.12	5,244.74	1.39	3,776.643	
200.00	200.00	213.45	213.44	1.34	1.26	-175.57	-5,230.37	-405.29	5,246.05	5,243.89	2.16	2,423.605	
246.97	246.97	258.37	258.37	1.51	1.66	-175.57	-5,230.40	-404.89	5,246.04	5,243.43	2.61	2,008.768	
300.00	300.00	309.56	309.55	1.73	2.10	-175.58	-5,230.45	-404.37	5,246.05	5,242.92	3.14	1,672.046	
400.00	400.00	410.06	410.05	2.11	2.89	-175.59	-5,230.56	-403.27	5,246.08	5,241.95	4.13	1,270.004	
500.00	500.00	509.67	509.65	2.48	3.65	-175.60	-5,230.68	-402.09	5,246.11	5,241.00	5.11	1,026.378	
600.00	600.00	607.25	607.22	2.85	4.34	-175.62	-5,230.82	-400.98	5,246.16	5,240.12	6.05	867.284	
700.00	700.00	710.62	710.59	3.22	5.01	-175.63	-5,230.98	-399.88	5,246.25	5,239.29	6.96	754.247	
800.00	800.00	823.15	823.11	3.58	5.66	-175.64	-5,230.96	-398.61	5,246.14	5,238.33	7.81	671.679	
900.00	900.00	923.68	923.63	3.95	6.17	-175.65	-5,230.79	-397.48	5,245.89	5,237.35	8.54	614.285	
1,000.00	1,000.00	1,020.63	1,020.58	4.31	6.66	-175.66	-5,230.66	-396.66	5,245.68	5,236.45	9.23	568.182	
1,100.00	1,100.00	1,129.27	1,129.22	4.67	6.92	-175.67	-5,230.41	-395.95	5,245.40	5,235.54	9.86	531.950	
1,200.00	1,200.00	1,231.98	1,231.93	5.03	7.20	-175.68	-5,230.08	-395.31	5,245.04	5,234.56	10.48	500.576	
1,300.00	1,300.00	1,333.93	1,333.87	5.40	7.59	-175.68	-5,229.71	-394.61	5,244.63	5,233.51	11.12	471.778	
1,400.00	1,400.00	1,434.21	1,434.15	5.76	7.99	-175.69	-5,229.33	-393.85	5,244.19	5,232.43	11.76	445.972	
1,500.00	1,500.00	1,532.83	1,532.77	6.12	8.41	-175.70	-5,228.96	-393.18	5,243.77	5,231.36	12.40	422.721	
1,600.00	1,600.00	1,635.08	1,635.02	6.48	8.83	-175.71	-5,228.58	-392.58	5,243.35	5,230.29	13.06	401.555	
1,700.00	1,700.00	1,738.93	1,738.86	6.84	9.25	-175.71	-5,228.11	-392.03	5,242.86	5,229.15	13.71	382.317	
1,800.00	1,800.00	1,841.31	1,841.24	7.20	9.62	-175.72	-5,227.59	-391.55	5,242.31	5,227.94	14.38	364.644	
1,900.00	1,900.00	1,943.68	1,943.61	7.56	9.99	-175.72	-5,227.01	-391.13	5,241.72	5,226.67	15.05	348.325	

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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 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
2,000.00	2,000.00	2,046.18	2,046.11	7.92	10.32	-175.72	-5,226.38	-390.82	5,241.08	5,225.33	15.75	332.741	
2,100.00	2,100.00	2,147.26	2,147.18	8.28	10.65	-175.73	-5,225.70	-390.62	5,240.40	5,223.94	16.46	318.354	
2,200.00	2,200.00	2,246.77	2,246.68	8.64	10.97	-175.73	-5,225.04	-390.41	5,239.73	5,222.55	17.18	305.023	
2,300.00	2,300.00	2,359.42	2,359.33	9.00	11.37	-175.73	-5,224.21	-390.04	5,238.97	5,221.05	17.92	292.331	
2,400.00	2,400.00	2,480.00	2,479.91	9.36	11.82	-175.74	-5,222.94	-389.24	5,237.87	5,219.20	18.68	280.414	
2,500.00	2,500.00	2,608.46	2,608.34	9.72	12.34	-175.75	-5,221.02	-387.73	5,236.29	5,216.85	19.45	269.233	
2,580.76	2,580.75	2,702.94	2,702.79	10.01	12.72	-138.57	-5,219.24	-386.16	5,235.53	5,215.42	20.10	260.431	
2,600.00	2,599.98	2,724.64	2,724.48	10.08	12.81	-138.58	-5,218.80	-385.76	5,235.57	5,215.32	20.26	258.460	
2,700.00	2,699.84	2,836.59	2,836.38	10.47	13.28	-138.62	-5,216.42	-383.39	5,237.22	5,216.04	21.17	247.331	
2,800.00	2,799.49	2,945.30	2,945.02	10.81	13.73	-138.69	-5,213.92	-380.61	5,240.97	5,219.07	21.89	239.390	
2,900.00	2,899.11	3,057.57	3,057.22	11.15	14.19	-138.80	-5,211.16	-377.23	5,244.86	5,222.26	22.61	231.986	
3,000.00	2,998.73	3,172.75	3,172.28	11.50	14.67	-138.91	-5,208.04	-373.20	5,248.49	5,225.14	23.35	224.762	
3,100.00	3,098.35	3,290.32	3,289.71	11.86	15.15	-139.03	-5,204.51	-368.59	5,251.81	5,227.71	24.11	217.856	
3,200.00	3,197.97	3,351.00	3,350.30	12.22	15.39	-139.09	-5,202.54	-366.05	5,255.07	5,230.40	24.68	212.953	
3,300.00	3,297.59	3,431.90	3,431.12	12.57	15.82	-139.17	-5,200.33	-363.17	5,258.80	5,233.48	25.32	207.731	
3,400.00	3,397.21	3,486.48	3,485.67	12.93	16.11	-139.22	-5,199.37	-361.85	5,263.51	5,237.65	25.87	203.498	
3,500.00	3,496.83	3,549.92	3,549.10	13.29	16.44	-139.27	-5,198.78	-360.92	5,269.07	5,242.63	26.44	199.262	
3,600.00	3,596.45	3,648.04	3,647.22	13.66	16.94	-139.34	-5,198.11	-359.66	5,274.92	5,247.79	27.14	194.380	
3,700.00	3,696.07	3,747.37	3,746.53	14.02	17.39	-139.42	-5,197.46	-358.26	5,280.81	5,252.97	27.84	189.672	
3,800.00	3,795.69	3,848.68	3,847.83	14.38	17.78	-139.50	-5,196.78	-356.82	5,286.69	5,258.13	28.56	185.084	
3,900.00	3,895.31	3,943.79	3,942.93	14.74	18.14	-139.57	-5,196.13	-355.51	5,292.58	5,263.31	29.27	180.843	
4,000.00	3,994.93	4,035.13	4,034.26	15.11	18.49	-139.64	-5,195.64	-354.38	5,298.62	5,268.66	29.96	176.876	
4,100.00	4,094.55	4,119.57	4,118.69	15.47	18.79	-139.70	-5,195.35	-353.30	5,304.87	5,274.23	30.64	173.138	
4,200.00	4,194.17	4,200.42	4,199.53	15.84	19.07	-139.77	-5,195.37	-351.91	5,311.46	5,280.14	31.32	169.598	
4,300.00	4,293.79	4,288.18	4,287.27	16.20	19.37	-139.84	-5,195.70	-349.95	5,318.39	5,286.35	32.04	166.002	
4,400.00	4,393.41	4,384.48	4,383.53	16.57	19.69	-139.93	-5,196.19	-347.21	5,325.43	5,292.62	32.81	162.312	
4,500.00	4,493.03	4,476.76	4,475.75	16.93	20.00	-140.02	-5,196.76	-344.04	5,332.56	5,299.00	33.56	158.878	
4,600.00	4,592.75	4,566.36	4,565.28	17.29	20.29	-140.17	-5,197.48	-340.65	5,338.93	5,304.63	34.30	155.635	
4,700.00	4,692.66	4,645.37	4,644.22	17.71	20.55	-140.28	-5,198.31	-337.48	5,342.91	5,307.82	35.09	152.252	
4,800.00	4,792.65	4,717.06	4,715.85	18.08	20.78	-177.55	-5,199.42	-334.59	5,344.87	5,309.09	35.77	149.403	
4,900.00	4,892.65	4,781.00	4,779.73	18.42	20.98	-177.58	-5,200.74	-332.07	5,346.79	5,310.41	36.38	146.962	
5,000.00	4,992.65	4,855.10	4,853.76	18.77	21.18	-177.61	-5,202.67	-329.66	5,349.28	5,312.25	37.04	144.434	
5,100.00	5,092.65	4,921.99	4,920.60	19.12	21.37	-177.62	-5,204.81	-328.34	5,352.40	5,314.74	37.68	142.136	
5,200.00	5,192.65	5,010.91	5,009.46	19.48	21.63	-177.63	-5,208.08	-327.53	5,356.03	5,317.68	38.34	139.692	
5,300.00	5,292.65	5,122.41	5,120.88	19.83	21.96	-177.64	-5,212.07	-326.63	5,359.57	5,320.47	39.10	137.073	
5,400.00	5,392.65	5,240.12	5,238.52	20.18	22.29	-177.65	-5,215.94	-325.76	5,362.82	5,322.94	39.89	134.443	
5,500.00	5,492.65	5,347.25	5,345.60	20.53	22.61	-177.66	-5,219.19	-325.04	5,365.83	5,325.18	40.65	131.990	
5,600.00	5,592.65	5,534.62	5,532.91	20.89	23.16	-177.68	-5,223.17	-323.38	5,367.87	5,326.13	41.74	128.606	
5,700.00	5,692.65	5,674.01	5,672.28	21.24	23.61	-177.70	-5,224.40	-321.87	5,368.67	5,326.08	42.59	126.066	
5,800.00	5,792.65	5,731.56	5,729.83	21.59	23.82	-177.70	-5,224.98	-321.80	5,369.65	5,326.54	43.11	124.545	
5,900.00	5,892.65	5,795.00	5,793.26	21.95	24.05	-177.69	-5,226.11	-322.37	5,371.44	5,327.78	43.66	123.028	
6,000.00	5,992.65	5,897.82	5,896.04	22.30	24.62	-177.68	-5,228.23	-323.99	5,373.57	5,329.23	44.34	121.179	
6,100.00	6,092.65	6,071.15	6,069.30	22.65	25.38	-177.64	-5,230.74	-328.00	5,375.26	5,329.93	45.33	118.586	
6,200.00	6,192.65	6,225.41	6,223.41	23.01	25.92	-177.56	-5,230.32	-334.74	5,375.05	5,328.72	46.33	116.020	
6,300.00	6,292.65	6,327.23	6,325.11	23.36	26.26	-177.51	-5,229.73	-339.63	5,374.68	5,327.53	47.14	114.009	
6,400.00	6,392.65	6,427.75	6,425.52	23.72	26.60	-177.46	-5,229.12	-344.41	5,374.28	5,326.42	47.88	112.295	
6,500.00	6,492.65	6,529.82	6,527.49	24.07	26.94	-177.41	-5,228.50	-349.07	5,373.88	5,325.30	48.58	110.625	
6,600.00	6,592.65	6,639.06	6,636.61	24.43	27.30	-177.36	-5,227.70	-354.03	5,373.35	5,324.03	49.32	108.938	
6,700.00	6,692.65	6,751.17	6,748.59	24.78	27.68	-177.30	-5,226.67	-359.24	5,372.65	5,322.56	50.09	107.268	
6,800.00	6,792.65	6,865.69	6,862.97	25.14	28.06	-177.24	-5,225.30	-364.73	5,371.69	5,320.83	50.86	105.621	
6,900.00	6,892.65	6,959.48	6,956.64	25.49	28.37	-177.19	-5,224.11	-369.32	5,370.65	5,319.09	51.56	104.172	
7,000.00	6,992.65	7,046.00	7,043.05	25.85	28.66	-177.15	-5,223.10	-373.58	5,369.73	5,317.51	52.23	102.817	

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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-														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)	Separation (usft)	Factor		
7,100.00	7,092.65	7,137.94	7,134.87	26.21	28.97	-177.10	-5,222.20	-378.18	5,369.02	5,316.11	52.91	101.472		
7,200.00	7,192.65	7,225.00	7,221.81	26.56	29.27	-177.05	-5,221.60	-382.65	5,368.58	5,315.00	53.58	100.201		
7,300.00	7,292.65	7,319.93	7,316.61	26.92	29.60	-177.00	-5,221.09	-387.59	5,368.31	5,314.04	54.27	98.920		
7,400.00	7,392.65	7,416.09	7,412.65	27.27	29.94	-176.94	-5,220.63	-392.60	5,368.11	5,313.15	54.97	97.664		
7,500.00	7,492.65	7,508.77	7,505.20	27.63	30.26	-176.89	-5,220.29	-397.34	5,368.02	5,312.38	55.65	96.467		
7,515.51	7,508.16	7,523.14	7,519.55	27.69	30.31	-176.88	-5,220.25	-398.06	5,368.02	5,312.27	55.75	96.284		
7,600.00	7,592.65	7,604.42	7,600.74	27.99	30.60	-176.84	-5,220.07	-402.03	5,368.06	5,311.73	56.34	95.283		
7,700.00	7,692.65	7,712.07	7,708.29	28.34	30.98	-176.79	-5,219.82	-406.41	5,368.06	5,310.98	57.07	94.053		
7,800.00	7,792.65	7,819.06	7,815.23	28.70	31.35	-176.76	-5,219.48	-409.66	5,367.91	5,310.10	57.81	92.850		
7,900.00	7,892.65	7,925.45	7,921.59	29.06	31.72	-176.73	-5,219.03	-412.55	5,367.64	5,309.09	58.55	91.675		
8,000.00	7,992.65	8,025.52	8,021.62	29.41	32.07	-176.70	-5,218.55	-415.16	5,367.31	5,308.04	59.27	90.560		
8,100.00	8,092.65	8,124.65	8,120.71	29.77	32.42	-176.67	-5,218.07	-417.84	5,366.99	5,307.01	59.98	89.476		
8,200.00	8,192.65	8,224.99	8,221.01	30.13	32.77	-176.64	-5,217.60	-420.55	5,366.68	5,305.97	60.70	88.411		
8,300.00	8,292.65	8,328.73	8,324.72	30.48	33.12	-176.61	-5,217.11	-423.18	5,366.35	5,304.92	61.43	87.355		
8,400.00	8,392.65	8,441.60	8,437.58	30.84	33.47	-176.60	-5,216.45	-424.65	5,365.84	5,303.65	62.19	86.277		
8,500.00	8,492.65	8,544.63	8,540.60	31.20	33.79	-176.60	-5,215.74	-424.74	5,365.16	5,302.24	62.92	85.265		
8,600.00	8,592.65	8,643.34	8,639.31	31.55	34.09	-176.59	-5,215.07	-424.86	5,364.49	5,300.85	63.64	84.294		
8,700.00	8,692.65	8,742.52	8,738.49	31.91	34.40	-176.59	-5,214.41	-425.08	5,363.84	5,299.48	64.37	83.330		
8,800.00	8,792.65	8,841.57	8,837.53	32.27	34.71	-176.59	-5,213.77	-425.32	5,363.21	5,298.11	65.10	82.386		
8,900.00	8,892.65	8,938.32	8,934.29	32.63	35.01	-176.59	-5,213.18	-425.63	5,362.62	5,296.79	65.82	81.470		
9,000.00	8,992.62	9,033.05	9,029.01	32.98	35.31	3.91	-5,212.65	-426.03	5,360.66	5,294.12	66.54	80.566		
9,100.00	9,091.25	9,119.85	9,115.81	33.46	35.60	4.04	-5,212.31	-426.54	5,344.63	5,277.24	67.39	79.309		
9,200.00	9,185.65	9,208.90	9,204.86	33.94	35.90	4.33	-5,212.14	-427.25	5,311.96	5,243.74	68.22	77.861		
9,300.00	9,272.96	9,327.07	9,323.02	34.36	36.31	4.85	-5,211.55	-428.32	5,263.19	5,194.10	69.09	76.178		
9,400.00	9,350.51	9,411.44	9,407.38	34.70	36.59	5.69	-5,210.76	-429.15	5,199.74	5,129.99	69.75	74.549		
9,500.00	9,415.97	9,470.80	9,466.73	34.95	36.79	7.08	-5,210.23	-429.82	5,123.96	5,053.74	70.23	72.964		
9,600.00	9,467.32	9,517.28	9,513.21	35.12	36.95	9.67	-5,209.85	-430.41	5,038.16	4,967.60	70.57	71.396		
9,700.00	9,503.03	9,549.00	9,544.93	35.22	37.06	15.58	-5,209.61	-430.84	4,944.91	4,874.14	70.78	69.868		
9,800.00	9,521.99	9,566.48	9,562.41	35.27	37.12	38.09	-5,209.49	-431.09	4,847.02	4,776.15	70.87	68.390		
9,900.00	9,525.81	9,569.39	9,565.31	35.31	37.13	82.46	-5,209.47	-431.13	4,747.41	4,676.52	70.89	66.968		
10,000.00	9,527.44	9,570.24	9,566.17	35.39	37.13	82.60	-5,209.46	-431.15	4,647.73	4,576.83	70.90	65.556		
10,100.00	9,529.07	9,571.11	9,567.03	35.60	37.13	82.73	-5,209.46	-431.16	4,548.08	4,477.15	70.91	64.142		
10,200.00	9,530.70	9,571.97	9,567.89	35.96	37.14	82.86	-5,209.45	-431.17	4,448.40	4,377.49	70.92	62.728		
10,300.00	9,532.32	9,572.83	9,568.76	36.42	37.14	82.99	-5,209.45	-431.19	4,348.76	4,277.83	70.93	61.313		
10,400.00	9,533.95	9,573.70	9,569.62	36.94	37.14	83.12	-5,209.44	-431.20	4,249.14	4,178.20	70.94	59.897		
10,500.00	9,535.58	9,574.57	9,570.49	37.52	37.15	83.26	-5,209.43	-431.21	4,149.53	4,078.58	70.95	58.482		
10,600.00	9,537.21	9,575.44	9,571.36	38.15	37.15	83.39	-5,209.43	-431.22	4,049.95	3,978.98	70.97	57.065		
10,700.00	9,538.83	9,576.31	9,572.23	38.82	37.15	83.52	-5,209.42	-431.24	3,950.38	3,879.39	70.99	55.648		
10,800.00	9,540.46	9,577.18	9,573.11	39.53	37.16	83.66	-5,209.42	-431.25	3,850.84	3,779.83	71.01	54.231		
10,900.00	9,542.09	9,578.06	9,573.98	40.29	37.16	83.79	-5,209.41	-431.26	3,751.32	3,680.29	71.03	52.813		
11,000.00	9,543.72	9,578.94	9,574.86	41.08	37.16	83.92	-5,209.40	-431.28	3,651.83	3,580.77	71.05	51.395		
11,100.00	9,545.34	9,579.81	9,575.74	41.90	37.17	84.06	-5,209.40	-431.29	3,552.36	3,481.28	71.08	49.977		
11,200.00	9,546.97	9,580.70	9,576.62	42.76	37.17	84.19	-5,209.39	-431.30	3,452.93	3,381.82	71.11	48.558		
11,300.00	9,548.60	9,581.58	9,577.50	43.65	37.17	84.33	-5,209.39	-431.32	3,353.53	3,282.38	71.14	47.139		
11,400.00	9,550.23	9,582.46	9,578.39	44.57	37.17	84.47	-5,209.38	-431.33	3,254.16	3,182.99	71.18	45.720		
11,500.00	9,551.85	9,583.35	9,579.27	45.51	37.18	84.60	-5,209.37	-431.35	3,154.84	3,083.62	71.21	44.301		
11,600.00	9,553.48	9,584.24	9,580.16	46.48	37.18	84.74	-5,209.37	-431.36	3,055.56	2,984.30	71.26	42.881		
11,700.00	9,555.11	9,585.13	9,581.05	47.47	37.18	84.88	-5,209.36	-431.37	2,956.32	2,885.02	71.30	41.461		
11,800.00	9,556.74	9,586.02	9,581.94	48.49	37.19	85.01	-5,209.35	-431.39	2,857.14	2,785.79	71.36	40.041		
11,900.00	9,558.36	9,586.91	9,582.84	49.53	37.19	85.15	-5,209.35	-431.40	2,758.02	2,686.61	71.41	38.620		
12,000.00	9,559.99	9,587.81	9,583.73	50.58	37.19	85.29	-5,209.34	-431.42	2,658.97	2,587.49	71.48	37.199		
12,100.00	9,561.62	9,588.71	9,584.63	51.66	37.20	85.43	-5,209.34	-431.43	2,559.99	2,488.44	71.55	35.778		

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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-												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
12,200.00	9,563.25	9,589.61	9,585.53	52.75	37.20	85.57	-5,209.33	-431.44	2,461.09	2,389.45	71.63	34.356	
12,300.00	9,564.87	9,590.51	9,586.43	53.86	37.20	85.70	-5,209.32	-431.46	2,362.28	2,290.55	71.73	32.934	
12,400.00	9,566.50	9,591.41	9,587.33	54.98	37.21	85.84	-5,209.32	-431.47	2,263.58	2,191.75	71.83	31.512	
12,500.00	9,568.13	9,592.32	9,588.24	56.12	37.21	85.98	-5,209.31	-431.49	2,164.99	2,093.04	71.95	30.088	
12,600.00	9,569.75	9,593.23	9,589.15	57.27	37.21	86.12	-5,209.31	-431.50	2,066.55	1,994.45	72.09	28.664	
12,700.00	9,571.38	9,594.14	9,590.06	58.44	37.22	86.26	-5,209.30	-431.52	1,968.25	1,896.00	72.26	27.239	
12,800.00	9,573.01	9,595.05	9,590.97	59.62	37.22	86.40	-5,209.29	-431.53	1,870.14	1,797.69	72.45	25.814	
12,900.00	9,574.64	9,595.96	9,591.88	60.80	37.22	86.54	-5,209.29	-431.55	1,772.24	1,699.57	72.67	24.387	
13,000.00	9,576.26	9,596.88	9,592.80	62.00	37.23	86.69	-5,209.28	-431.56	1,674.59	1,601.65	72.94	22.959	
13,100.00	9,577.89	9,597.79	9,593.71	63.21	37.23	86.83	-5,209.28	-431.57	1,577.23	1,503.97	73.26	21.529	
13,200.00	9,579.52	9,598.71	9,594.63	64.43	37.23	86.97	-5,209.27	-431.59	1,480.22	1,406.57	73.65	20.099	
13,300.00	9,581.15	9,599.63	9,595.55	65.66	37.24	87.11	-5,209.26	-431.60	1,383.64	1,309.51	74.12	18.667	
13,400.00	9,582.77	9,600.56	9,596.48	66.89	37.24	87.25	-5,209.26	-431.62	1,287.57	1,212.87	74.71	17.235	
13,500.00	9,584.40	9,601.48	9,597.40	68.14	37.24	87.40	-5,209.25	-431.63	1,192.16	1,116.72	75.44	15.803	
13,600.00	9,586.03	9,602.41	9,598.33	69.39	37.25	87.54	-5,209.25	-431.65	1,097.56	1,021.19	76.37	14.372	
13,700.00	9,587.66	9,603.34	9,599.26	70.65	37.25	87.68	-5,209.24	-431.67	1,004.01	926.45	77.55	12.946	
13,800.00	9,589.28	9,604.27	9,600.19	71.91	37.25	87.83	-5,209.23	-431.68	911.82	832.73	79.09	11.528	
13,900.00	9,590.91	9,605.20	9,601.12	73.18	37.26	87.97	-5,209.23	-431.70	821.47	740.36	81.11	10.128	
14,000.00	9,592.54	9,606.14	9,602.06	74.46	37.26	88.12	-5,209.22	-431.71	733.62	649.84	83.77	8.757	
14,100.00	9,594.17	9,607.08	9,603.00	75.74	37.26	88.26	-5,209.21	-431.73	649.29	561.98	87.31	7.436	
14,200.00	9,595.79	9,608.02	9,603.94	77.03	37.27	88.41	-5,209.21	-431.74	570.05	478.07	91.98	6.197	
14,300.00	9,597.42	9,608.96	9,604.88	78.33	37.27	88.55	-5,209.20	-431.76	498.34	400.34	98.00	5.085	
14,400.00	9,599.05	9,609.90	9,605.82	79.62	37.27	88.70	-5,209.20	-431.77	437.86	332.62	105.24	4.161	
14,458.44	9,600.00	9,610.45	9,606.37	80.38	37.27	88.78	-5,209.19	-431.78	409.75	300.05	109.70	3.735 CC, ES, SF	



Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandrill Quest)
MD Reference: RKB @ 3573.10usft (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			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	
0.00	0.00	10.08	10.08	1.00	0.01	-172.10	-4,892.11	-679.09	4,939.02				
100.00	100.00	110.38	110.38	1.03	0.10	-172.11	-4,892.22	-678.13	4,939.00	4,937.89	1.11	4,458.007	
104.30	104.30	114.20	114.20	1.04	0.11	-172.11	-4,892.23	-678.07	4,939.00	4,937.88	1.12	4,410.677	
200.00	200.00	200.00	199.98	1.34	0.27	-172.13	-4,892.54	-676.51	4,939.10	4,937.59	1.51	3,280.273	
300.00	300.00	292.33	292.28	1.73	0.44	-172.15	-4,893.08	-674.54	4,939.39	4,937.39	1.99	2,475.936	
400.00	400.00	383.84	383.77	2.11	0.61	-172.18	-4,893.79	-672.36	4,939.83	4,937.33	2.49	1,980.824	
500.00	500.00	489.02	488.92	2.48	0.81	-172.21	-4,894.64	-670.02	4,940.33	4,937.31	3.02	1,634.442	
600.00	600.00	614.04	613.93	2.85	1.04	-172.22	-4,895.05	-668.54	4,940.50	4,936.91	3.59	1,376.543	
700.00	700.00	724.72	724.60	3.22	1.25	-172.23	-4,895.01	-667.53	4,940.33	4,936.20	4.13	1,195.619	
800.00	800.00	863.61	863.48	3.58	1.50	-172.25	-4,894.37	-665.76	4,939.73	4,935.00	4.73	1,045.233	
900.00	900.00	957.95	957.79	3.95	1.68	-172.28	-4,893.53	-663.58	4,938.55	4,933.31	5.24	941.787	
1,000.00	1,000.00	1,034.81	1,034.61	4.31	1.82	-172.31	-4,893.31	-661.08	4,937.83	4,932.10	5.73	861.422	
1,100.00	1,100.00	1,122.10	1,121.87	4.67	1.99	-172.33	-4,893.34	-658.91	4,937.52	4,931.28	6.24	791.329	
1,200.00	1,200.00	1,241.17	1,240.93	5.03	2.20	-172.35	-4,892.97	-657.61	4,937.06	4,930.26	6.80	725.545	
1,300.00	1,300.00	1,340.08	1,339.84	5.40	2.37	-172.35	-4,892.32	-657.35	4,936.37	4,929.04	7.33	673.051	
1,400.00	1,400.00	1,433.03	1,432.79	5.76	2.52	-172.34	-4,891.83	-657.70	4,935.90	4,928.04	7.86	628.309	
1,500.00	1,500.00	1,545.86	1,545.61	6.12	2.69	-172.33	-4,891.01	-658.70	4,935.30	4,926.88	8.41	586.677	
1,600.00	1,600.00	1,646.24	1,645.97	6.48	2.85	-172.31	-4,890.04	-660.08	4,934.52	4,925.57	8.95	551.547	
1,700.00	1,700.00	1,733.57	1,733.29	6.84	2.99	-172.29	-4,889.26	-661.76	4,933.90	4,924.44	9.46	521.686	
1,800.00	1,800.00	1,818.64	1,818.33	7.20	3.13	-172.27	-4,888.72	-663.83	4,933.60	4,923.63	9.96	495.148	
1,900.00	1,900.00	1,914.53	1,914.17	7.56	3.28	-172.23	-4,888.22	-666.59	4,933.46	4,922.98	10.49	470.360	
1,978.67	1,978.67	1,988.96	1,988.57	7.84	3.40	-172.21	-4,887.86	-669.03	4,933.43	4,922.53	10.90	452.616	
2,000.00	2,000.00	2,008.49	2,008.08	7.92	3.43	-172.20	-4,887.77	-669.71	4,933.43	4,922.42	11.01	448.079	
2,100.00	2,100.00	2,100.00	2,099.55	8.28	3.59	-172.16	-4,887.51	-672.67	4,933.60	4,922.07	11.53	427.997	
2,200.00	2,200.00	2,188.18	2,187.70	8.64	3.73	-172.14	-4,887.51	-675.11	4,933.96	4,921.92	12.04	409.867	
2,300.00	2,300.00	2,301.56	2,301.04	9.00	3.92	-172.10	-4,887.51	-677.91	4,934.31	4,921.72	12.59	391.835	
2,400.00	2,400.00	2,525.66	2,525.07	9.36	4.32	-172.05	-4,884.36	-681.94	4,933.08	4,919.74	13.35	369.632	
2,500.00	2,500.00	2,653.48	2,652.85	9.72	4.55	-172.06	-4,881.15	-681.21	4,930.53	4,916.59	13.93	353.890	
2,600.00	2,599.98	2,794.58	2,793.83	10.08	4.80	-134.92	-4,876.92	-677.62	4,928.43	4,913.82	14.61	337.270	
2,640.24	2,640.18	2,821.20	2,820.42	10.23	4.85	-134.94	-4,876.06	-676.72	4,928.16	4,913.29	14.88	331.271	
2,700.00	2,699.84	2,856.02	2,855.22	10.47	4.91	-134.96	-4,875.09	-675.62	4,928.76	4,913.49	15.26	322.929	
2,800.00	2,799.49	2,900.00	2,899.16	10.81	4.99	-134.98	-4,874.09	-674.35	4,932.12	4,916.42	15.70	314.104	
2,900.00	2,899.11	2,977.99	2,977.12	11.15	5.13	-135.06	-4,872.89	-672.52	4,936.50	4,920.32	16.19	304.980	
3,000.00	2,998.73	3,049.53	3,048.65	11.50	5.26	-135.12	-4,872.30	-671.23	4,941.62	4,924.95	16.67	296.380	
3,100.00	3,098.35	3,125.35	3,124.45	11.86	5.40	-135.19	-4,872.06	-669.80	4,947.24	4,930.07	17.17	288.186	
3,200.00	3,197.97	3,200.00	3,199.09	12.22	5.53	-135.26	-4,872.18	-668.38	4,953.36	4,935.70	17.66	280.530	
3,300.00	3,297.59	3,290.98	3,290.04	12.57	5.69	-135.35	-4,872.70	-666.24	4,959.82	4,941.65	18.18	272.892	
3,400.00	3,397.21	3,374.18	3,373.20	12.93	5.84	-135.44	-4,873.46	-663.62	4,966.55	4,947.87	18.68	265.885	
3,500.00	3,496.83	3,456.44	3,455.39	13.29	5.98	-135.54	-4,874.55	-660.59	4,973.63	4,954.45	19.18	259.287	
3,600.00	3,596.45	3,525.97	3,524.86	13.66	6.10	-135.62	-4,875.77	-657.74	4,981.13	4,961.47	19.66	253.340	
3,700.00	3,696.07	3,600.00	3,598.81	14.02	6.23	-135.71	-4,877.77	-654.94	4,989.51	4,969.37	20.15	247.632	
3,800.00	3,795.69	3,691.62	3,690.35	14.38	6.39	-135.80	-4,880.45	-652.30	4,998.30	4,977.64	20.67	241.856	
3,900.00	3,895.31	3,828.10	3,826.79	14.74	6.63	-135.92	-4,883.06	-650.44	5,006.23	4,984.97	21.26	235.430	
4,000.00	3,994.93	3,900.00	3,898.67	15.11	6.75	-135.98	-4,884.49	-650.05	5,014.39	4,992.64	21.75	230.569	
4,100.00	4,094.55	3,966.25	3,964.90	15.47	6.87	-136.03	-4,886.17	-649.99	5,023.16	5,000.94	22.22	226.050	
4,200.00	4,194.17	4,050.03	4,048.65	15.84	7.01	-136.09	-4,888.68	-650.21	5,032.44	5,009.71	22.73	221.431	
4,300.00	4,293.79	4,158.17	4,156.73	16.20	7.20	-136.18	-4,892.09	-649.46	5,041.79	5,018.51	23.28	216.595	
4,400.00	4,393.41	4,353.47	4,351.94	16.57	7.54	-136.36	-4,896.60	-645.58	5,050.27	5,026.28	23.99	210.517	
4,500.00	4,493.03	4,463.48	4,461.89	16.93	7.74	-136.46	-4,897.64	-643.26	5,057.29	5,032.74	24.55	206.024	
4,600.00	4,592.75	4,544.13	4,542.54	17.29	7.89	-136.60	-4,898.63	-641.54	5,063.71	5,038.66	25.05	202.162	
4,700.00	4,692.66	4,634.39	4,632.76	17.71	8.05	-136.71	-4,900.08	-639.56	5,067.99	5,042.34	25.65	197.573	
4,800.00	4,792.65	4,761.10	4,759.40	18.08	8.28	-174.01	-4,901.99	-635.61	5,069.72	5,043.47	26.25	193.109	

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: 5H
Well Error: 1.00 usft
Reference Wellbore OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandrill Quest)
MD Reference: RKB @ 3573.10usft (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			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	
4,900.00	4,892.65	4,917.57	4,915.75	18.42	8.57	-174.07	-4,903.10	-629.72	5,070.05	5,043.18	26.87	188.672	
5,000.00	4,992.65	5,034.79	5,032.93	18.77	8.78	-174.11	-4,902.93	-626.64	5,069.64	5,042.21	27.43	184.847	
5,100.00	5,092.65	5,149.54	5,147.64	19.12	8.99	-174.14	-4,902.36	-623.87	5,068.90	5,040.92	27.98	181.189	
5,200.00	5,192.65	5,263.75	5,261.82	19.48	9.20	-174.17	-4,901.48	-620.92	5,067.86	5,039.34	28.52	177.665	
5,300.00	5,292.65	5,376.12	5,374.13	19.83	9.41	-174.21	-4,900.36	-617.60	5,066.57	5,037.50	29.07	174.284	
5,400.00	5,392.65	5,474.43	5,472.39	20.18	9.59	-174.24	-4,899.26	-614.51	5,065.15	5,035.56	29.59	171.169	
5,500.00	5,492.65	5,569.63	5,567.54	20.53	9.76	-174.27	-4,898.27	-611.68	5,063.82	5,033.71	30.11	168.194	
5,600.00	5,592.65	5,671.31	5,669.17	20.89	9.95	-174.30	-4,897.26	-608.79	5,062.54	5,031.90	30.63	165.256	
5,700.00	5,692.65	5,774.56	5,772.38	21.24	10.14	-174.33	-4,896.13	-606.00	5,061.19	5,030.02	31.17	162.398	
5,800.00	5,792.65	5,872.07	5,869.85	21.59	10.32	-174.36	-4,895.03	-603.55	5,059.82	5,028.13	31.69	159.685	
5,900.00	5,892.65	5,967.26	5,965.01	21.95	10.49	-174.38	-4,894.01	-601.46	5,058.53	5,026.33	32.20	157.082	
6,000.00	5,992.65	6,063.83	6,061.56	22.30	10.67	-174.40	-4,893.03	-599.66	5,057.34	5,024.62	32.72	154.550	
6,100.00	6,092.65	6,157.85	6,155.56	22.65	10.84	-174.41	-4,892.10	-598.35	5,056.22	5,022.98	33.24	152.118	
6,200.00	6,192.65	15,596.00	11,118.41	23.01	80.63	-116.13	-160.03	-717.51	4,962.78	4,909.11	53.67	92.460	
6,300.00	6,292.65	15,596.00	11,118.41	23.36	80.63	-116.13	-160.03	-717.51	4,863.75	4,809.82	53.93	90.192	
6,400.00	6,392.65	15,596.00	11,118.41	23.72	80.63	-116.13	-160.03	-717.51	4,764.75	4,710.57	54.18	87.936	
6,500.00	6,492.65	15,596.00	11,118.41	24.07	80.63	-116.13	-160.03	-717.51	4,665.80	4,611.35	54.45	85.693	
6,600.00	6,592.65	15,596.00	11,118.41	24.43	80.63	-116.13	-160.03	-717.51	4,566.90	4,512.18	54.72	83.462	
6,700.00	6,692.65	15,596.00	11,118.41	24.78	80.63	-116.13	-160.03	-717.51	4,468.04	4,413.04	54.99	81.245	
6,800.00	6,792.65	15,596.00	11,118.41	25.14	80.63	-116.13	-160.03	-717.51	4,369.23	4,313.96	55.28	79.040	
6,900.00	6,892.65	15,596.00	11,118.41	25.49	80.63	-116.13	-160.03	-717.51	4,270.48	4,214.91	55.57	76.849	
7,000.00	6,992.65	15,596.00	11,118.41	25.85	80.63	-116.13	-160.03	-717.51	4,171.79	4,115.93	55.87	74.672	
7,100.00	7,092.65	15,596.00	11,118.41	26.21	80.63	-116.13	-160.03	-717.51	4,073.17	4,016.99	56.18	72.508	
7,200.00	7,192.65	15,596.00	11,118.41	26.56	80.63	-116.13	-160.03	-717.51	3,974.61	3,918.12	56.49	70.358	
7,300.00	7,292.65	15,596.00	11,118.41	26.92	80.63	-116.13	-160.03	-717.51	3,876.13	3,819.31	56.82	68.222	
7,400.00	7,392.65	15,596.00	11,118.41	27.27	80.63	-116.13	-160.03	-717.51	3,777.72	3,720.57	57.15	66.100	
7,500.00	7,492.65	15,596.00	11,118.41	27.63	80.63	-116.13	-160.03	-717.51	3,679.40	3,621.90	57.50	63.992	
7,600.00	7,592.65	15,596.00	11,118.41	27.99	80.63	-116.13	-160.03	-717.51	3,581.18	3,523.32	57.86	61.898	
7,700.00	7,692.65	15,596.00	11,118.41	28.34	80.63	-116.13	-160.03	-717.51	3,483.05	3,424.83	58.23	59.819	
7,800.00	7,792.65	15,596.00	11,118.41	28.70	80.63	-116.13	-160.03	-717.51	3,385.04	3,326.43	58.61	57.755	
7,900.00	7,892.65	15,596.00	11,118.41	29.06	80.63	-116.13	-160.03	-717.51	3,287.14	3,228.14	59.01	55.706	
8,000.00	7,992.65	15,596.00	11,118.41	29.41	80.63	-116.13	-160.03	-717.51	3,189.38	3,129.96	59.42	53.671	
8,100.00	8,092.65	15,596.00	11,118.41	29.77	80.63	-116.13	-160.03	-717.51	3,091.76	3,031.90	59.86	51.652	
8,200.00	8,192.65	15,596.00	11,118.41	30.13	80.63	-116.13	-160.03	-717.51	2,994.30	2,933.99	60.31	49.648	
8,300.00	8,292.65	15,596.00	11,118.41	30.48	80.63	-116.13	-160.03	-717.51	2,897.00	2,836.22	60.78	47.660	
8,400.00	8,392.65	15,596.00	11,118.41	30.84	80.63	-116.13	-160.03	-717.51	2,799.90	2,738.62	61.28	45.687	
8,500.00	8,492.65	15,596.00	11,118.41	31.20	80.63	-116.13	-160.03	-717.51	2,703.02	2,641.21	61.81	43.731	
8,600.00	8,592.65	15,596.00	11,118.41	31.55	80.63	-116.13	-160.03	-717.51	2,606.36	2,544.00	62.37	41.791	
8,700.00	8,692.65	15,596.00	11,118.41	31.91	80.63	-116.13	-160.03	-717.51	2,509.97	2,447.01	62.96	39.867	
8,800.00	8,792.65	15,596.00	11,118.41	32.27	80.63	-116.13	-160.03	-717.51	2,413.87	2,350.28	63.59	37.961	
8,900.00	8,892.65	15,596.00	11,118.41	32.63	80.63	-116.13	-160.03	-717.51	2,318.10	2,253.84	64.26	36.072	
9,000.00	8,992.62	15,596.00	11,118.41	32.98	80.63	76.89	-160.03	-717.51	2,222.55	2,157.57	64.99	34.200	
9,100.00	9,091.25	15,596.00	11,118.41	33.46	80.63	109.77	-160.03	-717.51	2,126.76	2,061.01	65.75	32.345	
9,200.00	9,185.65	15,596.00	11,118.41	33.94	80.63	132.38	-160.03	-717.51	2,033.26	1,966.69	66.56	30.547	
9,300.00	9,272.96	15,596.00	11,118.41	34.36	80.63	144.64	-160.03	-717.51	1,945.40	1,877.97	67.43	28.851	
9,400.00	9,350.51	15,596.00	11,118.41	34.70	80.63	151.41	-160.03	-717.51	1,866.85	1,798.48	68.36	27.308	
9,500.00	9,415.97	15,596.00	11,118.41	34.95	80.63	155.33	-160.03	-717.51	1,801.34	1,731.97	69.36	25.970	
9,600.00	9,467.32	15,552.51	11,118.11	35.12	79.93	157.33	-203.52	-716.83	1,751.88	1,681.95	69.94	25.050	
9,700.00	9,503.03	15,463.57	11,117.42	35.22	78.51	158.28	-292.44	-715.88	1,717.74	1,647.76	69.98	24.548	
9,800.00	9,521.99	15,378.71	11,116.93	35.27	77.15	158.73	-377.30	-715.67	1,699.72	1,629.75	69.97	24.292	
9,900.00	9,525.81	15,281.88	11,116.85	35.31	75.61	158.75	-474.13	-715.77	1,696.43	1,626.82	69.61	24.370	
10,000.00	9,527.44	15,188.42	11,116.75	35.39	74.12	158.69	-567.59	-716.36	1,695.35	1,626.24	69.11	24.532	

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)		
10,100.00	9,529.07	15,087.49	11,116.68	35.60	72.52	158.60	-668.52	-717.58	1,694.51	1,625.93	68.58	24.709	
10,200.00	9,530.70	14,996.83	11,116.89	35.96	71.09	158.54	-759.17	-718.39	1,693.85	1,625.67	68.18	24.845	
10,300.00	9,532.32	14,869.60	11,116.79	36.42	69.07	158.46	-886.40	-718.84	1,692.71	1,625.28	67.43	25.102	
10,400.00	9,533.95	14,766.31	11,115.62	36.94	67.44	158.39	-989.68	-719.24	1,690.59	1,623.61	66.98	25.239	
10,500.00	9,535.58	14,665.10	11,114.19	37.52	65.85	158.29	-1,090.87	-720.34	1,688.47	1,621.87	66.60	25.351	
10,600.00	9,537.21	14,555.72	11,111.92	38.15	64.14	158.15	-1,200.21	-722.21	1,685.98	1,619.78	66.20	25.468	
10,700.00	9,538.83	14,458.38	11,109.49	38.82	62.61	158.02	-1,297.51	-723.92	1,683.14	1,617.19	65.95	25.523	
10,800.00	9,540.46	14,364.55	11,108.05	39.53	61.15	157.94	-1,391.33	-724.54	1,680.75	1,615.03	65.72	25.573	
10,900.00	9,542.09	14,265.64	11,106.58	40.29	59.61	157.84	-1,490.22	-725.50	1,678.55	1,613.06	65.49	25.630	
11,000.00	9,543.72	14,176.37	11,105.66	41.08	58.22	157.77	-1,579.48	-725.88	1,676.59	1,611.22	65.36	25.650	
11,100.00	9,545.34	14,093.83	11,105.63	41.90	56.94	157.72	-1,662.02	-726.24	1,675.53	1,610.24	65.29	25.662	
11,143.56	9,546.05	14,058.53	11,105.96	42.28	56.40	157.71	-1,697.32	-726.30	1,675.42	1,610.16	65.26	25.671	
11,200.00	9,546.97	14,029.89	11,106.53	42.76	55.95	157.70	-1,725.95	-726.28	1,675.83	1,610.44	65.39	25.629	
11,300.00	9,548.60	13,986.36	11,108.73	43.65	55.28	157.72	-1,769.42	-726.08	1,679.15	1,613.48	65.67	25.571	
11,400.00	9,550.23	13,792.56	11,119.24	44.57	52.28	157.94	-1,962.81	-720.31	1,682.32	1,617.83	64.49	26.088	
11,500.00	9,551.85	13,649.85	11,119.15	45.51	50.09	157.96	-2,105.48	-717.47	1,680.25	1,616.33	63.93	26.284	
11,600.00	9,553.48	13,516.55	11,115.18	46.48	48.06	157.85	-2,238.71	-717.36	1,676.32	1,612.74	63.58	26.367	
11,700.00	9,555.11	13,432.26	11,112.25	47.47	46.79	157.82	-2,322.93	-715.87	1,671.31	1,607.68	63.63	26.267	
11,800.00	9,556.74	13,358.58	11,111.53	48.49	45.67	157.85	-2,396.60	-713.63	1,668.03	1,604.26	63.77	26.157	
11,900.00	9,558.36	13,271.63	11,111.71	49.53	44.35	157.89	-2,483.49	-711.20	1,665.96	1,602.15	63.82	26.106	
12,000.00	9,559.99	13,162.73	11,112.90	50.58	42.69	158.01	-2,592.27	-706.14	1,664.05	1,600.41	63.64	26.148	
12,100.00	9,561.62	13,065.75	11,112.50	51.66	41.25	158.04	-2,689.21	-703.55	1,661.48	1,597.84	63.64	26.109	
12,200.00	9,563.25	12,986.92	11,112.51	52.75	40.09	158.03	-2,768.04	-702.84	1,659.96	1,596.14	63.82	26.011	
12,275.57	9,564.47	12,926.00	11,112.96	53.59	39.20	158.00	-2,828.95	-703.04	1,659.66	1,595.70	63.96	25.949	
12,300.00	9,564.87	12,909.29	11,113.16	53.86	38.96	157.99	-2,845.66	-703.20	1,659.73	1,595.69	64.04	25.918	
12,400.00	9,566.50	12,838.44	11,114.65	54.98	37.95	157.94	-2,916.49	-704.09	1,660.99	1,596.64	64.35	25.813	
12,500.00	9,568.13	12,696.15	11,117.13	56.12	35.93	157.81	-3,058.72	-707.24	1,662.38	1,598.14	64.24	25.877	
12,600.00	9,569.75	12,562.02	11,116.33	57.27	34.06	157.74	-3,192.84	-707.11	1,660.45	1,596.24	64.21	25.861	
12,700.00	9,571.38	12,476.76	11,116.08	58.44	32.90	157.73	-3,278.09	-705.87	1,658.46	1,593.97	64.49	25.717	
12,800.00	9,573.01	9,535.12	9,532.44	59.62	16.66	82.00	-4,904.40	-599.41	1,618.82	1,563.34	55.48	29.178	
12,900.00	9,574.64	9,539.03	9,536.34	60.80	16.66	82.41	-4,904.50	-599.50	1,524.93	1,468.80	56.13	27.170	
13,000.00	9,576.26	9,542.96	9,540.26	62.00	16.67	82.82	-4,904.60	-599.59	1,431.85	1,374.95	56.90	25.164	
13,100.00	9,577.89	9,546.91	9,544.22	63.21	16.68	83.24	-4,904.70	-599.68	1,339.76	1,281.93	57.84	23.164	
13,200.00	9,579.52	9,550.90	9,548.20	64.43	16.68	83.66	-4,904.81	-599.77	1,248.88	1,189.90	58.97	21.177	
13,300.00	9,581.15	9,554.91	9,552.21	65.66	16.69	84.08	-4,904.91	-599.86	1,159.48	1,099.12	60.36	19.209	
13,400.00	9,582.77	9,558.95	9,556.25	66.89	16.70	84.51	-4,905.01	-599.95	1,071.94	1,009.87	62.06	17.272	
13,500.00	9,584.40	9,563.03	9,560.32	68.14	16.70	84.94	-4,905.12	-600.05	986.75	922.60	64.15	15.382	
13,600.00	9,586.03	9,567.13	9,564.42	69.39	16.71	85.38	-4,905.23	-600.14	904.58	837.88	66.70	13.561	
13,700.00	9,587.66	9,571.26	9,568.55	70.65	16.72	85.82	-4,905.34	-600.23	826.33	756.52	69.81	11.836	
13,800.00	9,589.28	9,575.42	9,572.70	71.91	16.72	86.26	-4,905.45	-600.33	753.23	679.68	73.54	10.242	
13,900.00	9,590.91	9,579.61	9,576.89	73.18	16.73	86.71	-4,905.56	-600.43	686.90	609.01	77.90	8.818	
14,000.00	9,592.54	9,583.83	9,581.11	74.46	16.74	87.16	-4,905.68	-600.52	629.51	546.79	82.73	7.609	
14,100.00	9,594.17	9,588.08	9,585.36	75.74	16.75	87.61	-4,905.79	-600.62	583.70	496.03	87.66	6.658	
14,200.00	9,595.79	9,592.36	9,589.64	77.03	16.75	88.06	-4,905.91	-600.72	552.34	460.32	92.02	6.002	
14,300.00	9,597.42	9,596.68	9,593.95	78.33	16.76	88.52	-4,906.03	-600.82	537.98	442.99	94.99	5.664	
14,328.45	9,597.88	9,597.91	9,595.18	78.70	16.76	88.66	-4,906.06	-600.85	537.22	441.75	95.48	5.627 CC, ES, SF	
14,400.00	9,599.05	9,601.03	9,598.30	79.62	16.77	88.99	-4,906.15	-600.92	541.96	446.02	95.94	5.649	
14,458.44	9,600.00	9,603.60	9,600.87	80.38	16.77	89.26	-4,906.22	-600.98	552.70	457.17	95.53	5.786	

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandrill Quest)
MD Reference: RKB @ 3573.10usft (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 - 3H - 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
0.00	0.00	0.00	0.00	1.00	1.00	89.90	2.00	1,160.00	1,160.01				
100.00	100.00	96.10	96.10	1.03	1.03	89.90	2.00	1,160.00	1,160.00	1,157.97	2.04	569.813	
200.00	200.00	196.10	196.10	1.34	1.32	89.90	2.00	1,160.00	1,160.00	1,157.55	2.45	473.030	
300.00	300.00	296.10	296.10	1.73	1.72	89.90	2.00	1,160.00	1,160.00	1,156.94	3.06	379.478	
400.00	400.00	396.10	396.10	2.11	2.10	89.90	2.00	1,160.00	1,160.00	1,156.30	3.70	313.313	
500.00	500.00	496.10	496.10	2.48	2.47	89.90	2.00	1,160.00	1,160.00	1,155.63	4.37	265.445	
600.00	600.00	596.10	596.10	2.85	2.84	89.90	2.00	1,160.00	1,160.00	1,154.95	5.05	229.651	
700.00	700.00	696.10	696.10	3.22	3.20	89.90	2.00	1,160.00	1,160.00	1,154.26	5.74	202.056	
800.00	800.00	796.10	796.10	3.58	3.57	89.90	2.00	1,160.00	1,160.00	1,153.56	6.44	180.215	
900.00	900.00	896.10	896.10	3.95	3.93	89.90	2.00	1,160.00	1,160.00	1,152.87	7.14	162.540	
1,000.00	1,000.00	996.10	996.10	4.31	4.30	89.90	2.00	1,160.00	1,160.00	1,152.16	7.84	147.965	
1,100.00	1,100.00	1,096.10	1,096.10	4.67	4.66	89.90	2.00	1,160.00	1,160.00	1,151.46	8.55	135.751	
1,200.00	1,200.00	1,196.10	1,196.10	5.03	5.02	89.90	2.00	1,160.00	1,160.00	1,150.75	9.25	125.376	
1,300.00	1,300.00	1,296.10	1,296.10	5.40	5.38	89.90	2.00	1,160.00	1,160.00	1,150.04	9.96	116.458	
1,400.00	1,400.00	1,396.10	1,396.10	5.76	5.74	89.90	2.00	1,160.00	1,160.00	1,149.33	10.67	108.713	
1,500.00	1,500.00	1,496.10	1,496.10	6.12	6.10	89.90	2.00	1,160.00	1,160.00	1,148.62	11.38	101.925	
1,600.00	1,600.00	1,596.10	1,596.10	6.48	6.46	89.90	2.00	1,160.00	1,160.00	1,147.91	12.09	95.930	
1,700.00	1,700.00	1,696.10	1,696.10	6.84	6.82	89.90	2.00	1,160.00	1,160.00	1,147.20	12.80	90.596	
1,800.00	1,800.00	1,796.10	1,796.10	7.20	7.18	89.90	2.00	1,160.00	1,160.00	1,146.49	13.52	85.820	
1,900.00	1,900.00	1,896.10	1,896.10	7.56	7.54	89.90	2.00	1,160.00	1,160.00	1,145.77	14.23	81.521	
2,000.00	2,000.00	1,996.10	1,996.10	7.92	7.90	89.90	2.00	1,160.00	1,160.00	1,145.06	14.94	77.629	
2,100.00	2,100.00	2,096.10	2,096.10	8.28	8.26	89.90	2.00	1,160.00	1,160.00	1,144.35	15.66	74.091	
2,200.00	2,200.00	2,196.10	2,196.10	8.64	8.62	89.90	2.00	1,160.00	1,160.00	1,143.63	16.37	70.860	
2,300.00	2,300.00	2,296.10	2,296.10	9.00	8.98	89.90	2.00	1,160.00	1,160.00	1,142.92	17.08	67.898	
2,400.00	2,400.00	2,396.10	2,396.10	9.36	9.34	89.90	2.00	1,160.00	1,160.00	1,142.20	17.80	65.172	
2,500.00	2,500.00	2,496.10	2,496.10	9.72	9.70	89.90	2.00	1,160.00	1,160.00	1,141.49	18.51	62.657	
2,600.00	2,599.98	2,656.23	2,656.15	10.08	10.22	127.19	3.31	1,155.95	1,158.56	1,139.06	19.50	59.409	
2,700.00	2,699.84	2,818.37	2,817.72	10.47	10.81	127.40	7.43	1,143.18	1,153.85	1,133.19	20.66	55.857	
2,800.00	2,799.49	2,911.20	2,910.04	10.81	11.11	127.60	10.40	1,134.00	1,148.95	1,127.61	21.33	53.858	
2,900.00	2,899.11	3,011.02	3,009.32	11.15	11.43	127.79	13.61	1,124.07	1,144.28	1,122.29	21.99	52.027	
3,000.00	2,998.73	3,110.84	3,108.59	11.50	11.75	127.98	16.81	1,114.13	1,139.63	1,116.97	22.66	50.293	
3,100.00	3,098.35	3,210.66	3,207.86	11.86	12.08	128.17	20.02	1,104.20	1,134.99	1,111.66	23.33	48.649	
3,200.00	3,197.97	3,310.48	3,307.14	12.22	12.41	128.36	23.23	1,094.27	1,130.37	1,106.36	24.00	47.090	
3,300.00	3,297.59	3,410.30	3,406.41	12.57	12.74	128.55	26.44	1,084.33	1,125.76	1,101.07	24.68	45.610	
3,400.00	3,397.21	3,510.13	3,505.68	12.93	13.07	128.75	29.65	1,074.40	1,121.16	1,095.79	25.36	44.203	
3,500.00	3,496.83	3,609.95	3,604.96	13.29	13.42	128.94	32.85	1,064.47	1,116.57	1,090.52	26.05	42.866	
3,600.00	3,596.45	3,709.77	3,704.23	13.66	13.79	129.14	36.06	1,054.53	1,112.00	1,085.26	26.73	41.594	
3,700.00	3,696.07	3,809.59	3,803.50	14.02	14.15	129.34	39.27	1,044.60	1,107.44	1,080.01	27.42	40.382	
3,800.00	3,795.69	3,909.41	3,902.78	14.38	14.52	129.54	42.48	1,034.67	1,102.89	1,074.77	28.12	39.227	
3,900.00	3,895.31	4,009.23	4,002.05	14.74	14.89	129.75	45.69	1,024.73	1,098.36	1,069.55	28.81	38.124	
4,000.00	3,994.93	4,109.05	4,101.33	15.11	15.26	129.95	48.89	1,014.80	1,093.84	1,064.33	29.51	37.072	
4,100.00	4,094.55	4,208.87	4,200.60	15.47	15.64	130.16	52.10	1,004.87	1,089.33	1,059.13	30.20	36.066	
4,200.00	4,194.17	4,308.69	4,299.87	15.84	16.01	130.37	55.31	994.93	1,084.84	1,053.94	30.90	35.104	
4,300.00	4,293.79	4,408.51	4,399.15	16.20	16.38	130.58	58.52	985.00	1,080.37	1,048.76	31.60	34.183	
4,400.00	4,393.41	4,508.33	4,498.42	16.57	16.75	130.79	61.73	975.07	1,075.90	1,043.60	32.31	33.302	
4,500.00	4,493.03	4,608.16	4,597.69	16.93	17.13	131.00	64.94	965.13	1,071.46	1,038.45	33.01	32.457	
4,600.00	4,592.75	4,707.97	4,696.96	17.29	17.50	131.10	68.14	955.20	1,066.21	1,032.49	33.72	31.618	
4,700.00	4,692.66	4,807.68	4,796.12	17.71	17.87	131.01	71.35	945.28	1,058.70	1,024.24	34.45	30.729	
4,800.00	4,792.65	4,907.19	4,895.09	18.08	18.25	93.59	74.55	935.38	1,049.04	1,013.89	35.15	29.842	
4,900.00	4,892.65	5,006.64	4,993.99	18.42	18.62	93.44	77.74	925.48	1,038.91	1,003.06	35.86	28.975	
5,000.00	4,992.65	5,106.09	5,092.90	18.77	18.99	93.30	80.94	915.58	1,028.78	992.22	36.56	28.137	
5,100.00	5,092.65	5,205.54	5,191.81	19.12	19.37	93.15	84.13	905.69	1,018.66	981.39	37.27	27.331	

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: 5H
Well Error: 1.00 usft
Reference Wellbore OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandrill Quest)
MD Reference: RKB @ 3573.10usft (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 - 3H - 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
5,200.00	5,192.65	5,304.99	5,290.71	19.48	19.74	93.00	87.33	895.79	1,008.55	970.57	37.98	26.555	
5,300.00	5,292.65	5,404.45	5,389.62	19.83	20.11	92.85	90.53	885.89	998.45	959.76	38.69	25.807	
5,400.00	5,392.65	5,503.90	5,488.52	20.18	20.49	92.69	93.72	876.00	988.35	948.95	39.40	25.085	
5,500.00	5,492.65	5,603.35	5,587.43	20.53	20.86	92.53	96.92	866.10	978.26	938.15	40.11	24.389	
5,600.00	5,592.65	5,702.80	5,686.34	20.89	21.24	92.36	100.12	856.20	968.17	927.35	40.82	23.718	
5,700.00	5,692.65	5,802.25	5,785.24	21.24	21.61	92.20	103.31	846.31	958.10	916.57	41.53	23.069	
5,800.00	5,792.65	5,901.70	5,884.15	21.59	21.99	92.02	106.51	836.41	948.03	905.79	42.24	22.442	
5,900.00	5,892.65	6,001.16	5,983.06	21.95	22.36	91.85	109.70	826.51	937.97	895.02	42.96	21.836	
6,000.00	5,992.65	6,100.61	6,081.96	22.30	22.74	91.67	112.90	816.62	927.92	884.25	43.67	21.249	
6,100.00	6,092.65	6,200.06	6,180.87	22.65	23.12	91.49	116.10	806.72	917.88	873.50	44.38	20.681	
6,200.00	6,192.65	6,299.51	6,279.78	23.01	23.49	91.30	119.29	796.82	907.85	862.76	45.10	20.132	
6,300.00	6,292.65	6,398.96	6,378.68	23.36	23.87	91.11	122.49	786.93	897.83	852.02	45.81	19.599	
6,400.00	6,392.65	6,498.41	6,477.59	23.72	24.25	90.92	125.69	777.03	887.82	841.29	46.52	19.083	
6,500.00	6,492.65	6,597.87	6,576.50	24.07	24.62	90.72	128.88	767.13	877.82	830.58	47.24	18.582	
6,600.00	6,592.65	6,697.32	6,675.40	24.43	25.00	90.51	132.08	757.24	867.83	819.87	47.95	18.097	
6,700.00	6,692.65	6,796.77	6,774.31	24.78	25.38	90.31	135.27	747.34	857.85	809.18	48.67	17.626	
6,800.00	6,792.65	6,892.33	6,859.44	25.14	25.69	90.13	137.89	739.23	848.40	799.03	49.37	17.184	
6,900.00	6,892.65	6,960.19	6,937.09	25.49	25.99	90.01	139.66	733.75	841.36	791.28	50.07	16.802	
7,000.00	6,992.65	7,038.31	7,015.12	25.85	26.29	89.93	140.79	730.27	836.91	786.14	50.77	16.485	
7,100.00	7,092.65	7,116.57	7,093.37	26.21	26.59	89.90	141.25	728.82	835.06	783.63	51.43	16.238	
7,142.33	7,134.98	7,154.29	7,131.08	26.36	26.72	89.90	141.27	728.78	835.00	783.30	51.70	16.151	
7,200.00	7,192.65	7,211.96	7,188.75	26.56	26.91	89.90	141.27	728.78	835.00	782.90	52.11	16.025	
7,300.00	7,292.65	7,311.96	7,288.75	26.92	27.25	89.90	141.27	728.78	835.00	782.19	52.81	15.812	
7,400.00	7,392.65	7,411.96	7,388.75	27.27	27.59	89.90	141.27	728.78	835.00	781.49	53.52	15.603	
7,500.00	7,492.65	7,511.96	7,488.75	27.63	27.93	89.90	141.27	728.78	835.00	780.78	54.22	15.399	
7,600.00	7,592.65	7,611.96	7,588.75	27.99	28.27	89.90	141.27	728.78	835.00	780.07	54.93	15.201	
7,700.00	7,692.65	7,711.96	7,688.75	28.34	28.61	89.90	141.27	728.78	835.00	779.36	55.64	15.008	
7,800.00	7,792.65	7,811.96	7,788.75	28.70	28.95	89.90	141.27	728.78	835.00	778.66	56.34	14.820	
7,900.00	7,892.65	7,911.96	7,888.75	29.06	29.29	89.90	141.27	728.78	835.00	777.95	57.05	14.636	
8,000.00	7,992.65	8,011.96	7,988.75	29.41	29.64	89.90	141.27	728.78	835.00	777.24	57.76	14.456	
8,100.00	8,092.65	8,111.96	8,088.75	29.77	29.98	89.90	141.27	728.78	835.00	776.53	58.47	14.281	
8,200.00	8,192.65	8,211.96	8,188.75	30.13	30.32	89.90	141.27	728.78	835.00	775.82	59.18	14.110	
8,300.00	8,292.65	8,311.96	8,288.75	30.48	30.67	89.90	141.27	728.78	835.00	775.12	59.89	13.943	
8,400.00	8,392.65	8,411.96	8,388.75	30.84	31.01	89.90	141.27	728.78	835.00	774.41	60.59	13.780	
8,500.00	8,492.65	8,511.96	8,488.75	31.20	31.36	89.90	141.27	728.78	835.00	773.70	61.30	13.621	
8,600.00	8,592.65	8,611.96	8,588.75	31.55	31.70	89.90	141.27	728.78	835.00	772.99	62.01	13.465	
8,700.00	8,692.65	8,711.96	8,688.75	31.91	32.05	89.90	141.27	728.78	835.00	772.28	62.72	13.313	
8,800.00	8,792.65	8,811.96	8,788.75	32.27	32.39	89.90	141.27	728.78	835.00	771.57	63.43	13.164	
8,900.00	8,892.65	8,911.96	8,888.75	32.63	32.74	89.90	141.27	728.78	835.00	770.86	64.14	13.018 CC	
9,000.00	8,992.62	9,011.25	8,987.93	32.98	33.12	-89.49	138.03	728.81	835.02	770.20	64.82	12.883	
9,100.00	9,091.25	9,109.62	9,084.37	33.46	33.66	-89.26	119.27	728.96	835.05	769.64	65.41	12.767	
9,200.00	9,185.65	9,207.45	9,175.70	33.94	34.14	-89.04	84.54	729.26	835.10	769.14	65.96	12.661	
9,300.00	9,272.96	9,304.81	9,259.42	34.36	34.55	-88.86	35.07	729.67	835.15	768.68	66.47	12.564	
9,400.00	9,350.51	9,401.78	9,333.29	34.70	34.88	-88.71	-27.57	730.20	835.19	768.24	66.96	12.474	
9,500.00	9,415.97	9,498.45	9,395.38	34.95	35.12	-88.60	-101.51	730.82	835.23	767.80	67.43	12.387	
9,600.00	9,467.32	9,594.91	9,444.08	35.12	35.29	-88.53	-184.64	731.52	835.26	767.35	67.90	12.301	
9,700.00	9,503.03	9,691.27	9,478.14	35.22	35.40	-88.50	-274.65	732.28	835.27	766.87	68.39	12.213	
9,800.00	9,521.99	9,787.61	9,496.65	35.27	35.48	-88.52	-369.08	733.07	835.28	766.36	68.90	12.122	
9,900.00	9,525.81	9,885.61	9,500.73	35.31	35.58	-88.55	-466.95	733.90	835.25	765.81	69.44	12.028	
10,000.00	9,527.44	9,985.61	9,502.36	35.39	35.75	-88.55	-566.93	734.74	835.25	765.16	70.09	11.916	
10,100.00	9,529.07	10,085.61	9,503.98	35.60	36.01	-88.55	-666.91	735.58	835.25	764.39	70.86	11.788	
10,200.00	9,530.70	10,185.61	9,505.61	35.96	36.36	-88.55	-766.90	736.42	835.25	763.52	71.73	11.644	

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: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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 - 3H - 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)					
10,300.00	9,532.32	10,285.61	9,507.24	36.42	36.79	-88.55	-866.88	737.26	835.25	762.54	72.71	11.488	
10,400.00	9,533.95	10,385.61	9,508.86	36.94	37.29	-88.55	-966.86	738.10	835.25	761.47	73.78	11.320	
10,500.00	9,535.58	10,485.61	9,510.49	37.52	37.85	-88.55	-1,066.85	738.95	835.25	760.30	74.95	11.144	
10,600.00	9,537.21	10,585.61	9,512.12	38.15	38.47	-88.55	-1,166.83	739.79	835.25	759.04	76.21	10.959	
10,700.00	9,538.83	10,685.61	9,513.75	38.82	39.12	-88.55	-1,266.81	740.63	835.25	757.69	77.56	10.769	
10,800.00	9,540.46	10,785.61	9,515.37	39.53	39.83	-88.55	-1,366.80	741.47	835.25	756.26	78.99	10.574	
10,900.00	9,542.09	10,885.61	9,517.00	40.29	40.57	-88.55	-1,466.78	742.31	835.25	754.75	80.50	10.376	
11,000.00	9,543.72	10,985.61	9,518.63	41.08	41.35	-88.55	-1,566.76	743.15	835.25	753.17	82.08	10.176	
11,100.00	9,545.34	11,085.61	9,520.26	41.90	42.17	-88.55	-1,666.75	743.99	835.25	751.52	83.73	9.976	
11,200.00	9,546.97	11,185.61	9,521.88	42.76	43.02	-88.55	-1,766.73	744.84	835.25	749.81	85.44	9.776	
11,300.00	9,548.60	11,285.61	9,523.51	43.65	43.90	-88.55	-1,866.71	745.68	835.25	748.03	87.22	9.577	
11,400.00	9,550.23	11,385.61	9,525.14	44.57	44.81	-88.55	-1,966.70	746.52	835.25	746.20	89.05	9.380	
11,500.00	9,551.85	11,485.61	9,526.77	45.51	45.75	-88.55	-2,066.68	747.36	835.25	744.31	90.94	9.185	
11,600.00	9,553.48	11,585.61	9,528.39	46.48	46.71	-88.55	-2,166.66	748.20	835.25	742.38	92.87	8.993	
11,700.00	9,555.11	11,685.61	9,530.02	47.47	47.70	-88.55	-2,266.65	749.04	835.25	740.39	94.86	8.805	
11,800.00	9,556.74	11,785.61	9,531.65	48.49	48.71	-88.55	-2,366.63	749.88	835.25	738.36	96.89	8.621	
11,900.00	9,558.36	11,885.61	9,533.28	49.53	49.74	-88.55	-2,466.61	750.73	835.25	736.29	98.96	8.440	
12,000.00	9,559.99	11,985.61	9,534.90	50.58	50.79	-88.55	-2,566.59	751.57	835.25	734.18	101.07	8.264	
12,100.00	9,561.62	12,085.61	9,536.53	51.66	51.86	-88.55	-2,666.58	752.41	835.25	732.03	103.22	8.092	
12,200.00	9,563.25	12,185.61	9,538.16	52.75	52.95	-88.55	-2,766.56	753.25	835.25	729.84	105.41	7.924	
12,300.00	9,564.87	12,285.61	9,539.79	53.86	54.05	-88.55	-2,866.54	754.09	835.25	727.63	107.62	7.761	
12,400.00	9,566.50	12,385.61	9,541.41	54.98	55.17	-88.55	-2,966.53	754.93	835.25	725.38	109.87	7.602	
12,500.00	9,568.13	12,485.61	9,543.04	56.12	56.31	-88.55	-3,066.51	755.77	835.25	723.10	112.15	7.448	
12,600.00	9,569.75	12,585.61	9,544.67	57.27	57.46	-88.55	-3,166.49	756.62	835.25	720.80	114.45	7.298	
12,700.00	9,571.38	12,685.61	9,546.29	58.44	58.62	-88.55	-3,266.48	757.46	835.25	718.47	116.78	7.152	
12,800.00	9,573.01	12,785.61	9,547.92	59.62	59.79	-88.55	-3,366.46	758.30	835.25	716.12	119.13	7.011	
12,900.00	9,574.64	12,885.61	9,549.55	60.80	60.97	-88.55	-3,466.44	759.14	835.25	713.74	121.51	6.874	
13,000.00	9,576.26	12,985.61	9,551.18	62.00	62.17	-88.55	-3,566.43	759.98	835.25	711.35	123.90	6.741	
13,100.00	9,577.89	13,085.61	9,552.80	63.21	63.37	-88.55	-3,666.41	760.82	835.25	708.93	126.32	6.612	
13,200.00	9,579.52	13,185.61	9,554.43	64.43	64.59	-88.55	-3,766.39	761.66	835.25	706.50	128.75	6.487	
13,300.00	9,581.15	13,285.61	9,556.06	65.66	65.81	-88.55	-3,866.38	762.51	835.25	704.04	131.21	6.366	
13,400.00	9,582.77	13,385.61	9,557.69	66.89	67.04	-88.55	-3,966.36	763.35	835.25	701.57	133.68	6.248	
13,500.00	9,584.40	13,485.61	9,559.31	68.14	68.28	-88.55	-4,066.34	764.19	835.25	699.09	136.16	6.134	
13,600.00	9,586.03	13,585.61	9,560.94	69.39	69.53	-88.55	-4,166.33	765.03	835.25	696.59	138.66	6.024	
13,700.00	9,587.66	13,685.61	9,562.57	70.65	70.79	-88.55	-4,266.31	765.87	835.25	694.07	141.18	5.916	
13,800.00	9,589.28	13,785.61	9,564.20	71.91	72.05	-88.55	-4,366.29	766.71	835.25	691.54	143.71	5.812	
13,900.00	9,590.91	13,885.61	9,565.82	73.18	73.32	-88.55	-4,466.28	767.56	835.25	689.00	146.25	5.711	
14,000.00	9,592.54	13,985.61	9,567.45	74.46	74.59	-88.55	-4,566.26	768.40	835.25	686.44	148.80	5.613	
14,100.00	9,594.17	14,085.61	9,569.08	75.74	75.87	-88.55	-4,666.24	769.24	835.25	683.88	151.37	5.518	
14,200.00	9,595.79	14,185.61	9,570.71	77.03	77.16	-88.55	-4,766.23	770.08	835.25	681.30	153.95	5.426	
14,300.00	9,597.42	14,285.61	9,572.33	78.33	78.45	-88.55	-4,866.21	770.92	835.25	678.71	156.54	5.336	
14,400.00	9,599.05	14,385.61	9,573.96	79.62	79.75	-88.55	-4,966.19	771.76	835.25	676.12	159.13	5.249	
14,458.44	9,600.00	14,444.05	9,574.91	80.38	80.51	-88.55	-5,024.62	772.25	835.25	674.60	160.65	5.199 ES, SF	

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



Anticollision Report

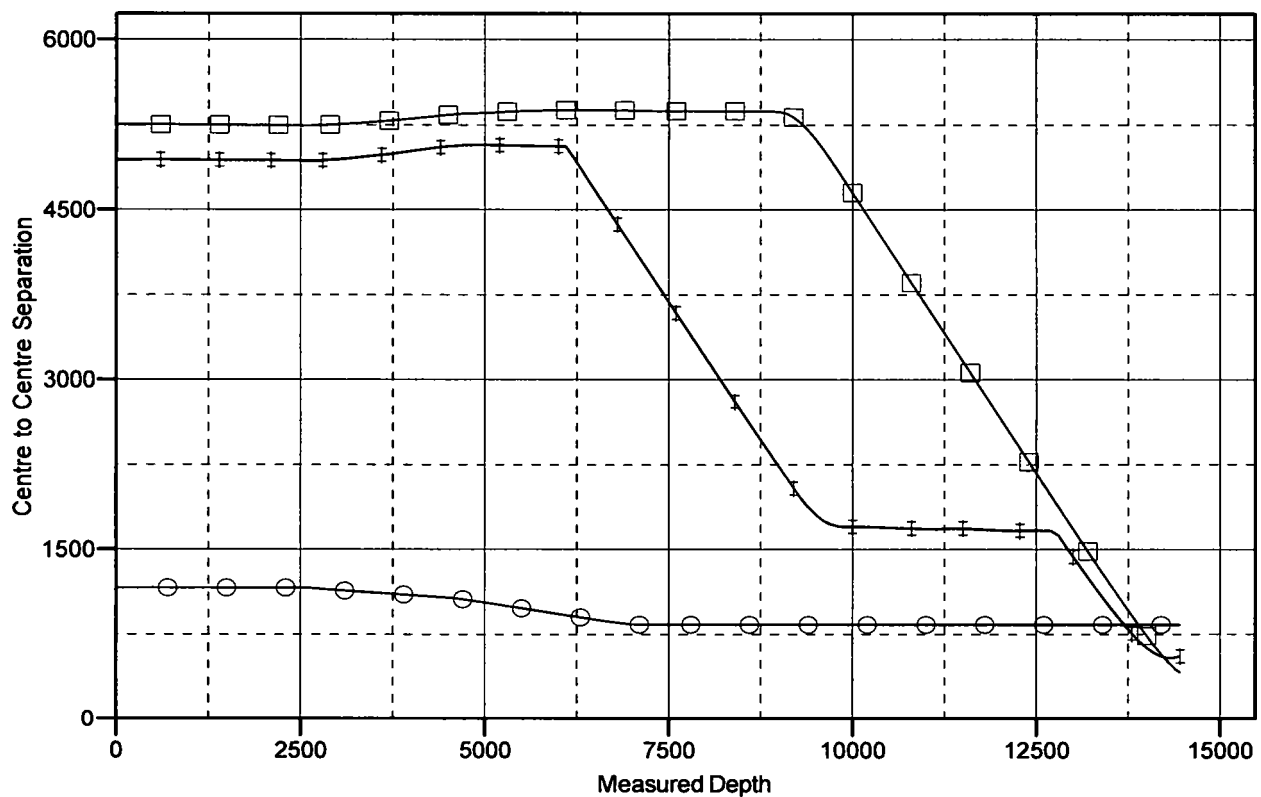


Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
Reference Well: 5H
Well Error: 1.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 09-03-19

Local Co-ordinate Reference: Well 5H
TVD Reference: RKB @ 3573.10usft (Scandril Quest)
MD Reference: RKB @ 3573.10usft (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 @ 3573.10usft (Scandril Quest) Coordinates are relative to: 5H
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 3H, OH, Plan 1 09-03-19 V0 1H, ST01, Surveys V0

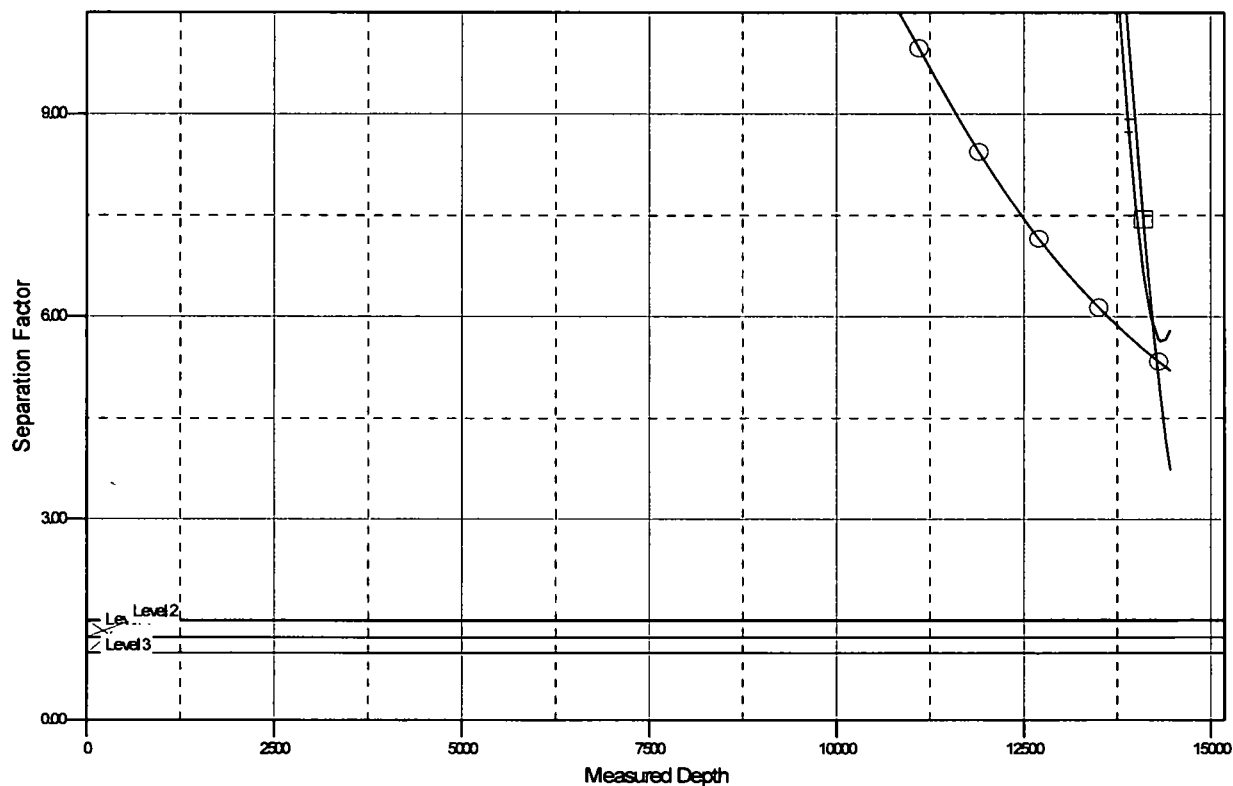
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Sopapilla State
Site Error: 0.00 usft
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Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
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Reference Depths are relative to RKB @ 3573.10usft (Scandril Quest) Coordinates are relative to: 5H
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.000000 W
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.42°

Separation Factor Plot



LEGEND

1H, OH/Job 1311084, Surveys (Ensign 153) V0 3H, OH, Plan 1 09-03-19 V0 1H, ST01, Surveys V0