

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Carlsbad Field Office

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

OCD Hobbs

SUNDRY NOTICES AND REPORTS ON WELLS
*Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.*5. Lease Serial No.
NMNM120907

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

SUBMIT IN TRIPLICATE - Other instructions on page 2 MAY 08 2018

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other2. Name of Operator
COG OPERATING LLCContact: MAYTE REYES
E-Mail: mreyes1@concho.com8. Well Name and No.
EIDER FEDERAL 202H9. API Well No.
30-025-44627-00-X13a. Address
ONE CONCHO CENTER 600 W ILLINOIS AVENUE
MIDLAND, TX 79701-42873b. Phone No. (include area code)
Ph: 575-748-694510. Field and Pool or Exploratory Area
WC025G08S253235G-LWR BONE SPF

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

Sec 35 T24S R32E SWSW 210FSL 1080FWL
32.167393 N Lat, 103.650496 W Lon

11. County or Parish, State

LEA COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Change to Original A
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	PD

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

COG Production LLC, respectfully requests approval for the following SHL, BHL and name change to the original approved APD.

NAME CHANGE

From: Eider Federal 15H

To: Eider Federal 202H

SHL

From: 210' FSL & 1020' FWL SWSW Section 35, T24S, R32E

To: 210' FSL & 1080' FWL SWSW Section 35, T24S, R32E

BHL

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #410763 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Hobbs
Committed to AFMSS for processing by DEBORAH HAM on 04/18/2018 (18DMH0062SE)

Name (Printed/Typed) MAYTE REYES

Title SENIOR REGULATORY ANALYST

Signature (Electronic Submission)

Date 04/09/2018

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By CODY LAYTON

Title ASSISTANT FIELD MANAGER

Date 04/18/2018

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office Hobbs

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED **

Additional data for EC transaction #410763 that would not fit on the form

32. Additional remarks, continued

From: 2410' FSL & 1320' FWL NWSW Section 26, T24S, R32E

To: 2410' FWL & 1315' FWL NWSW Section 26, T24S, R32E

There are no changes to the drilling program other than the names of course.

Attached:

Directional plan

Anti-collision report

C102

DISTRICT I
1625 N. FRENCH DR., BOBBS, NM 88240
Phone: (575) 383-8181 Fax: (575) 383-8780

DISTRICT II
811 S. FIRST ST., ARTESIA, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 RIO BRAZOS RD., AZTEC, NM 87410
Phone: (505) 336-8178 Fax: (505) 336-8170

DISTRICT IV
1220 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 478-3400 Fax: (505) 478-3482

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-025-44627	Pool Code 97964	Pool Name WC-025 G-07 S243225S; Lower Bone Spring
Property Code	Property Name EIDER FEDERAL	Well Number 202H
OGRID No. 217955	Operator Name COG PRODUCTION, LLC	Elevation 3522.3'

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	35	24-S	32-E		210	SOUTH	1080	WEST	LEA

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
L	26	24-S	32-E		2310 2410	SOUTH	1315	WEST	LEA

Dedicated Acres 240	Joint or Infill	Consolidation Code	Order No.
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

*NO LEASE X-ING Y=433001.1 N X=751497.8 E Y=433014.4 N X=752820.0 E Y=432792.7 N X=752813.9 E LAT.=32.187977° N LONG.=103.649734° W Y=425082.4 N X=751546.9 E Y=425090.4 N X=752861.9 E 1315' 2310' FSL & 1315' FWL LAT.=32.187702° N LONG.=103.649734° W 330' FSL & 1315' FWL LAT.=32.167725° N LONG.=103.649737° W GRID AZ. TO FTP 62'26'18" PROJECT AREA PRODUCING AREA NMNM120907 SECTION 26 SECTION 35 GRID AZ. - 359°38'32" HORZ. DIST. - 7367.8' 1080' S.L. 210'	NAD 83 NME <u>PROPOSED BOTTOM HOLE LOCATION</u> Y=432792.7 N X=752813.9 E LAT.=32.187977° N LONG.=103.649734° W NAD 83 NME <u>SURFACE LOCATION</u> Y=425302.8 N X=752625.6 E LAT.=32.167393° N LONG.=103.650496° W	OPERATOR CERTIFICATION I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unless mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. <i>Mayte Reyes</i> 4-8-18 Signature Date Mayte Reyes Printed Name mreyes1@concho.com E-mail Address SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. AUGUST 25, 2017 Date of Survey Signature & Seal of Professional Surveyor CHAD L. HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR <i>Chad Harcrow</i> 9/25/17 Certificate No. CHAD HARCROW 17777 W.O. # 17-1197 DRAWN BY: AI
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PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)
Eider Federal
202H

OH
Plan 1 04-06-18

Anticollision Report

06 April, 2018



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Reference Plan 1 04-06-18

Filter type: GLOBAL FILTER APPLIED: All wellpaths within 200'+ 100/1000 of refere
Interpolation Method: MD Interval 100.00usft
Depth Range: Unlimited
Results Limited by: Maximum center-center distance of 1,884.27 us
Warning Levels Evaluated at: 2.00 Sigma

Error Model: ISCWSA
Scan Method: Closest Approach 3D
Error Surface: Major Axis
Casing Method: Not applied

Survey Tool Program Date 4/6/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	16,842.66	Plan 1 04-06-18 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

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						
Eider Federal						
101H - OH - Plan 1 10-11-17	2,500.00	2,499.40	66.95	54.98	5.594	CC, ES
101H - OH - Plan 1 10-11-17	2,600.00	2,599.38	68.68	56.24	5.519	SF
102H - OH - Plan 1 10-11-17	2,500.00	2,500.00	30.00	18.03	2.507	CC, ES
102H - OH - Plan 1 10-11-17	16,842.72	16,479.71	350.04	178.50	2.041	SF
201H - OH - Plan 1 10-11-17	2,500.00	2,499.40	42.36	30.39	3.539	CC, ES, SF
301H - OH - Plan 1 04-06-18	2,500.00	2,499.00	59.90	42.43	3.428	CC, ES, SF
302H - OH - Plan 1 10-11-17	2,500.00	2,499.10	30.00	18.03	2.507	CC, ES
302H - OH - Plan 1 10-11-17	16,842.72	17,030.36	359.61	185.51	2.066	SF

Offset Design Eider Federal - 101H - OH - Plan 1 10-11-17

Survey Program: 0-Scientific Gyro, 8768-MWD+HFR1+MS

Offset Site Error: 0.00 usft

Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Tooface (")	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	0.00	0.60	0.00	0.00	-63.86		29.50	-60.10	66.95				
100.00	100.00	99.40	100.00	0.14	0.07	-63.86		29.50	-60.10	66.95	66.75	0.20	328.520	
200.00	200.00	199.40	200.00	0.49	0.20	-63.86		29.50	-60.10	66.95	66.26	0.69	96.861	
300.00	300.00	299.40	300.00	0.85	0.33	-63.86		29.50	-60.10	66.95	65.77	1.18	56.690	
400.00	400.00	399.40	400.00	1.21	0.46	-63.86		29.50	-60.10	66.95	65.28	1.67	40.064	
500.00	500.00	499.40	500.00	1.57	0.59	-63.86		29.50	-60.10	66.95	64.79	2.16	30.977	
600.00	600.00	599.40	600.00	1.93	0.72	-63.86		29.50	-60.10	66.95	64.30	2.65	25.250	
700.00	700.00	699.40	700.00	2.29	0.85	-63.86		29.50	-60.10	66.95	63.81	3.14	21.310	
800.00	800.00	799.40	800.00	2.65	0.99	-63.86		29.50	-60.10	66.95	63.32	3.63	18.433	
900.00	900.00	899.40	900.00	3.00	1.12	-63.86		29.50	-60.10	66.95	62.83	4.12	16.241	
1,000.00	1,000.00	999.40	1,000.00	3.36	1.25	-63.86		29.50	-60.10	66.95	62.34	4.61	14.515	
1,100.00	1,100.00	1,099.40	1,100.00	3.72	1.38	-63.86		29.50	-60.10	66.95	61.85	5.10	13.120	
1,200.00	1,200.00	1,199.40	1,200.00	4.08	1.51	-63.86		29.50	-60.10	66.95	61.36	5.59	11.970	
1,300.00	1,300.00	1,299.40	1,300.00	4.44	1.65	-63.86		29.50	-60.10	66.95	60.87	6.08	11.005	
1,400.00	1,400.00	1,399.40	1,400.00	4.80	1.78	-63.86		29.50	-60.10	66.95	60.38	6.57	10.184	
1,500.00	1,500.00	1,499.40	1,500.00	5.15	1.91	-63.86		29.50	-60.10	66.95	59.89	7.06	9.477	
1,600.00	1,600.00	1,599.40	1,600.00	5.51	2.04	-63.86		29.50	-60.10	66.95	59.40	7.55	8.862	
1,700.00	1,700.00	1,699.40	1,700.00	5.87	2.17	-63.86		29.50	-60.10	66.95	58.90	8.04	8.322	
1,800.00	1,800.00	1,799.40	1,800.00	6.23	2.30	-63.86		29.50	-60.10	66.95	58.41	8.53	7.844	
1,900.00	1,900.00	1,899.40	1,900.00	6.59	2.44	-63.86		29.50	-60.10	66.95	57.92	9.03	7.418	

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

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 101H - OH - Plan 1 10-11-17													Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro. 8768-MWD+IFR1+MS													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		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	Warning
2,000.00	2,000.00	1,999.40	2,000.00	6.95	2.57	-63.86	29.50	-60.10	66.95	57.43	9.52	7.036	
2,100.00	2,100.00	2,099.40	2,100.00	7.31	2.70	-63.86	29.50	-60.10	66.95	56.94	10.01	6.691	
2,200.00	2,200.00	2,199.40	2,200.00	7.66	2.83	-63.86	29.50	-60.10	66.95	56.45	10.50	6.378	
2,300.00	2,300.00	2,299.40	2,300.00	8.02	2.96	-63.86	29.50	-60.10	66.95	55.96	10.99	6.094	
2,400.00	2,400.00	2,399.40	2,400.00	8.38	3.10	-63.86	29.50	-60.10	66.95	55.47	11.48	5.833	
2,500.00	2,500.00	2,499.40	2,500.00	8.74	3.23	-63.86	29.50	-60.10	66.95	54.98	11.97	5.594 CC, ES	
2,600.00	2,599.98	2,599.38	2,599.98	9.08	3.36	172.47	29.50	-60.10	68.68	56.24	12.44	5.519 SF	
2,700.00	2,699.84	2,699.24	2,699.84	9.42	3.49	172.99	29.50	-60.10	73.87	60.96	12.91	5.723	
2,800.00	2,799.49	2,798.89	2,799.49	9.75	3.62	173.69	29.50	-60.10	82.10	68.72	13.38	6.138	
2,900.00	2,899.11	2,898.51	2,899.11	10.09	3.75	174.29	29.50	-60.10	90.76	76.92	13.85	6.556	
3,000.00	2,998.73	2,998.13	2,998.73	10.43	3.89	174.79	29.50	-60.10	99.44	85.12	14.32	6.945	
3,100.00	3,098.35	3,097.75	3,098.35	10.78	4.02	175.21	29.50	-60.10	108.12	93.33	14.79	7.309	
3,200.00	3,197.97	3,197.37	3,197.97	11.12	4.15	175.57	29.50	-60.10	116.81	101.54	15.27	7.649	
3,300.00	3,297.59	3,296.99	3,297.59	11.47	4.28	175.87	29.50	-60.10	125.50	109.75	15.75	7.968	
3,400.00	3,397.21	3,396.61	3,397.21	11.82	4.41	176.14	29.50	-60.10	134.20	117.96	16.23	8.267	
3,500.00	3,496.83	3,496.23	3,496.83	12.17	4.54	176.38	29.50	-60.10	142.89	126.18	16.72	8.549	
3,600.00	3,596.45	3,595.85	3,596.45	12.53	4.67	176.59	29.50	-60.10	151.59	134.39	17.20	8.814	
3,700.00	3,696.07	3,695.47	3,696.07	12.88	4.80	176.77	29.50	-60.10	160.29	142.61	17.69	9.063	
3,800.00	3,795.69	3,795.09	3,795.69	13.24	4.94	176.94	29.50	-60.10	169.00	150.82	18.17	9.299	
3,900.00	3,895.31	3,894.71	3,895.31	13.60	5.07	177.09	29.50	-60.10	177.70	159.04	18.66	9.522	
4,000.00	3,994.93	3,994.33	3,994.93	13.95	5.20	177.22	29.50	-60.10	186.40	167.25	19.15	9.733	
4,100.00	4,094.55	4,093.95	4,094.55	14.31	5.33	177.35	29.50	-60.10	195.11	175.47	19.64	9.933	
4,200.00	4,194.17	4,193.57	4,194.17	14.67	5.46	177.46	29.50	-60.10	203.82	183.68	20.14	10.122	
4,300.00	4,293.78	4,293.18	4,293.78	15.04	5.59	177.57	29.50	-60.10	212.52	191.90	20.63	10.303	
4,400.00	4,393.40	4,392.80	4,393.40	15.40	5.72	177.66	29.50	-60.10	221.23	200.11	21.12	10.474	
4,500.00	4,493.02	4,492.42	4,493.02	15.76	5.86	177.75	29.50	-60.10	229.94	208.33	21.62	10.637	
4,600.00	4,592.64	4,592.04	4,592.64	16.12	5.99	177.83	29.50	-60.10	238.65	216.54	22.11	10.793	
4,700.00	4,692.26	4,691.66	4,692.26	16.49	6.07	177.75	29.50	-61.37	248.52	225.96	22.56	11.017	
4,800.00	4,791.88	4,791.28	4,791.88	16.85	6.11	177.33	29.50	-65.60	261.13	238.16	22.97	11.370	
4,900.00	4,891.50	4,890.90	4,891.50	17.22	6.15	176.63	29.50	-72.72	276.47	253.10	23.37	11.830	
5,000.00	4,991.12	4,990.52	4,991.12	17.59	6.19	175.74	29.50	-82.55	294.00	270.22	23.78	12.364	
5,100.00	5,090.74	5,090.14	5,090.74	17.95	6.24	174.91	29.50	-92.83	311.75	287.56	24.19	12.887	
5,200.00	5,190.36	5,189.76	5,190.36	18.32	6.28	174.17	29.50	-103.11	329.55	304.95	24.61	13.393	
5,300.00	5,289.98	5,289.38	5,289.98	18.69	6.34	173.50	29.50	-113.39	347.41	322.38	25.02	13.883	
5,400.00	5,389.60	5,389.00	5,389.60	19.06	6.39	172.90	29.50	-123.66	365.30	339.86	25.44	14.357	
5,500.00	5,489.22	5,488.62	5,489.22	19.43	6.44	172.36	29.50	-133.94	383.23	357.36	25.87	14.815	
5,600.00	5,588.84	5,588.24	5,588.84	19.79	6.50	171.86	29.50	-144.22	401.19	374.90	26.29	15.258	
5,700.00	5,688.46	5,687.86	5,688.46	20.16	6.56	171.41	29.50	-154.49	419.18	392.46	26.72	15.686	
5,800.00	5,788.12	5,787.52	5,788.12	20.53	6.62	171.01	29.50	-164.78	436.71	409.56	27.15	16.084	
5,900.00	5,887.98	5,887.38	5,887.98	20.89	6.68	170.60	29.50	-175.11	451.25	423.67	27.58	16.363	
6,000.00	5,987.96	5,987.36	5,987.96	21.24	6.75	-66.00	29.50	-185.49	462.40	434.40	27.99	16.518	
6,100.00	6,087.96	6,087.36	6,087.96	21.58	6.82	-66.52	29.50	-195.89	471.97	443.57	28.40	16.616	
6,200.00	6,187.96	6,187.36	6,187.96	21.93	6.89	-67.01	29.50	-206.28	481.59	452.77	28.82	16.711	
6,300.00	6,287.96	6,287.36	6,287.96	22.27	6.96	-67.49	29.50	-216.68	491.23	462.00	29.24	16.803	
6,400.00	6,387.96	6,387.36	6,387.96	22.62	7.04	-67.95	29.50	-227.07	500.91	471.26	29.65	16.892	
6,500.00	6,487.96	6,487.36	6,487.96	22.96	7.11	-68.39	29.50	-237.47	510.63	480.55	30.08	16.978	
6,600.00	6,587.96	6,587.36	6,587.96	23.31	7.19	-68.81	29.50	-247.87	520.36	489.86	30.50	17.061	
6,700.00	6,687.96	6,687.36	6,687.96	23.65	7.27	-69.22	29.50	-258.26	530.13	499.21	30.93	17.142	
6,800.00	6,787.96	6,787.36	6,787.96	24.00	7.36	-69.61	29.50	-268.66	539.92	508.57	31.35	17.220	
6,900.00	6,887.96	6,887.36	6,887.96	24.34	7.44	-69.99	29.50	-279.05	549.74	517.96	31.78	17.296	
7,000.00	6,987.96	6,987.36	6,987.96	24.69	7.52	-70.36	29.50	-289.45	559.58	527.36	32.22	17.370	
7,100.00	7,087.96	7,087.36	7,087.96	25.04	7.61	-70.71	29.50	-299.84	569.44	536.79	32.65	17.441	

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 101H - OH - Plan 1 10-11-17													Offset Site Error:
Survey Program: 0-Scientific Gyro, 8768-MWD+IFR1+MS													Offset Well Error:
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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,200.00	7,187.96	7,142.89	7,130.65	25.39	7.70	-71.05	29.50	-310.24	579.32	546.24	33.09	17.510	
7,300.00	7,287.96	7,242.34	7,229.56	25.73	7.79	-71.38	29.50	-320.63	589.22	555.70	33.52	17.577	
7,400.00	7,387.96	7,341.79	7,328.47	26.08	7.88	-71.70	29.50	-331.03	599.14	565.18	33.96	17.642	
7,500.00	7,487.96	7,441.25	7,427.38	26.43	7.97	-72.01	29.50	-341.43	609.08	574.68	34.40	17.705	
7,600.00	7,587.96	7,540.70	7,526.28	26.78	8.07	-72.31	29.50	-351.82	619.04	584.19	34.84	17.766	
7,700.00	7,687.96	7,640.15	7,625.19	27.13	8.16	-72.60	29.50	-362.22	629.01	593.72	35.29	17.825	
7,800.00	7,787.96	7,739.60	7,724.10	27.48	8.26	-72.88	29.50	-372.61	639.00	603.26	35.73	17.882	
7,900.00	7,887.96	7,839.05	7,823.01	27.82	8.36	-73.15	29.50	-383.01	649.00	612.82	36.18	17.938	
8,000.00	7,987.96	7,938.51	7,921.91	28.17	8.45	-73.41	29.50	-393.40	659.01	622.38	36.63	17.992	
8,100.00	8,087.96	8,037.96	8,020.82	28.52	8.55	-73.67	29.50	-403.80	669.04	631.96	37.08	18.044	
8,200.00	8,187.96	8,137.41	8,119.73	28.87	8.65	-73.91	29.50	-414.20	679.08	641.55	37.53	18.095	
8,300.00	8,287.96	8,236.86	8,218.64	29.22	8.76	-74.16	29.50	-424.59	689.14	651.16	37.98	18.144	
8,400.00	8,387.96	8,336.32	8,317.54	29.57	8.86	-74.39	29.50	-434.99	699.20	660.77	38.43	18.192	
8,500.00	8,487.96	8,435.77	8,416.45	29.93	8.96	-74.62	29.50	-445.38	709.28	670.39	38.89	18.239	
8,600.00	8,587.96	8,535.22	8,515.36	30.28	9.07	-74.84	29.50	-455.78	719.37	680.02	39.34	18.284	
8,700.00	8,687.96	8,634.67	8,614.27	30.63	9.17	-75.05	29.50	-466.17	729.46	689.67	39.80	18.329	
8,800.00	8,787.96	8,734.12	8,713.17	30.98	9.26	-75.26	29.50	-476.57	739.57	699.34	40.24	18.380	
8,900.00	8,887.96	8,800.00	8,778.63	31.33	9.28	-75.33	30.53	-483.80	751.04	710.43	40.61	18.494	
9,000.00	8,987.62	8,850.00	8,827.77	31.68	9.30	-75.45	36.18	-490.91	766.58	725.61	40.97	18.709	
9,100.00	9,083.91	8,907.48	8,882.92	32.00	9.33	-71.98	48.70	-501.02	782.33	741.00	41.33	18.930	
9,200.00	9,172.61	8,958.83	8,930.34	32.27	9.37	-70.93	65.19	-511.67	797.75	756.10	41.64	19.157	
9,300.00	9,249.87	9,009.57	8,974.93	32.49	9.42	-70.33	86.20	-523.59	812.54	770.63	41.91	19.388	
9,400.00	9,312.29	9,059.73	9,016.31	32.66	9.47	-70.12	111.36	-536.60	826.67	784.51	42.16	19.608	
9,500.00	9,357.15	9,109.35	9,054.14	32.85	9.54	-70.25	140.25	-550.52	840.26	797.69	42.57	19.737	
9,600.00	9,382.50	9,158.51	9,088.17	33.06	9.60	-70.65	172.52	-565.20	853.60	810.56	43.04	19.834	
9,700.00	9,387.89	9,207.60	9,118.38	33.28	9.67	-71.63	207.99	-580.58	867.29	823.86	43.43	19.969	
9,800.00	9,387.48	9,262.68	9,147.38	33.55	9.74	-73.83	251.21	-598.50	885.82	842.05	43.77	20.239	
9,900.00	9,387.06	9,325.00	9,173.49	33.88	9.82	-75.86	303.77	-619.34	909.65	865.47	44.18	20.590	
10,000.00	9,386.64	9,400.00	9,194.90	34.26	9.89	-77.59	370.94	-644.70	937.22	892.53	44.68	20.975	
10,100.00	9,386.22	9,475.00	9,204.86	34.69	9.95	-78.54	440.83	-669.80	967.21	921.95	45.26	21.370	
10,200.00	9,385.80	9,709.93	9,205.96	35.18	10.13	-79.37	667.19	-731.68	993.71	947.34	46.37	21.431	
10,300.00	9,385.38	9,985.70	9,206.44	35.72	10.86	-79.70	941.44	-756.35	1,000.79	952.84	47.95	20.873	
10,400.00	9,384.96	10,085.70	9,206.61	36.31	11.32	-79.73	1,041.43	-756.96	1,000.69	951.71	48.98	20.430	
10,500.00	9,384.55	10,185.70	9,206.78	36.95	11.83	-79.77	1,141.43	-757.57	1,000.59	950.50	50.09	19.974	
10,600.00	9,384.13	10,285.70	9,206.95	37.62	12.39	-79.80	1,241.43	-758.19	1,000.49	949.21	51.28	19.511	
10,700.00	9,383.71	10,385.69	9,207.12	38.34	12.97	-79.83	1,341.42	-758.80	1,000.39	947.86	52.53	19.044	
10,800.00	9,383.29	10,485.69	9,207.29	39.10	13.58	-79.87	1,441.42	-759.41	1,000.30	946.45	53.85	18.576	
10,900.00	9,382.87	10,585.69	9,207.46	39.90	14.20	-79.90	1,541.41	-760.02	1,000.20	944.98	55.22	18.113	
11,000.00	9,382.45	10,685.69	9,207.63	40.73	14.84	-79.93	1,641.41	-760.64	1,000.10	943.45	56.65	17.655	
11,100.00	9,382.04	10,785.69	9,207.81	41.60	15.49	-79.97	1,741.41	-761.25	1,000.00	941.88	58.12	17.204	
11,200.00	9,381.62	10,885.69	9,207.98	42.49	16.16	-80.00	1,841.40	-761.86	999.91	940.26	59.65	16.764	
11,300.00	9,381.20	10,985.68	9,208.15	43.42	16.83	-80.03	1,941.40	-762.47	999.81	938.60	61.21	16.334	
11,400.00	9,380.78	11,085.68	9,208.32	44.37	17.51	-80.07	2,041.40	-763.08	999.71	936.90	62.82	15.915	
11,500.00	9,380.36	11,185.68	9,208.49	45.35	18.19	-80.10	2,141.39	-763.70	999.62	935.16	64.45	15.509	
11,600.00	9,379.94	11,285.68	9,208.66	46.35	18.88	-80.13	2,241.39	-764.31	999.52	933.39	66.13	15.115	
11,700.00	9,379.52	11,385.68	9,208.83	47.37	19.58	-80.17	2,341.38	-764.92	999.43	931.59	67.83	14.734	
11,800.00	9,379.11	11,485.68	9,209.00	48.41	20.28	-80.20	2,441.38	-765.53	999.33	929.77	69.56	14.366	
11,900.00	9,378.69	11,585.67	9,209.17	49.48	20.99	-80.23	2,541.38	-766.15	999.24	927.91	71.32	14.010	
12,000.00	9,378.27	11,685.67	9,209.34	50.56	21.70	-80.27	2,641.37	-766.76	999.14	926.04	73.11	13.667	
12,100.00	9,377.85	11,785.67	9,209.51	51.66	22.41	-80.30	2,741.37	-767.37	999.05	924.13	74.91	13.336	
12,200.00	9,377.43	11,885.67	9,209.68	52.78	23.13	-80.33	2,841.37	-767.98	998.95	922.21	76.74	13.017	
12,300.00	9,377.01	11,985.67	9,209.85	53.91	23.85	-80.37	2,941.36	-768.60	998.86	920.27	78.59	12.710	

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 101H - OH - Plan 1 10-11-17													Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro, 8768-MWD+IFR1+MS													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	Warning
12,400.00	9,376.59	12,085.67	9,210.02	55.05	24.57	-80.40	3,041.36	-769.21	998.77	918.31	80.45	12.414	
12,500.00	9,376.18	12,185.66	9,210.19	56.21	25.30	-80.43	3,141.35	-769.82	998.67	916.34	82.34	12.129	
12,600.00	9,375.76	12,285.66	9,210.36	57.38	26.03	-80.47	3,241.35	-770.43	998.58	914.35	84.23	11.855	
12,700.00	9,375.34	12,385.66	9,210.53	58.57	26.76	-80.50	3,341.35	-771.04	998.49	912.34	86.15	11.590	
12,800.00	9,374.92	12,485.66	9,210.71	59.76	27.49	-80.53	3,441.34	-771.66	998.40	910.32	88.08	11.336	
12,900.00	9,374.50	12,585.66	9,210.88	60.96	28.22	-80.57	3,541.34	-772.27	998.31	908.29	90.02	11.090	
13,000.00	9,374.08	12,685.66	9,211.05	62.18	28.95	-80.60	3,641.34	-772.88	998.22	906.25	91.97	10.854	
13,100.00	9,373.66	12,785.65	9,211.22	63.40	29.69	-80.63	3,741.33	-773.49	998.13	904.19	93.93	10.626	
13,200.00	9,373.25	12,885.65	9,211.39	64.64	30.43	-80.67	3,841.33	-774.11	998.04	902.13	95.91	10.406	
13,300.00	9,372.83	12,985.65	9,211.56	65.88	31.17	-80.70	3,941.32	-774.72	997.95	900.05	97.90	10.194	
13,400.00	9,372.41	13,085.65	9,211.73	67.12	31.91	-80.73	4,041.32	-775.33	997.86	897.97	99.89	9.989	
13,500.00	9,371.99	13,185.65	9,211.90	68.38	32.65	-80.77	4,141.32	-775.94	997.77	895.87	101.90	9.792	
13,600.00	9,371.57	13,285.64	9,212.07	69.64	33.39	-80.80	4,241.31	-776.55	997.68	893.77	103.91	9.602	
13,700.00	9,371.15	13,385.64	9,212.24	70.91	34.13	-80.83	4,341.31	-777.17	997.59	891.66	105.93	9.417	
13,800.00	9,370.73	13,485.64	9,212.41	72.19	34.87	-80.87	4,441.31	-777.78	997.50	889.54	107.96	9.240	
13,900.00	9,370.32	13,585.64	9,212.58	73.47	35.62	-80.90	4,541.30	-778.39	997.41	887.42	109.99	9.068	
14,000.00	9,369.90	13,685.64	9,212.75	74.76	36.36	-80.93	4,641.30	-779.00	997.33	885.29	112.04	8.902	
14,100.00	9,369.48	13,785.64	9,212.92	76.05	37.11	-80.97	4,741.29	-779.62	997.24	883.15	114.09	8.741	
14,200.00	9,369.06	13,885.63	9,213.09	77.35	37.86	-81.00	4,841.29	-780.23	997.15	881.01	116.14	8.586	
14,300.00	9,368.64	13,985.63	9,213.26	78.65	38.61	-81.03	4,941.29	-780.84	997.07	878.86	118.20	8.435	
14,400.00	9,368.22	14,085.63	9,213.44	79.96	39.35	-81.07	5,041.28	-781.45	996.98	876.71	120.27	8.290	
14,500.00	9,367.81	14,185.63	9,213.61	81.27	40.10	-81.10	5,141.28	-782.07	996.89	874.55	122.34	8.149	
14,600.00	9,367.39	14,285.63	9,213.78	82.59	40.85	-81.14	5,241.28	-782.68	996.81	872.39	124.42	8.012	
14,700.00	9,366.97	14,385.63	9,213.95	83.91	41.60	-81.17	5,341.27	-783.29	996.72	870.22	126.50	7.879	
14,800.00	9,366.55	14,485.62	9,214.12	85.23	42.35	-81.20	5,441.27	-783.90	996.64	868.05	128.59	7.751	
14,900.00	9,366.13	14,585.62	9,214.29	86.56	43.10	-81.24	5,541.26	-784.51	996.55	865.88	130.68	7.626	
15,000.00	9,365.71	14,685.62	9,214.46	87.89	43.85	-81.27	5,641.26	-785.13	996.47	863.70	132.77	7.505	
15,100.00	9,365.29	14,785.62	9,214.63	89.22	44.61	-81.30	5,741.26	-785.74	996.39	861.52	134.87	7.388	
15,200.00	9,364.88	14,885.62	9,214.80	90.56	45.36	-81.34	5,841.25	-786.35	996.30	859.33	136.97	7.274	
15,300.00	9,364.46	14,985.62	9,214.97	91.90	46.11	-81.37	5,941.25	-786.96	996.22	857.14	139.08	7.163	
15,400.00	9,364.04	15,085.61	9,215.14	93.24	46.86	-81.40	6,041.25	-787.58	996.14	854.95	141.19	7.055	
15,500.00	9,363.62	15,185.61	9,215.31	94.59	47.62	-81.44	6,141.24	-788.19	996.05	852.75	143.30	6.951	
15,600.00	9,363.20	15,285.61	9,215.48	95.93	48.37	-81.47	6,241.24	-788.80	995.97	850.56	145.42	6.849	
15,700.00	9,362.78	15,385.61	9,215.65	97.28	49.12	-81.50	6,341.23	-789.41	995.89	848.36	147.53	6.750	
15,800.00	9,362.36	15,485.61	9,215.82	98.64	49.88	-81.54	6,441.23	-790.02	995.81	846.15	149.66	6.654	
15,900.00	9,361.95	15,585.60	9,215.99	99.99	50.63	-81.57	6,541.23	-790.64	995.73	843.95	151.78	6.560	
16,000.00	9,361.53	15,685.60	9,216.16	101.35	51.39	-81.61	6,641.22	-791.25	995.65	841.74	153.91	6.469	
16,100.00	9,361.11	15,785.60	9,216.34	102.71	52.14	-81.64	6,741.22	-791.86	995.57	839.53	156.04	6.380	
16,200.00	9,360.69	15,885.60	9,216.51	104.07	52.90	-81.67	6,841.22	-792.47	995.49	837.32	158.17	6.294	
16,300.00	9,360.27	15,985.60	9,216.68	105.44	53.65	-81.71	6,941.21	-793.09	995.41	835.10	160.30	6.209	
16,400.00	9,359.85	16,085.60	9,216.85	106.80	54.41	-81.74	7,041.21	-793.70	995.33	832.89	162.44	6.127	
16,500.00	9,359.43	16,185.59	9,217.02	108.17	55.16	-81.77	7,141.20	-794.31	995.25	830.67	164.58	6.047	
16,600.00	9,359.02	16,285.59	9,217.19	109.54	55.92	-81.81	7,241.20	-794.92	995.17	828.45	166.72	5.969	
16,700.00	9,358.60	16,385.59	9,217.36	110.91	56.68	-81.84	7,341.20	-795.53	995.09	826.23	168.86	5.893	
16,800.00	9,358.18	16,485.59	9,217.53	112.28	57.43	-81.87	7,441.19	-796.15	995.01	824.00	171.01	5.818	
16,841.70	9,358.00	16,526.90	9,217.60	112.86	57.75	-81.89	7,482.50	-796.40	994.98	823.08	171.90	5.788	
16,842.72	9,358.00	16,526.90	9,217.60	112.87	57.75	-81.89	7,482.50	-796.40	994.98	823.07	171.92	5.788	

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

Company: COG Operating LLC
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Reference Well: 202H
Well Error: 0.00 usft
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Offset Design Eider Federal - 102H - OH - Plan 1 10-11-17													Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro, 8743-MWD+IFR1+MS													Offset Well Error: 0.00 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	0.00	0.00	0.00	0.00	-0.38	30.00	-0.20	30.00				
100.00	100.00	100.00	100.00	0.14	0.07	-0.38	30.00	-0.20	30.00	29.80	0.20	146.918	
200.00	200.00	200.00	200.00	0.49	0.20	-0.38	30.00	-0.20	30.00	29.31	0.69	43.356	
300.00	300.00	300.00	300.00	0.85	0.33	-0.38	30.00	-0.20	30.00	28.82	1.18	25.386	
400.00	400.00	400.00	400.00	1.21	0.46	-0.38	30.00	-0.20	30.00	28.33	1.67	17.945	
500.00	500.00	500.00	500.00	1.57	0.59	-0.38	30.00	-0.20	30.00	27.84	2.16	13.876	
600.00	600.00	600.00	600.00	1.93	0.72	-0.38	30.00	-0.20	30.00	27.35	2.65	11.311	
700.00	700.00	700.00	700.00	2.29	0.86	-0.38	30.00	-0.20	30.00	26.86	3.14	9.547	
800.00	800.00	800.00	800.00	2.65	0.99	-0.38	30.00	-0.20	30.00	26.37	3.63	8.258	
900.00	900.00	900.00	900.00	3.00	1.12	-0.38	30.00	-0.20	30.00	25.88	4.12	7.276	
1,000.00	1,000.00	1,000.00	1,000.00	3.36	1.25	-0.38	30.00	-0.20	30.00	25.39	4.61	6.503	
1,100.00	1,100.00	1,100.00	1,100.00	3.72	1.38	-0.38	30.00	-0.20	30.00	24.90	5.10	5.878	
1,200.00	1,200.00	1,200.00	1,200.00	4.08	1.51	-0.38	30.00	-0.20	30.00	24.41	5.59	5.363	
1,300.00	1,300.00	1,300.00	1,300.00	4.44	1.65	-0.38	30.00	-0.20	30.00	23.92	6.08	4.931	
1,400.00	1,400.00	1,400.00	1,400.00	4.80	1.78	-0.38	30.00	-0.20	30.00	23.43	6.57	4.563	
1,500.00	1,500.00	1,500.00	1,500.00	5.15	1.91	-0.38	30.00	-0.20	30.00	22.94	7.06	4.246	
1,600.00	1,600.00	1,600.00	1,600.00	5.51	2.04	-0.38	30.00	-0.20	30.00	22.45	7.56	3.971	
1,700.00	1,700.00	1,700.00	1,700.00	5.87	2.17	-0.38	30.00	-0.20	30.00	21.96	8.05	3.729	
1,800.00	1,800.00	1,800.00	1,800.00	6.23	2.31	-0.38	30.00	-0.20	30.00	21.46	8.54	3.515	
1,900.00	1,900.00	1,900.00	1,900.00	6.59	2.44	-0.38	30.00	-0.20	30.00	20.97	9.03	3.324	
2,000.00	2,000.00	2,000.00	2,000.00	6.95	2.57	-0.38	30.00	-0.20	30.00	20.48	9.52	3.153	
2,100.00	2,100.00	2,100.00	2,100.00	7.31	2.70	-0.38	30.00	-0.20	30.00	19.99	10.01	2.998	
2,200.00	2,200.00	2,200.00	2,200.00	7.66	2.83	-0.38	30.00	-0.20	30.00	19.50	10.50	2.858	
2,300.00	2,300.00	2,300.00	2,300.00	8.02	2.96	-0.38	30.00	-0.20	30.00	19.01	10.99	2.730	
2,400.00	2,400.00	2,400.00	2,400.00	8.38	3.10	-0.38	30.00	-0.20	30.00	18.52	11.48	2.614	
2,500.00	2,500.00	2,500.00	2,500.00	8.74	3.23	-0.38	30.00	-0.20	30.00	18.03	11.97	2.507 CC, ES	
2,600.00	2,599.98	2,599.98	2,599.98	9.08	3.36	-126.90	30.00	-0.20	31.02	18.57	12.44	2.492	
2,700.00	2,699.84	2,699.84	2,699.84	9.42	3.49	-133.83	30.00	-0.20	34.41	21.51	12.91	2.666	
2,800.00	2,799.49	2,799.49	2,799.49	9.75	3.62	-142.24	30.00	-0.20	40.60	27.22	13.38	3.035	
2,900.00	2,899.11	2,899.11	2,899.11	10.09	3.75	-148.65	30.00	-0.20	47.79	33.95	13.85	3.452	
3,000.00	2,998.73	2,998.73	2,998.73	10.43	3.89	-153.34	30.00	-0.20	55.43	41.11	14.32	3.871	
3,100.00	3,098.35	3,098.35	3,098.35	10.78	4.02	-156.87	30.00	-0.20	63.34	48.55	14.79	4.282	
3,200.00	3,197.97	3,197.97	3,197.97	11.12	4.15	-159.62	30.00	-0.20	71.45	56.17	15.27	4.678	
3,300.00	3,297.59	3,297.59	3,297.59	11.47	4.28	-161.80	30.00	-0.20	79.68	63.93	15.75	5.058	
3,400.00	3,397.21	3,397.21	3,397.21	11.82	4.41	-163.57	30.00	-0.20	88.00	71.77	16.23	5.421	
3,500.00	3,496.83	3,496.83	3,496.83	12.17	4.54	-165.04	30.00	-0.20	96.40	79.68	16.72	5.767	
3,600.00	3,596.45	3,596.45	3,596.45	12.53	4.67	-166.27	30.00	-0.20	104.84	87.64	17.20	6.095	
3,700.00	3,696.07	3,696.07	3,696.07	12.88	4.81	-167.31	30.00	-0.20	113.33	95.64	17.69	6.407	
3,800.00	3,795.69	3,795.69	3,795.69	13.24	4.94	-168.21	30.00	-0.20	121.85	103.67	18.17	6.704	
3,900.00	3,895.31	3,895.31	3,895.31	13.60	5.07	-169.00	30.00	-0.20	130.39	111.73	18.66	6.987	
4,000.00	3,994.93	3,994.93	3,994.93	13.95	5.20	-169.68	30.00	-0.20	138.96	119.81	19.15	7.255	
4,100.00	4,094.55	4,094.55	4,094.55	14.31	5.33	-170.29	30.00	-0.20	147.54	127.90	19.64	7.511	
4,200.00	4,194.17	4,194.17	4,194.17	14.67	5.46	-170.83	30.00	-0.20	156.14	136.00	20.14	7.754	
4,300.00	4,293.78	4,293.78	4,293.78	15.04	5.59	-171.31	30.00	-0.20	164.75	144.12	20.63	7.986	
4,400.00	4,393.40	4,393.40	4,393.40	15.40	5.72	-171.75	30.00	-0.20	173.37	152.25	21.12	8.208	
4,500.00	4,493.02	4,493.02	4,493.02	15.76	5.86	-172.14	30.00	-0.20	182.00	160.39	21.62	8.419	
4,600.00	4,592.64	4,592.64	4,592.64	16.12	5.99	-172.50	30.00	-0.20	190.64	168.53	22.11	8.622	
4,700.00	4,692.26	4,692.26	4,692.26	16.49	6.12	-172.82	30.00	-0.20	199.29	176.68	22.61	8.815	
4,800.00	4,791.88	4,791.88	4,791.88	16.85	6.25	-173.12	30.00	-0.20	207.94	184.83	23.10	9.000	
4,900.00	4,891.50	4,891.50	4,891.50	17.22	6.38	-173.40	30.00	-0.20	216.59	192.99	23.60	9.177	
5,000.00	4,991.12	4,991.12	4,991.12	17.59	6.51	-173.66	30.00	-0.20	225.25	201.15	24.10	9.347	
5,100.00	5,090.74	5,090.74	5,090.74	17.95	6.64	-173.89	30.00	-0.20	233.92	209.32	24.60	9.510	

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: Eider Federal
 Site Error: 0.00 usft
 Reference Well: 202H
 Well Error: 0.00 usft
 Reference Wellbore: OH
 Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (Ensign 155)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: USA Compass
 Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 102H - OH - Plan 1 10-11-17														Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro, 8743-MWD+IFR1+MS														Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	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)		+N/-S (usft)	+E/-W (usft)						
5,200.00	5,190.36	5,190.36	5,190.36	18.32	6.78	-174.11	30.00	-0.20	242.58	217.49	25.10	9.666		
5,300.00	5,289.98	5,289.98	5,289.98	18.69	6.91	-174.31	30.00	-0.20	251.26	225.66	25.60	9.817		
5,400.00	5,389.60	5,389.60	5,389.60	19.06	7.04	-174.50	30.00	-0.20	259.93	233.84	26.09	9.961		
5,500.00	5,489.22	5,489.22	5,489.22	19.43	7.17	-174.68	30.00	-0.20	268.61	242.01	26.59	10.100		
5,600.00	5,588.84	5,588.84	5,588.84	19.79	7.30	-174.85	30.00	-0.20	277.29	250.19	27.10	10.234		
5,700.00	5,688.46	5,688.46	5,688.46	20.16	7.43	-175.01	30.00	-0.20	285.97	258.37	27.60	10.363		
5,800.00	5,788.12	5,788.12	5,788.12	20.53	7.56	-175.15	30.00	-0.20	294.17	266.07	28.10	10.470		
5,900.00	5,887.98	5,887.98	5,887.98	20.89	7.70	-175.24	30.00	-0.20	299.28	270.69	28.59	10.469		
6,000.00	5,987.96	5,987.96	5,987.96	21.24	7.83	-51.41	30.00	-0.20	300.92	271.85	29.07	10.352		
6,100.00	6,087.96	6,087.96	6,087.96	21.58	7.96	-51.41	30.00	-0.20	300.92	271.37	29.54	10.185		
6,200.00	6,187.96	6,187.96	6,187.96	21.93	8.09	-51.41	30.00	-0.20	300.92	270.90	30.02	10.024		
6,300.00	6,287.96	6,287.96	6,287.96	22.27	8.22	-51.41	30.00	-0.20	300.92	270.42	30.49	9.868		
6,400.00	6,387.96	6,387.96	6,387.96	22.62	8.35	-51.41	30.00	-0.20	300.92	269.95	30.97	9.716		
6,500.00	6,487.96	6,487.96	6,487.96	22.96	8.49	-51.41	30.00	-0.20	300.92	269.47	31.45	9.569		
6,600.00	6,587.96	6,587.96	6,587.96	23.31	8.62	-51.41	30.00	-0.20	300.92	268.99	31.92	9.426		
6,700.00	6,687.96	6,687.96	6,687.96	23.65	8.75	-51.41	30.00	-0.20	300.92	268.51	32.40	9.287		
6,800.00	6,787.96	6,787.96	6,787.96	24.00	8.88	-51.41	30.00	-0.20	300.92	268.04	32.88	9.152		
6,900.00	6,887.96	6,887.96	6,887.96	24.34	9.01	-51.41	30.00	-0.20	300.92	267.56	33.36	9.021		
7,000.00	6,987.96	6,987.96	6,987.96	24.69	9.15	-51.41	30.00	-0.20	300.92	267.08	33.84	8.893		
7,100.00	7,087.96	7,087.96	7,087.96	25.04	9.28	-51.41	30.00	-0.20	300.92	266.60	34.32	8.769		
7,200.00	7,187.96	7,187.96	7,187.96	25.39	9.41	-51.41	30.00	-0.20	300.92	266.12	34.79	8.648		
7,300.00	7,287.96	7,287.96	7,287.96	25.73	9.54	-51.41	30.00	-0.20	300.92	265.64	35.27	8.531		
7,400.00	7,387.96	7,387.96	7,387.96	26.08	9.67	-51.41	30.00	-0.20	300.92	265.16	35.75	8.416		
7,500.00	7,487.96	7,487.96	7,487.96	26.43	9.80	-51.41	30.00	-0.20	300.92	264.68	36.23	8.305		
7,600.00	7,587.96	7,587.96	7,587.96	26.78	9.94	-51.41	30.00	-0.20	300.92	264.20	36.71	8.196		
7,700.00	7,687.96	7,687.96	7,687.96	27.13	10.07	-51.41	30.00	-0.20	300.92	263.72	37.19	8.090		
7,800.00	7,787.96	7,787.96	7,787.96	27.48	10.20	-51.41	30.00	-0.20	300.92	263.24	37.68	7.987		
7,900.00	7,887.96	7,887.96	7,887.96	27.82	10.33	-51.41	30.00	-0.20	300.92	262.76	38.16	7.886		
8,000.00	7,987.96	7,987.96	7,987.96	28.17	10.46	-51.41	30.00	-0.20	300.92	262.28	38.64	7.788		
8,100.00	8,087.96	8,087.96	8,087.96	28.52	10.60	-51.41	30.00	-0.20	300.92	261.80	39.12	7.692		
8,200.00	8,187.96	8,187.96	8,187.96	28.87	10.73	-51.41	30.00	-0.20	300.92	261.31	39.60	7.599		
8,300.00	8,287.96	8,287.96	8,287.96	29.22	10.86	-51.41	30.00	-0.20	300.92	260.83	40.08	7.507		
8,400.00	8,387.96	8,387.96	8,387.96	29.57	10.99	-51.41	30.00	-0.20	300.92	260.35	40.57	7.418		
8,500.00	8,487.96	8,487.96	8,487.96	29.93	11.12	-51.41	30.00	-0.20	300.92	259.87	41.05	7.331		
8,600.00	8,587.96	8,587.96	8,587.96	30.28	11.25	-51.41	30.00	-0.20	300.92	259.39	41.53	7.246		
8,700.00	8,687.96	8,687.96	8,687.96	30.63	11.39	-51.41	30.00	-0.20	300.92	258.90	42.01	7.162		
8,701.91	8,689.87	8,689.87	8,689.87	30.63	11.39	-51.41	30.00	-0.20	300.92	258.89	42.02	7.161		
8,800.00	8,787.96	8,775.00	8,774.98	30.98	11.46	-51.27	31.09	-0.38	302.01	259.57	42.44	7.116		
8,900.00	8,887.96	8,840.27	8,839.59	31.33	11.48	-50.17	39.84	-1.80	312.15	269.34	42.81	7.292		
9,000.00	8,987.62	8,904.55	8,901.46	31.68	11.50	-47.16	56.87	-4.58	328.93	285.75	43.18	7.618		
9,100.00	9,083.91	8,968.01	8,959.72	32.00	11.54	-45.37	81.58	-8.60	342.62	299.08	43.54	7.870		
9,200.00	9,172.61	9,030.98	9,013.76	32.27	11.59	-44.72	113.41	-13.78	352.21	308.34	43.86	8.030		
9,300.00	9,249.87	9,093.71	9,062.90	32.49	11.65	-45.12	151.82	-20.04	357.46	313.32	44.14	8.098		
9,400.00	9,312.29	9,156.44	9,106.52	32.66	11.71	-46.52	196.25	-27.28	358.51	314.13	44.37	8.079		
9,500.00	9,357.15	9,219.46	9,144.02	32.85	11.78	-48.91	246.18	-35.41	355.83	311.20	44.63	7.972		
9,600.00	9,382.50	9,283.09	9,174.80	33.06	11.84	-52.31	301.09	-44.35	350.27	305.35	44.92	7.798		
9,700.00	9,387.89	9,350.00	9,198.89	33.28	11.90	-56.57	362.65	-54.38	343.42	298.23	45.19	7.599		
9,745.52	9,387.70	9,378.74	9,206.51	33.40	11.92	-58.05	389.99	-58.83	342.38	297.04	45.34	7.552		
9,800.00	9,387.48	9,416.97	9,214.04	33.55	11.95	-59.65	426.98	-64.85	343.82	298.32	45.50	7.556		
9,900.00	9,387.06	9,489.47	9,220.00	33.88	11.98	-61.45	498.23	-76.46	353.08	307.22	45.85	7.700		
10,000.00	9,386.64	9,615.27	9,220.15	34.26	12.01	-62.62	623.09	-91.42	362.88	316.61	46.27	7.843		
10,100.00	9,386.22	9,737.67	9,220.29	34.69	12.05	-62.96	745.39	-95.60	365.00	318.26	46.74	7.809		

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 102H - OH - Plan 1 10-11-17													Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro: 8743-MWD+IFR1+MS													Offset Well Error: 0.00 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)					
10,200.00	9,385.80	9,837.67	9,220.41	35.18	12.07	-63.04	845.38	-96.20	364.76	317.50	47.26	7.719	
10,300.00	9,385.38	9,937.67	9,220.52	35.72	12.11	-63.11	945.38	-96.81	364.52	316.69	47.83	7.621	
10,400.00	9,384.96	10,037.66	9,220.64	36.31	12.14	-63.19	1,045.38	-97.41	364.28	315.49	48.78	7.467	
10,500.00	9,384.55	10,137.66	9,220.75	36.95	12.19	-63.26	1,145.37	-98.02	364.03	314.15	49.89	7.297	
10,600.00	9,384.13	10,237.66	9,220.87	37.62	12.25	-63.34	1,245.37	-98.62	363.79	312.73	51.07	7.124	
10,700.00	9,383.71	10,337.66	9,220.98	38.34	12.39	-63.41	1,345.37	-99.23	363.55	311.24	52.31	6.950	
10,800.00	9,383.29	10,437.66	9,221.09	39.10	12.76	-63.49	1,445.36	-99.83	363.31	309.69	53.62	6.776	
10,900.00	9,382.87	10,537.66	9,221.21	39.90	13.35	-63.56	1,545.36	-100.44	363.08	308.09	54.99	6.603	
11,000.00	9,382.45	10,637.66	9,221.32	40.73	14.00	-63.64	1,645.36	-101.04	362.84	306.43	56.41	6.432	
11,100.00	9,382.04	10,737.65	9,221.44	41.60	14.68	-63.71	1,745.35	-101.65	362.60	304.72	57.88	6.265	
11,200.00	9,381.62	10,837.65	9,221.55	42.49	15.36	-63.79	1,845.35	-102.25	362.36	302.97	59.39	6.101	
11,300.00	9,381.20	10,937.65	9,221.67	43.42	16.06	-63.86	1,945.35	-102.86	362.13	301.17	60.95	5.941	
11,400.00	9,380.78	11,037.65	9,221.78	44.37	16.76	-63.94	2,045.34	-103.46	361.89	299.34	62.55	5.786	
11,500.00	9,380.36	11,137.65	9,221.89	45.35	17.47	-64.01	2,145.34	-104.07	361.65	297.47	64.18	5.635	
11,600.00	9,379.94	11,237.65	9,222.01	46.35	18.18	-64.09	2,245.34	-104.67	361.42	295.57	65.85	5.489	
11,700.00	9,379.52	11,337.65	9,222.12	47.37	18.90	-64.16	2,345.33	-105.28	361.19	293.64	67.55	5.347	
11,800.00	9,379.11	11,437.64	9,222.24	48.41	19.62	-64.24	2,445.33	-105.88	360.95	291.68	69.27	5.211	
11,900.00	9,378.69	11,537.64	9,222.35	49.48	20.34	-64.32	2,545.33	-106.49	360.72	289.69	71.03	5.079	
12,000.00	9,378.27	11,637.64	9,222.47	50.56	21.07	-64.39	2,645.32	-107.09	360.49	287.68	72.80	4.951	
12,100.00	9,377.85	11,737.64	9,222.58	51.66	21.80	-64.47	2,745.32	-107.70	360.26	285.65	74.60	4.829	
12,200.00	9,377.43	11,837.64	9,222.69	52.78	22.53	-64.55	2,845.32	-108.30	360.03	283.60	76.43	4.711	
12,300.00	9,377.01	11,937.64	9,222.81	53.91	23.27	-64.62	2,945.31	-108.91	359.80	281.53	78.27	4.597	
12,400.00	9,376.59	12,037.64	9,222.92	55.05	24.00	-64.70	3,045.31	-109.52	359.57	279.44	80.13	4.487	
12,500.00	9,376.18	12,137.63	9,223.04	56.21	24.74	-64.78	3,145.31	-110.12	359.34	277.33	82.01	4.382	
12,600.00	9,375.76	12,237.63	9,223.15	57.38	25.48	-64.85	3,245.30	-110.73	359.11	275.21	83.90	4.280	
12,700.00	9,375.34	12,337.63	9,223.27	58.57	26.22	-64.93	3,345.30	-111.33	358.88	273.07	85.81	4.182	
12,800.00	9,374.92	12,437.63	9,223.38	59.76	26.96	-65.01	3,445.30	-111.94	358.66	270.92	87.74	4.088	
12,900.00	9,374.50	12,537.63	9,223.49	60.96	27.71	-65.08	3,545.29	-112.54	358.43	268.76	89.67	3.997	
13,000.00	9,374.08	12,637.63	9,223.61	62.18	28.45	-65.16	3,645.29	-113.15	358.20	266.58	91.62	3.910	
13,100.00	9,373.66	12,737.63	9,223.72	63.40	29.20	-65.24	3,745.29	-113.75	357.98	264.39	93.59	3.825	
13,200.00	9,373.25	12,837.62	9,223.84	64.64	29.94	-65.32	3,845.28	-114.36	357.76	262.20	95.56	3.744	
13,300.00	9,372.83	12,937.62	9,223.95	65.88	30.69	-65.39	3,945.28	-114.96	357.53	259.99	97.54	3.665	
13,400.00	9,372.41	13,037.62	9,224.07	67.12	31.44	-65.47	4,045.28	-115.57	357.31	257.78	99.53	3.590	
13,500.00	9,371.99	13,137.62	9,224.18	68.38	32.19	-65.55	4,145.27	-116.17	357.09	255.55	101.54	3.517	
13,600.00	9,371.57	13,237.62	9,224.29	69.64	32.94	-65.63	4,245.27	-116.78	356.87	253.32	103.55	3.446	
13,700.00	9,371.15	13,337.62	9,224.41	70.91	33.69	-65.70	4,345.27	-117.38	356.64	251.08	105.57	3.378	
13,800.00	9,370.73	13,437.62	9,224.52	72.19	34.44	-65.78	4,445.26	-117.99	356.42	248.83	107.59	3.313	
13,900.00	9,370.32	13,537.61	9,224.64	73.47	35.19	-65.86	4,545.26	-118.59	356.20	246.58	109.63	3.249	
14,000.00	9,369.90	13,637.61	9,224.75	74.76	35.94	-65.94	4,645.26	-119.20	355.99	244.32	111.67	3.188	
14,100.00	9,369.48	13,737.61	9,224.87	76.05	36.69	-66.02	4,745.25	-119.80	355.77	242.05	113.72	3.129	
14,200.00	9,369.06	13,837.61	9,224.98	77.35	37.45	-66.09	4,845.25	-120.41	355.55	239.78	115.77	3.071	
14,300.00	9,368.64	13,937.61	9,225.09	78.65	38.20	-66.17	4,945.25	-121.01	355.33	237.50	117.83	3.016	
14,400.00	9,368.22	14,037.61	9,225.21	79.96	38.95	-66.25	5,045.25	-121.62	355.12	235.22	119.89	2.962	
14,500.00	9,367.81	14,137.61	9,225.32	81.27	39.71	-66.33	5,145.24	-122.22	354.90	232.94	121.97	2.910	
14,600.00	9,367.39	14,237.60	9,225.44	82.59	40.46	-66.41	5,245.24	-122.83	354.69	230.64	124.04	2.859	
14,700.00	9,366.97	14,337.60	9,225.55	83.91	41.22	-66.49	5,345.24	-123.44	354.47	228.35	126.12	2.811	
14,800.00	9,366.55	14,437.60	9,225.67	85.23	41.97	-66.57	5,445.23	-124.04	354.26	226.05	128.21	2.763	
14,900.00	9,366.13	14,537.60	9,225.78	86.56	42.73	-66.65	5,545.23	-124.65	354.04	223.75	130.30	2.717	
15,000.00	9,365.71	14,637.60	9,225.89	87.89	43.48	-66.72	5,645.23	-125.25	353.83	221.44	132.39	2.673	
15,100.00	9,365.29	14,737.60	9,226.01	89.22	44.24	-66.80	5,745.22	-125.86	353.62	219.13	134.49	2.629	
15,200.00	9,364.88	14,837.60	9,226.12	90.56	45.00	-66.88	5,845.22	-126.46	353.41	216.82	136.59	2.587	
15,300.00	9,364.46	14,937.59	9,226.24	91.90	45.75	-66.96	5,945.22	-127.07	353.20	214.50	138.70	2.547	

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 102H - OH - Plan 1 10-11-17														Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Gyro: 8743-MWD+IFR1+MS														Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference Offset (usft)	Semi Major Axis 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		
15,400.00	9,364.04	15,037.59	9,226.35	93.24	46.51	-67.04	6,045.21	-127.67	352.99	212.18	140.81	2.507			
15,500.00	9,363.62	15,137.59	9,226.47	94.59	47.27	-67.12	6,145.21	-128.28	352.78	209.86	142.92	2.468			
15,600.00	9,363.20	15,237.59	9,226.58	95.93	48.03	-67.20	6,245.21	-128.88	352.57	207.54	145.03	2.431			
15,700.00	9,362.78	15,337.59	9,226.69	97.28	48.78	-67.28	6,345.20	-129.49	352.37	205.21	147.15	2.395			
15,800.00	9,362.36	15,437.59	9,226.81	98.64	49.54	-67.36	6,445.20	-130.09	352.16	202.88	149.27	2.359			
15,900.00	9,361.95	15,537.59	9,226.92	99.99	50.30	-67.44	6,545.20	-130.70	351.95	200.55	151.40	2.325			
16,000.00	9,361.53	15,637.58	9,227.04	101.35	51.06	-67.52	6,645.19	-131.30	351.75	198.22	153.53	2.291			
16,100.00	9,361.11	15,737.58	9,227.15	102.71	51.82	-67.60	6,745.19	-131.91	351.54	195.89	155.66	2.258			
16,200.00	9,360.69	15,837.58	9,227.27	104.07	52.57	-67.68	6,845.18	-132.51	351.34	193.55	157.79	2.227			
16,300.00	9,360.27	15,937.58	9,227.38	105.44	53.33	-67.76	6,945.18	-133.12	351.14	191.21	159.92	2.196			
16,400.00	9,359.85	16,037.58	9,227.49	106.80	54.09	-67.84	7,045.18	-133.72	350.93	188.87	162.06	2.165			
16,500.00	9,359.43	16,137.58	9,227.61	108.17	54.85	-67.92	7,145.18	-134.33	350.73	186.53	164.20	2.136			
16,600.00	9,359.02	16,237.58	9,227.72	109.54	55.61	-68.00	7,245.17	-134.93	350.53	184.19	166.34	2.107			
16,700.00	9,358.60	16,337.57	9,227.84	110.91	56.37	-68.08	7,345.17	-135.54	350.33	181.84	168.48	2.079			
16,800.00	9,358.18	16,437.57	9,227.95	112.28	57.13	-68.16	7,445.17	-136.14	350.13	179.50	170.63	2.052			
16,842.72	9,358.00	16,479.71	9,228.00	112.87	57.45	-68.20	7,487.30	-136.40	350.04	178.50	171.54	2.041 SF			

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Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
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Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 201H - OH - Plan 1 10-11-17													Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro, 4600-MWD+IFR1+MS													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
0.00	0.00	0.00	0.60	0.00	0.00	-45.48	29.70	-30.20	42.36				
100.00	100.00	99.40	100.00	0.14	0.07	-45.48	29.70	-30.20	42.36	42.15	0.20	207.845	
200.00	200.00	199.40	200.00	0.49	0.20	-45.48	29.70	-30.20	42.36	41.67	0.69	61.281	
300.00	300.00	299.40	300.00	0.85	0.33	-45.48	29.70	-30.20	42.36	41.18	1.18	35.866	
400.00	400.00	399.40	400.00	1.21	0.46	-45.48	29.70	-30.20	42.36	40.69	1.67	25.347	
500.00	500.00	499.40	500.00	1.57	0.59	-45.48	29.70	-30.20	42.36	40.20	2.16	19.598	
600.00	600.00	599.40	600.00	1.93	0.72	-45.48	29.70	-30.20	42.36	39.71	2.65	15.975	
700.00	700.00	699.40	700.00	2.29	0.85	-45.48	29.70	-30.20	42.36	39.22	3.14	13.482	
800.00	800.00	799.40	800.00	2.65	0.99	-45.48	29.70	-30.20	42.36	38.73	3.63	11.662	
900.00	900.00	899.40	900.00	3.00	1.12	-45.48	29.70	-30.20	42.36	38.23	4.12	10.275	
1,000.00	1,000.00	999.40	1,000.00	3.36	1.25	-45.48	29.70	-30.20	42.36	37.74	4.61	9.183	
1,100.00	1,100.00	1,099.40	1,100.00	3.72	1.38	-45.48	29.70	-30.20	42.36	37.25	5.10	8.301	
1,200.00	1,200.00	1,199.40	1,200.00	4.08	1.51	-45.48	29.70	-30.20	42.36	36.76	5.59	7.573	
1,300.00	1,300.00	1,299.40	1,300.00	4.44	1.65	-45.48	29.70	-30.20	42.36	36.27	6.08	6.963	
1,400.00	1,400.00	1,399.40	1,400.00	4.80	1.78	-45.48	29.70	-30.20	42.36	35.78	6.57	6.443	
1,500.00	1,500.00	1,499.40	1,500.00	5.15	1.91	-45.48	29.70	-30.20	42.36	35.29	7.06	5.996	
1,600.00	1,600.00	1,599.40	1,600.00	5.51	2.04	-45.48	29.70	-30.20	42.36	34.80	7.55	5.607	
1,700.00	1,700.00	1,699.40	1,700.00	5.87	2.17	-45.48	29.70	-30.20	42.36	34.31	8.04	5.265	
1,800.00	1,800.00	1,799.40	1,800.00	6.23	2.30	-45.48	29.70	-30.20	42.36	33.82	8.53	4.963	
1,900.00	1,900.00	1,899.40	1,900.00	6.59	2.44	-45.48	29.70	-30.20	42.36	33.33	9.03	4.693	
2,000.00	2,000.00	1,999.40	2,000.00	6.95	2.57	-45.48	29.70	-30.20	42.36	32.84	9.52	4.451	
2,100.00	2,100.00	2,099.40	2,100.00	7.31	2.70	-45.48	29.70	-30.20	42.36	32.35	10.01	4.233	
2,200.00	2,200.00	2,199.40	2,200.00	7.66	2.83	-45.48	29.70	-30.20	42.36	31.86	10.50	4.035	
2,300.00	2,300.00	2,299.40	2,300.00	8.02	2.96	-45.48	29.70	-30.20	42.36	31.37	10.99	3.855	
2,400.00	2,400.00	2,399.40	2,400.00	8.38	3.10	-45.48	29.70	-30.20	42.36	30.88	11.48	3.691	
2,500.00	2,500.00	2,499.40	2,500.00	8.74	3.23	-45.48	29.70	-30.20	42.36	30.39	11.97	3.539 CC, ES, SF	
2,600.00	2,599.98	2,599.38	2,599.98	9.08	3.36	-169.76	29.70	-30.20	44.07	31.63	12.44	3.542	
2,700.00	2,699.84	2,699.24	2,699.84	9.42	3.49	-170.82	29.70	-30.20	49.23	36.32	12.91	3.814	
2,800.00	2,799.49	2,798.89	2,799.49	9.75	3.62	-172.13	29.70	-30.20	57.42	44.05	13.38	4.293	
2,900.00	2,899.11	2,898.51	2,899.11	10.09	3.75	-173.16	29.70	-30.20	66.07	52.22	13.85	4.772	
3,000.00	2,998.73	2,998.13	2,998.73	10.43	3.89	-173.96	29.70	-30.20	74.73	60.41	14.32	5.219	
3,100.00	3,098.35	3,097.75	3,098.35	10.78	4.02	-174.59	29.70	-30.20	83.40	68.61	14.79	5.638	
3,200.00	3,197.97	3,197.37	3,197.97	11.12	4.15	-175.10	29.70	-30.20	92.08	76.81	15.27	6.030	
3,300.00	3,297.59	3,296.99	3,297.59	11.47	4.28	-175.52	29.70	-30.20	100.77	85.02	15.75	6.398	
3,400.00	3,397.21	3,396.61	3,397.21	11.82	4.41	-175.88	29.70	-30.20	109.46	93.23	16.23	6.743	
3,500.00	3,496.83	3,496.23	3,496.83	12.17	4.54	-176.18	29.70	-30.20	118.15	101.44	16.72	7.069	
3,600.00	3,596.45	3,595.85	3,596.45	12.53	4.67	-176.45	29.70	-30.20	126.85	109.65	17.20	7.375	
3,700.00	3,696.07	3,695.47	3,696.07	12.88	4.80	-176.67	29.70	-30.20	135.55	117.87	17.69	7.664	
3,800.00	3,795.69	3,795.09	3,795.69	13.24	4.94	-176.88	29.70	-30.20	144.25	126.08	18.17	7.937	
3,900.00	3,895.31	3,894.71	3,895.31	13.60	5.07	-177.05	29.70	-30.20	152.96	134.29	18.66	8.196	
4,000.00	3,994.93	3,994.33	3,994.93	13.95	5.20	-177.21	29.70	-30.20	161.66	142.51	19.15	8.441	
4,100.00	4,094.55	4,093.95	4,094.55	14.31	5.33	-177.35	29.70	-30.20	170.37	150.72	19.64	8.673	
4,200.00	4,194.17	4,193.57	4,194.17	14.67	5.46	-177.46	29.70	-30.20	179.07	158.94	20.14	8.894	
4,300.00	4,293.78	4,293.18	4,293.78	15.04	5.59	-177.60	29.70	-30.20	187.78	167.15	20.63	9.103	
4,400.00	4,393.40	4,392.80	4,393.40	15.40	5.72	-177.71	29.70	-30.20	196.49	175.37	21.12	9.303	
4,500.00	4,493.02	4,492.42	4,493.02	15.76	5.86	-177.80	29.70	-30.20	205.20	183.58	21.62	9.493	
4,600.00	4,592.64	4,592.04	4,592.64	16.12	5.99	-177.89	29.70	-30.20	213.91	191.80	22.11	9.674	
4,700.00	4,692.26	4,691.66	4,692.26	16.49	6.04	-177.98	29.70	-30.20	222.62	200.09	22.53	9.880	
4,800.00	4,791.88	4,791.28	4,791.88	16.85	6.07	-178.05	29.70	-30.20	231.33	208.41	22.92	10.092	
4,900.00	4,891.50	4,890.90	4,891.50	17.22	6.11	-178.12	29.70	-30.20	240.04	216.71	23.33	10.290	
5,000.00	4,991.12	4,990.52	4,991.12	17.59	6.17	-178.19	29.70	-30.20	248.75	225.00	23.75	10.472	
5,100.00	5,090.74	5,090.14	5,090.74	17.95	6.25	-178.25	29.70	-30.20	257.46	233.26	24.20	10.638	

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

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Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 201H - OH - Plan 1 10-11-17														Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Gyro, 4600-MWD+IFR1+MS														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside		Distance		Minimum		Separation		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
5,200.00	5,190.36	5,189.76	5,190.36	18.32	6.35	-178.31	29.70	-30.20	266.17	241.50	24.67	10.790			
5,300.00	5,289.98	5,289.38	5,289.98	18.69	6.47	-178.36	29.70	-30.20	274.88	249.73	25.15	10.928			
5,400.00	5,389.60	5,389.00	5,389.60	19.06	6.60	-178.41	29.70	-30.20	283.60	257.94	25.66	11.053			
5,500.00	5,489.22	5,488.62	5,489.22	19.43	6.75	-178.46	29.70	-30.20	292.31	266.13	26.18	11.167			
5,600.00	5,588.84	5,588.24	5,588.84	19.79	6.92	-178.50	29.70	-30.20	301.02	274.31	26.71	11.269			
5,700.00	5,688.46	5,680.33	5,680.92	20.16	7.08	-178.44	30.72	-30.67	310.80	283.55	27.25	11.406			
5,800.00	5,788.12	5,772.95	5,773.45	20.53	7.26	-178.12	34.37	-32.33	322.73	294.94	27.79	11.611			
5,900.00	5,887.98	5,872.45	5,872.81	20.89	7.47	-177.71	39.10	-34.49	332.40	304.04	28.36	11.721			
6,000.00	5,987.96	5,972.22	5,972.45	21.24	7.68	-53.43	43.86	-36.65	338.61	309.69	28.92	11.708			
6,100.00	6,087.96	6,072.08	6,072.17	21.58	7.91	-53.00	48.61	-38.82	343.21	313.71	29.49	11.638			
6,200.00	6,187.96	6,171.94	6,171.90	21.93	8.14	-52.59	53.37	-40.99	347.82	317.75	30.07	11.567			
6,300.00	6,287.96	6,271.81	6,271.62	22.27	8.39	-52.19	58.12	-43.15	352.44	321.79	30.66	11.496			
6,400.00	6,387.96	6,371.67	6,371.35	22.62	8.64	-51.80	62.88	-45.32	357.09	325.83	31.25	11.425			
6,500.00	6,487.96	6,471.53	6,471.08	22.96	8.90	-51.42	67.63	-47.49	361.75	329.89	31.86	11.355			
6,600.00	6,587.96	6,571.40	6,570.80	23.31	9.16	-51.05	72.39	-49.66	366.42	333.95	32.47	11.285			
6,700.00	6,687.96	6,671.26	6,670.53	23.65	9.44	-50.69	77.15	-51.82	371.11	338.02	33.09	11.216			
6,800.00	6,787.96	6,771.12	6,770.25	24.00	9.71	-50.34	81.90	-53.99	375.82	342.11	33.71	11.148			
6,900.00	6,887.96	6,870.99	6,869.98	24.34	10.00	-49.99	86.66	-56.16	380.53	346.19	34.34	11.081			
7,000.00	6,987.96	6,970.85	6,969.71	24.69	10.28	-49.66	91.41	-58.32	385.27	350.29	34.98	11.015			
7,100.00	7,087.96	7,070.71	7,069.43	25.04	10.58	-49.33	96.17	-60.49	390.01	354.40	35.62	10.951			
7,200.00	7,187.96	7,170.57	7,169.16	25.39	10.87	-49.01	100.93	-62.66	394.77	358.51	36.26	10.887			
7,300.00	7,287.96	7,270.44	7,268.88	25.73	11.17	-48.70	105.68	-64.83	399.54	362.63	36.91	10.826			
7,400.00	7,387.96	7,370.30	7,368.61	26.08	11.48	-48.40	110.44	-66.99	404.32	366.76	37.56	10.765			
7,500.00	7,487.96	7,470.16	7,468.34	26.43	11.78	-48.10	115.19	-69.16	409.11	370.90	38.21	10.705			
7,600.00	7,587.96	7,570.03	7,568.06	26.78	12.09	-47.81	119.95	-71.33	413.91	375.04	38.87	10.646			
7,700.00	7,687.96	7,669.89	7,667.79	27.13	12.41	-47.53	124.70	-73.50	418.72	379.19	39.53	10.592			
7,800.00	7,787.96	7,769.75	7,767.52	27.48	12.72	-47.25	129.46	-75.66	423.55	383.35	40.20	10.537			
7,900.00	7,887.96	7,869.61	7,867.24	27.82	13.04	-46.98	134.22	-77.83	428.38	387.52	40.86	10.483			
8,000.00	7,987.96	7,969.48	7,966.97	28.17	13.36	-46.72	138.97	-80.00	433.22	391.69	41.53	10.431			
8,100.00	8,087.96	8,069.34	8,066.69	28.52	13.68	-46.46	143.73	-82.17	438.07	395.87	42.20	10.380			
8,200.00	8,187.96	8,169.20	8,166.42	28.87	14.00	-46.20	148.48	-84.33	442.93	400.05	42.88	10.330			
8,300.00	8,287.96	8,269.07	8,266.15	29.22	14.33	-45.96	153.24	-86.50	447.80	404.25	43.55	10.282			
8,400.00	8,387.96	8,368.93	8,365.87	29.57	14.65	-45.71	158.00	-88.67	452.67	408.44	44.23	10.235			
8,500.00	8,487.96	8,468.79	8,465.60	29.93	14.98	-45.48	162.75	-90.84	457.56	412.65	44.91	10.189			
8,600.00	8,587.96	8,568.66	8,565.32	30.28	15.31	-45.25	167.51	-93.00	462.45	416.86	45.59	10.144			
8,700.00	8,687.96	8,668.52	8,665.05	30.63	15.64	-45.02	172.26	-95.17	467.35	421.08	46.27	10.101			
8,800.00	8,787.96	8,768.38	8,764.78	30.98	15.97	-44.80	177.02	-97.34	472.25	425.30	46.95	10.058			
8,900.00	8,887.96	8,868.24	8,864.50	31.33	16.31	-44.58	181.77	-99.50	477.17	429.53	47.64	10.017			
9,000.00	8,987.62	8,950.00	8,946.12	31.68	16.58	-44.37	186.03	-101.44	478.30	430.04	48.26	9.911			
9,100.00	9,083.91	9,000.00	8,995.57	32.00	16.75	-45.63	192.61	-104.44	473.12	424.37	48.75	9.705			
9,200.00	9,172.61	9,050.00	9,043.99	32.27	16.93	-47.93	203.87	-109.57	463.85	414.65	49.20	9.428			
9,300.00	9,249.87	9,100.00	9,090.86	32.49	17.10	-51.26	219.66	-116.77	451.69	402.11	49.59	9.109			
9,400.00	9,312.29	9,150.00	9,135.65	32.66	17.26	-55.54	239.83	-125.96	438.46	388.54	49.92	8.783			
9,500.00	9,357.15	9,200.00	9,177.88	32.85	17.42	-60.56	264.15	-137.05	426.60	376.33	50.27	8.486			
9,600.00	9,382.50	9,245.14	9,213.42	33.06	17.55	-65.47	289.45	-148.58	419.05	368.42	50.62	8.278			
9,643.08	9,387.59	9,264.85	9,228.08	33.16	17.60	-67.49	301.43	-154.04	418.10	367.33	50.77	8.235			
9,700.00	9,387.89	9,290.17	9,246.10	33.28	17.67	-70.17	317.62	-161.41	419.17	368.20	50.96	8.225			
9,800.00	9,387.48	9,341.20	9,279.43	33.55	17.80	-75.16	352.76	-177.43	433.21	381.86	51.35	8.436			
9,900.00	9,387.06	9,402.41	9,313.68	33.88	17.93	-80.24	398.87	-198.44	459.96	408.15	51.81	8.879			
10,000.00	9,386.64	9,475.00	9,345.50	34.26	18.06	-84.76	458.17	-225.46	494.94	442.62	52.32	9.460			
10,100.00	9,386.22	9,556.49	9,369.01	34.69	18.17	-87.88	529.08	-257.78	534.14	481.28	52.87	10.103			
10,200.00	9,385.80	9,644.97	9,379.14	35.18	18.28	-89.16	608.94	-294.18	574.81	521.35	53.46	10.752			

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 201H - OH - Plan 1 10-11-17													Offset Site Error:
Survey Program: 0-Scientific Gyro. 4600-MWD+IFR1+MS													Offset Well Error:
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
10,300.00	9,385.38	9,794.68	9,378.65	35.72	18.49	-89.25	747.70	-350.22	611.97	557.76	54.22	11.288	
10,400.00	9,384.96	9,965.97	9,377.89	36.31	18.87	-89.30	912.59	-396.24	638.31	583.13	55.18	11.567	
10,500.00	9,384.55	10,146.24	9,377.10	36.95	19.37	-89.32	1,090.72	-423.06	652.63	596.31	56.32	11.589	
10,600.00	9,384.13	10,298.83	9,376.44	37.62	19.84	-89.33	1,243.15	-428.62	655.15	597.69	57.46	11.402	
10,700.00	9,383.71	10,398.83	9,376.01	38.34	20.17	-89.33	1,343.15	-429.23	655.15	596.64	58.51	11.197	
10,800.00	9,383.29	10,498.83	9,375.58	39.10	20.52	-89.33	1,443.15	-429.83	655.15	595.52	59.63	10.988	
10,900.00	9,382.87	10,598.83	9,375.15	39.90	20.90	-89.32	1,543.15	-430.44	655.15	594.34	60.81	10.774	
11,000.00	9,382.45	10,698.83	9,374.72	40.73	21.31	-89.32	1,643.14	-431.04	655.15	593.11	62.04	10.560	
11,100.00	9,382.04	10,798.83	9,374.29	41.60	21.74	-89.32	1,743.14	-431.65	655.15	591.81	63.34	10.344	
11,200.00	9,381.62	10,898.83	9,373.86	42.49	22.18	-89.32	1,843.14	-432.25	655.15	590.47	64.68	10.129	
11,300.00	9,381.20	10,998.83	9,373.43	43.42	22.65	-89.32	1,943.13	-432.86	655.14	589.08	66.07	9.916	
11,400.00	9,380.78	11,098.83	9,373.00	44.37	23.13	-89.32	2,043.13	-433.46	655.14	587.64	67.50	9.706	
11,500.00	9,380.36	11,198.83	9,372.57	45.35	23.63	-89.32	2,143.13	-434.07	655.14	586.17	68.98	9.498	
11,600.00	9,379.94	11,298.83	9,372.14	46.35	24.14	-89.32	2,243.13	-434.67	655.14	584.65	70.49	9.294	
11,700.00	9,379.52	11,398.83	9,371.71	47.37	24.67	-89.32	2,343.12	-435.28	655.14	583.10	72.04	9.094	
11,800.00	9,379.11	11,498.83	9,371.28	48.41	25.21	-89.32	2,443.12	-435.88	655.14	581.52	73.62	8.899	
11,900.00	9,378.69	11,598.83	9,370.85	49.48	25.76	-89.31	2,543.12	-436.49	655.14	579.90	75.23	8.708	
12,000.00	9,378.27	11,698.83	9,370.42	50.56	26.32	-89.31	2,643.12	-437.09	655.14	578.26	76.88	8.522	
12,100.00	9,377.85	11,798.83	9,369.99	51.66	26.89	-89.31	2,743.11	-437.70	655.13	576.59	78.55	8.341	
12,200.00	9,377.43	11,898.83	9,369.56	52.78	27.47	-89.31	2,843.11	-438.30	655.13	574.89	80.24	8.164	
12,300.00	9,377.01	11,998.83	9,369.13	53.91	28.06	-89.31	2,943.11	-438.91	655.13	573.17	81.97	7.993	
12,400.00	9,376.59	12,098.83	9,368.70	55.05	28.66	-89.31	3,043.10	-439.51	655.13	571.42	83.71	7.826	
12,500.00	9,376.18	12,198.83	9,368.27	56.21	29.26	-89.31	3,143.10	-440.12	655.13	569.66	85.47	7.665	
12,600.00	9,375.76	12,298.83	9,367.84	57.38	29.87	-89.31	3,243.10	-440.73	655.13	567.87	87.26	7.508	
12,700.00	9,375.34	12,398.83	9,367.41	58.57	30.49	-89.31	3,343.10	-441.33	655.13	566.07	89.06	7.356	
12,800.00	9,374.92	12,498.83	9,366.98	59.76	31.12	-89.31	3,443.09	-441.94	655.12	564.24	90.88	7.209	
12,900.00	9,374.50	12,598.83	9,366.55	60.96	31.75	-89.30	3,543.09	-442.54	655.12	562.40	92.72	7.066	
13,000.00	9,374.08	12,698.83	9,366.12	62.18	32.39	-89.30	3,643.09	-443.15	655.12	560.55	94.57	6.927	
13,100.00	9,373.66	12,798.83	9,365.69	63.40	33.04	-89.30	3,743.08	-443.75	655.12	558.68	96.44	6.793	
13,200.00	9,373.25	12,898.83	9,365.26	64.64	33.69	-89.30	3,843.08	-444.36	655.12	556.80	98.32	6.663	
13,300.00	9,372.83	12,998.83	9,364.83	65.88	34.34	-89.30	3,943.08	-444.96	655.12	554.90	100.22	6.537	
13,400.00	9,372.41	13,098.83	9,364.40	67.12	35.00	-89.30	4,043.08	-445.57	655.12	552.99	102.12	6.415	
13,500.00	9,371.99	13,198.83	9,363.97	68.38	35.66	-89.30	4,143.07	-446.17	655.12	551.07	104.04	6.297	
13,600.00	9,371.57	13,298.83	9,363.54	69.64	36.33	-89.30	4,243.07	-446.78	655.11	549.14	105.97	6.182	
13,700.00	9,371.15	13,398.83	9,363.11	70.91	37.00	-89.30	4,343.07	-447.38	655.11	547.20	107.91	6.071	
13,800.00	9,370.73	13,498.83	9,362.68	72.19	37.67	-89.30	4,443.07	-447.99	655.11	545.25	109.87	5.963	
13,900.00	9,370.32	13,598.83	9,362.25	73.47	38.35	-89.29	4,543.06	-448.59	655.11	543.28	111.83	5.858	
14,000.00	9,369.90	13,698.83	9,361.82	74.76	39.03	-89.29	4,643.06	-449.20	655.11	541.31	113.80	5.756	
14,100.00	9,369.48	13,798.83	9,361.39	76.05	39.71	-89.29	4,743.06	-449.80	655.11	539.32	115.79	5.658	
14,200.00	9,369.06	13,898.83	9,360.96	77.35	40.40	-89.29	4,843.05	-450.41	655.11	537.33	117.77	5.562	
14,300.00	9,368.64	13,998.83	9,360.53	78.65	41.09	-89.29	4,943.05	-451.01	655.10	535.33	119.77	5.470	
14,400.00	9,368.22	14,098.83	9,360.10	79.96	41.78	-89.29	5,043.05	-451.62	655.10	533.33	121.78	5.380	
14,500.00	9,367.81	14,198.83	9,359.67	81.27	42.47	-89.29	5,143.05	-452.23	655.10	531.31	123.79	5.292	
14,600.00	9,367.39	14,298.83	9,359.24	82.59	43.17	-89.29	5,243.04	-452.83	655.10	529.30	125.80	5.207	
14,700.00	9,366.97	14,398.83	9,358.81	83.91	43.87	-89.29	5,343.04	-453.44	655.10	527.27	127.83	5.125	
14,800.00	9,366.55	14,498.83	9,358.38	85.23	44.57	-89.29	5,443.04	-454.04	655.10	525.24	129.86	5.045	
14,900.00	9,366.13	14,598.83	9,357.95	86.56	45.27	-89.28	5,543.04	-454.65	655.10	523.20	131.89	4.967	
15,000.00	9,365.71	14,698.83	9,357.52	87.89	45.98	-89.28	5,643.03	-455.25	655.10	521.16	133.93	4.891	
15,100.00	9,365.29	14,798.83	9,357.09	89.22	46.69	-89.28	5,743.03	-455.86	655.09	519.11	135.98	4.818	
15,200.00	9,364.88	14,898.83	9,356.66	90.56	47.40	-89.28	5,843.03	-456.46	655.09	517.06	138.03	4.746	
15,300.00	9,364.46	14,998.83	9,356.23	91.90	48.11	-89.28	5,943.02	-457.07	655.09	515.00	140.09	4.676	
15,400.00	9,364.04	15,098.83	9,355.80	93.24	48.82	-89.28	6,043.02	-457.67	655.09	512.94	142.15	4.609	

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
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Output errors are at 2.00 sigma
Database: USA Compass
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Offset Design Eider Federal - 201H - OH - Plan 1 10-11-17														Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Gyro. 4600-MWD+IFR1+MS														Offset Well Error:	0.00 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		
15,500.00	9,363.62	15,198.83	9,355.37	94.59	49.53	-89.28	6,143.02	-458.28	655.09	510.88	144.21	4.543			
15,600.00	9,363.20	15,298.83	9,354.94	95.93	50.25	-89.28	6,243.02	-458.88	655.09	508.81	146.28	4.478			
15,700.00	9,362.78	15,398.83	9,354.51	97.28	50.96	-89.28	6,343.01	-459.49	655.09	506.73	148.35	4.416			
15,800.00	9,362.36	15,498.83	9,354.08	98.64	51.68	-89.28	6,443.01	-460.09	655.08	504.65	150.43	4.355			
15,900.00	9,361.95	15,598.83	9,353.65	99.99	52.40	-89.27	6,543.01	-460.70	655.08	502.57	152.51	4.295			
16,000.00	9,361.53	15,698.83	9,353.22	101.35	53.12	-89.27	6,643.01	-461.30	655.08	500.49	154.59	4.237			
16,100.00	9,361.11	15,798.83	9,352.79	102.71	53.84	-89.27	6,743.00	-461.91	655.08	498.40	156.68	4.181			
16,200.00	9,360.69	15,898.83	9,352.36	104.07	54.57	-89.27	6,843.00	-462.51	655.08	496.31	158.77	4.126			
16,300.00	9,360.27	15,998.83	9,351.93	105.44	55.29	-89.27	6,943.00	-463.12	655.08	494.21	160.87	4.072			
16,400.00	9,359.85	16,098.83	9,351.50	106.80	56.02	-89.27	7,042.99	-463.73	655.08	492.11	162.96	4.020			
16,500.00	9,359.43	16,198.83	9,351.07	108.17	56.74	-89.27	7,142.99	-464.33	655.08	490.01	165.06	3.969			
16,600.00	9,359.02	16,298.83	9,350.64	109.54	57.47	-89.27	7,242.99	-464.94	655.07	487.91	167.17	3.919			
16,700.00	9,358.60	16,398.83	9,350.21	110.91	58.20	-89.27	7,342.99	-465.54	655.07	485.80	169.27	3.870			
16,800.00	9,358.18	16,498.83	9,349.78	112.28	58.93	-89.27	7,442.98	-466.15	655.07	483.69	171.38	3.822			
16,841.43	9,358.01	16,540.26	9,349.60	112.85	59.23	-89.26	7,484.41	-466.40	655.07	482.82	172.25	3.803			
16,842.72	9,358.00	16,540.75	9,349.60	112.87	59.23	-89.26	7,484.90	-466.40	655.07	482.80	172.27	3.802			

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 301H - OH - Plan 1 04-06-18													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													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	0.00	1.00	0.00	0.00	-90.57	-0.60	-59.90	59.91					
100.00	100.00	99.00	100.00	0.14	0.13	-90.57	-0.60	-59.90	59.90	59.63	0.27	220.982		
200.00	200.00	199.00	200.00	0.49	0.49	-90.57	-0.60	-59.90	59.90	58.92	0.99	60.766		
300.00	300.00	299.00	300.00	0.85	0.85	-90.57	-0.60	-59.90	59.90	58.20	1.70	35.180		
400.00	400.00	399.00	400.00	1.21	1.21	-90.57	-0.60	-59.90	59.90	57.48	2.42	24.757		
500.00	500.00	499.00	500.00	1.57	1.57	-90.57	-0.60	-59.90	59.90	56.77	3.14	19.098		
600.00	600.00	599.00	600.00	1.93	1.92	-90.57	-0.60	-59.90	59.90	56.05	3.85	15.545		
700.00	700.00	699.00	700.00	2.29	2.28	-90.57	-0.60	-59.90	59.90	55.33	4.57	13.106		
800.00	800.00	799.00	800.00	2.65	2.64	-90.57	-0.60	-59.90	59.90	54.62	5.29	11.329		
900.00	900.00	899.00	900.00	3.00	3.00	-90.57	-0.60	-59.90	59.90	53.90	6.00	9.977		
1,000.00	1,000.00	999.00	1,000.00	3.36	3.36	-90.57	-0.60	-59.90	59.90	53.18	6.72	8.912		
1,100.00	1,100.00	1,099.00	1,100.00	3.72	3.72	-90.57	-0.60	-59.90	59.90	52.46	7.44	8.053		
1,200.00	1,200.00	1,199.00	1,200.00	4.08	4.08	-90.57	-0.60	-59.90	59.90	51.75	8.16	7.345		
1,300.00	1,300.00	1,299.00	1,300.00	4.44	4.43	-90.57	-0.60	-59.90	59.90	51.03	8.87	6.752		
1,400.00	1,400.00	1,399.00	1,400.00	4.80	4.79	-90.57	-0.60	-59.90	59.90	50.31	9.59	6.247		
1,500.00	1,500.00	1,499.00	1,500.00	5.15	5.15	-90.57	-0.60	-59.90	59.90	49.60	10.31	5.812		
1,600.00	1,600.00	1,599.00	1,600.00	5.51	5.51	-90.57	-0.60	-59.90	59.90	48.88	11.02	5.434		
1,700.00	1,700.00	1,699.00	1,700.00	5.87	5.87	-90.57	-0.60	-59.90	59.90	48.16	11.74	5.102		
1,800.00	1,800.00	1,799.00	1,800.00	6.23	6.23	-90.57	-0.60	-59.90	59.90	47.45	12.46	4.809		
1,900.00	1,900.00	1,899.00	1,900.00	6.59	6.59	-90.57	-0.60	-59.90	59.90	46.73	13.17	4.547		
2,000.00	2,000.00	1,999.00	2,000.00	6.95	6.94	-90.57	-0.60	-59.90	59.90	46.01	13.89	4.312		
2,100.00	2,100.00	2,099.00	2,100.00	7.31	7.30	-90.57	-0.60	-59.90	59.90	45.30	14.61	4.101		
2,200.00	2,200.00	2,199.00	2,200.00	7.66	7.66	-90.57	-0.60	-59.90	59.90	44.58	15.32	3.909		
2,300.00	2,300.00	2,299.00	2,300.00	8.02	8.02	-90.57	-0.60	-59.90	59.90	43.86	16.04	3.734		
2,400.00	2,400.00	2,399.00	2,400.00	8.38	8.38	-90.57	-0.60	-59.90	59.90	43.14	16.76	3.574		
2,500.00	2,500.00	2,499.00	2,500.00	8.74	8.74	-90.57	-0.60	-59.90	59.90	42.43	17.48	3.428 CC, ES, SF		
2,600.00	2,599.98	2,596.93	2,597.91	9.08	9.08	146.07	-0.96	-61.49	62.98	44.82	18.16	3.468		
2,700.00	2,699.84	2,694.26	2,695.11	9.42	9.41	147.31	-2.15	-66.30	72.27	53.45	18.82	3.839		
2,800.00	2,799.49	2,790.50	2,791.01	9.75	9.74	148.71	-4.06	-74.20	87.40	67.91	19.49	4.485		
2,900.00	2,899.11	2,887.80	2,887.70	10.09	10.07	149.46	-6.60	-84.71	105.46	85.30	20.16	5.230		
3,000.00	2,998.73	2,986.11	2,985.38	10.43	10.41	149.97	-9.22	-95.53	123.73	102.88	20.85	5.935		
3,100.00	3,098.35	3,084.43	3,083.06	10.78	10.76	150.34	-11.83	-106.36	142.01	120.48	21.54	6.594		
3,200.00	3,197.97	3,182.74	3,180.74	11.12	11.11	150.63	-14.45	-117.18	160.30	138.07	22.23	7.211		
3,300.00	3,297.59	3,281.05	3,278.42	11.47	11.46	150.86	-17.07	-128.00	178.58	155.66	22.93	7.789		
3,400.00	3,397.21	3,379.36	3,376.10	11.82	11.81	151.05	-19.68	-138.82	196.88	173.24	23.63	8.331		
3,500.00	3,496.83	3,477.67	3,473.77	12.17	12.16	151.20	-22.30	-149.64	215.17	190.83	24.34	8.841		
3,600.00	3,596.45	3,575.98	3,571.45	12.53	12.52	151.33	-24.92	-160.47	233.46	208.41	25.05	9.321		
3,700.00	3,696.07	3,674.29	3,669.13	12.88	12.88	151.45	-27.53	-171.29	251.76	226.00	25.76	9.773		
3,800.00	3,795.69	3,772.60	3,766.81	13.24	13.24	151.54	-30.15	-182.11	270.05	243.57	26.48	10.200		
3,900.00	3,895.31	3,870.92	3,864.49	13.60	13.60	151.63	-32.77	-192.93	288.35	261.15	27.19	10.603		
4,000.00	3,994.93	3,969.23	3,962.17	13.95	13.96	151.70	-35.38	-203.75	306.64	278.73	27.91	10.985		
4,100.00	4,094.55	4,067.54	4,059.85	14.31	14.32	151.77	-38.00	-214.57	324.94	296.30	28.64	11.347		
4,200.00	4,194.17	4,165.85	4,157.53	14.67	14.69	151.83	-40.62	-225.40	343.24	313.87	29.36	11.690		
4,300.00	4,293.78	4,264.16	4,255.20	15.04	15.05	151.88	-43.23	-236.22	361.53	331.44	30.09	12.015		
4,400.00	4,393.40	4,362.47	4,352.88	15.40	15.42	151.93	-45.85	-247.04	379.83	349.01	30.82	12.325		
4,500.00	4,493.02	4,460.78	4,450.56	15.76	15.79	151.97	-48.47	-257.86	398.13	366.58	31.55	12.619		
4,600.00	4,592.64	4,559.09	4,548.24	16.12	16.16	152.01	-51.08	-268.68	416.43	384.15	32.28	12.900		
4,700.00	4,692.26	4,657.41	4,645.92	16.49	16.53	152.05	-53.70	-279.50	434.73	401.71	33.01	13.168		
4,800.00	4,791.88	4,755.72	4,743.60	16.85	16.89	152.08	-56.32	-290.33	453.03	419.28	33.75	13.423		
4,900.00	4,891.50	4,854.03	4,841.28	17.22	17.27	152.11	-58.93	-301.15	471.32	436.84	34.49	13.667		
5,000.00	4,991.12	4,952.34	4,938.96	17.59	17.64	152.14	-61.55	-311.97	489.62	454.40	35.22	13.901		
5,100.00	5,090.74	5,050.65	5,036.63	17.95	18.01	152.17	-64.17	-322.79	507.92	471.96	35.96	14.124		

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 301H - OH - Plan 1 04-06-18														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		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		
5,200.00	5,190.36	5,148.96	5,134.31	18.32	18.38	152.19	-66.78	-333.61	526.22	489.52	36.70	14.338			
5,300.00	5,289.98	5,247.27	5,231.99	18.69	18.75	152.21	-69.40	-344.44	544.52	507.08	37.44	14.543			
5,400.00	5,389.60	5,345.58	5,329.67	19.06	19.13	152.24	-72.02	-355.26	562.82	524.64	38.18	14.740			
5,500.00	5,489.22	5,443.89	5,427.35	19.43	19.50	152.26	-74.63	-366.08	581.12	542.19	38.93	14.929			
5,600.00	5,588.84	5,542.21	5,525.03	19.79	19.87	152.27	-77.25	-376.90	599.42	559.75	39.67	15.111			
5,700.00	5,688.46	5,640.52	5,622.71	20.16	20.25	152.29	-79.87	-387.72	617.72	577.31	40.41	15.285			
5,800.00	5,788.12	5,738.91	5,720.46	20.53	20.62	152.38	-82.48	-398.55	635.59	594.43	41.16	15.443			
5,900.00	5,887.98	5,837.73	5,818.65	20.89	21.00	152.39	-85.12	-409.43	650.75	608.86	41.89	15.533			
6,000.00	5,987.96	5,936.95	5,917.23	21.24	21.38	-83.91	-87.76	-420.35	662.86	620.24	42.62	15.552			
6,100.00	6,087.96	6,036.30	6,015.95	21.58	21.76	-84.23	-90.40	-431.29	673.54	630.20	43.35	15.539			
6,200.00	6,187.96	6,135.66	6,114.66	21.93	22.14	-84.55	-93.04	-442.23	684.24	640.17	44.07	15.527			
6,300.00	6,287.96	6,235.02	6,213.38	22.27	22.52	-84.85	-95.69	-453.16	694.97	650.17	44.79	15.515			
6,400.00	6,387.96	6,334.37	6,312.10	22.62	22.90	-85.15	-98.33	-464.10	705.71	660.19	45.52	15.504			
6,500.00	6,487.96	6,433.73	6,410.82	22.96	23.28	-85.43	-100.98	-475.04	716.46	670.22	46.24	15.493			
6,600.00	6,587.96	6,533.09	6,509.53	23.31	23.66	-85.71	-103.62	-485.97	727.24	680.27	46.97	15.483			
6,700.00	6,687.96	6,632.44	6,608.25	23.65	24.05	-85.98	-106.27	-496.91	738.03	690.33	47.70	15.473			
6,800.00	6,787.96	6,731.80	6,706.97	24.00	24.43	-86.24	-108.91	-507.85	748.84	700.41	48.43	15.463			
6,900.00	6,887.96	6,831.16	6,805.69	24.34	24.81	-86.50	-111.56	-518.78	759.66	710.51	49.16	15.454			
7,000.00	6,987.96	6,930.51	6,904.40	24.69	25.19	-86.74	-114.20	-529.72	770.50	720.62	49.88	15.446			
7,100.00	7,087.96	7,029.87	7,003.12	25.04	25.58	-86.98	-116.85	-540.66	781.35	730.74	50.61	15.437			
7,200.00	7,187.96	7,129.23	7,101.84	25.39	25.96	-87.22	-119.49	-551.60	792.22	740.87	51.34	15.430			
7,300.00	7,287.96	7,228.58	7,200.56	25.73	26.34	-87.45	-122.13	-562.53	803.10	751.02	52.07	15.422			
7,400.00	7,387.96	7,327.94	7,299.27	26.08	26.72	-87.67	-124.78	-573.47	813.98	761.18	52.81	15.415			
7,500.00	7,487.96	7,427.30	7,397.99	26.43	27.11	-87.88	-127.42	-584.41	824.89	771.35	53.54	15.408			
7,600.00	7,587.96	7,526.65	7,496.71	26.78	27.49	-88.09	-130.07	-595.34	835.80	781.53	54.27	15.401			
7,700.00	7,687.96	7,626.01	7,595.43	27.13	27.88	-88.30	-132.71	-606.28	846.72	791.72	55.00	15.394			
7,800.00	7,787.96	7,725.37	7,694.14	27.48	28.26	-88.50	-135.36	-617.22	857.66	801.92	55.74	15.388			
7,900.00	7,887.96	7,824.72	7,792.86	27.82	28.64	-88.69	-138.00	-628.15	868.60	812.13	56.47	15.382			
8,000.00	7,987.96	7,924.08	7,891.58	28.17	29.03	-88.88	-140.65	-639.09	879.55	822.35	57.20	15.376			
8,100.00	8,087.96	8,023.44	7,990.30	28.52	29.41	-89.07	-143.29	-650.03	890.52	832.58	57.94	15.371			
8,200.00	8,187.96	8,122.79	8,089.01	28.87	29.80	-89.25	-145.93	-660.96	901.49	842.82	58.67	15.365			
8,300.00	8,287.96	8,222.15	8,187.73	29.22	30.18	-89.42	-148.58	-671.90	912.47	853.06	59.41	15.360			
8,400.00	8,387.96	8,321.51	8,286.45	29.57	30.57	-89.60	-151.22	-682.84	923.46	863.32	60.14	15.355			
8,500.00	8,487.96	8,420.86	8,385.17	29.93	30.95	-89.76	-153.87	-693.77	934.45	873.58	60.88	15.350			
8,600.00	8,587.96	8,520.22	8,483.88	30.28	31.34	-89.93	-156.51	-704.71	945.46	883.85	61.61	15.346			
8,700.00	8,687.96	8,619.58	8,582.60	30.63	31.72	-90.09	-159.16	-715.65	956.47	894.12	62.35	15.341			
8,800.00	8,787.96	8,718.93	8,681.32	30.98	32.11	-90.24	-161.80	-726.59	967.49	904.41	63.08	15.337			
8,900.00	8,887.96	8,847.31	8,809.01	31.33	32.60	-90.42	-164.91	-739.43	977.65	913.73	63.92	15.294			
9,000.00	8,987.62	8,996.51	8,957.95	31.68	33.14	-90.27	-166.90	-747.69	983.22	918.40	64.82	15.169			
9,100.00	9,083.91	9,122.48	9,083.91	32.00	33.57	-91.96	-167.23	-749.02	984.72	919.16	65.56	15.019			
9,200.00	9,172.61	9,211.19	9,172.61	32.27	33.86	-93.98	-167.23	-749.02	987.46	921.33	66.13	14.931			
9,300.00	9,249.87	9,289.88	9,251.30	32.49	34.12	-95.98	-167.20	-749.02	994.70	928.09	66.61	14.932			
9,400.00	9,312.29	9,405.77	9,365.91	32.66	34.49	-99.09	-152.07	-749.12	1,007.20	940.05	67.15	14.998			
9,500.00	9,357.15	9,566.51	9,511.93	32.85	34.92	-102.97	-86.70	-749.52	1,022.75	954.97	67.77	15.091			
9,600.00	9,382.50	9,811.24	9,672.49	33.06	35.26	-107.43	94.44	-750.64	1,036.42	968.08	68.34	15.166			
9,700.00	9,387.89	10,070.12	9,723.64	33.28	35.45	-108.84	345.20	-752.20	1,039.83	971.09	68.74	15.127			
9,800.00	9,387.48	10,170.12	9,722.41	33.55	35.64	-108.80	445.19	-752.81	1,039.58	970.38	69.20	15.023			
9,900.00	9,387.06	10,270.12	9,721.19	33.88	35.93	-108.75	545.18	-753.43	1,039.33	969.52	69.81	14.888			
10,000.00	9,386.64	10,370.11	9,719.96	34.26	36.30	-108.71	645.17	-754.05	1,039.08	968.53	70.55	14.728			
10,100.00	9,386.22	10,470.11	9,718.73	34.69	36.72	-108.67	745.15	-754.67	1,038.84	967.43	71.41	14.547			
10,200.00	9,385.80	10,570.11	9,717.50	35.18	37.19	-108.63	845.14	-755.29	1,038.59	966.21	72.37	14.350			
10,300.00	9,385.38	10,670.10	9,716.27	35.72	37.71	-108.58	945.13	-755.91	1,038.34	964.90	73.44	14.139			

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 301H - OH - Plan 1 04-06-18													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 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
10,400.00	9,384.96	10,770.10	9,715.05	36.31	38.29	-108.54	1,045.11	-756.53	1,038.10	963.50	74.60	13.916	
10,500.00	9,384.55	10,870.10	9,713.82	36.95	38.90	-108.50	1,145.10	-757.15	1,037.85	962.01	75.85	13.683	
10,600.00	9,384.13	10,970.09	9,712.59	37.62	39.56	-108.46	1,245.09	-757.77	1,037.61	960.43	77.18	13.444	
10,700.00	9,383.71	11,070.09	9,711.36	38.34	40.26	-108.41	1,345.08	-758.39	1,037.36	958.76	78.60	13.198	
10,800.00	9,383.29	11,170.09	9,710.14	39.10	40.99	-108.37	1,445.06	-759.01	1,037.12	957.03	80.09	12.949	
10,900.00	9,382.87	11,270.08	9,708.91	39.90	41.76	-108.33	1,545.05	-759.63	1,036.88	955.21	81.66	12.697	
11,000.00	9,382.45	11,370.08	9,707.68	40.73	42.57	-108.29	1,645.04	-760.25	1,036.64	953.34	83.30	12.445	
11,100.00	9,382.04	11,470.08	9,706.45	41.60	43.41	-108.24	1,745.03	-760.86	1,036.39	951.39	85.00	12.193	
11,200.00	9,381.62	11,570.07	9,705.22	42.49	44.27	-108.20	1,845.01	-761.48	1,036.15	949.39	86.77	11.942	
11,300.00	9,381.20	11,670.07	9,704.00	43.42	45.17	-108.16	1,945.00	-762.10	1,035.91	947.33	88.59	11.694	
11,400.00	9,380.78	11,770.07	9,702.77	44.37	46.09	-108.11	2,044.99	-762.72	1,035.67	945.21	90.46	11.449	
11,500.00	9,380.36	11,870.06	9,701.54	45.35	47.04	-108.07	2,144.97	-763.34	1,035.43	943.04	92.39	11.207	
11,600.00	9,379.94	11,970.06	9,700.31	46.35	48.02	-108.03	2,244.96	-763.96	1,035.19	940.83	94.36	10.970	
11,700.00	9,379.52	12,070.06	9,699.09	47.37	49.01	-107.99	2,344.95	-764.58	1,034.96	938.57	96.38	10.738	
11,800.00	9,379.11	12,170.05	9,697.86	48.41	50.03	-107.94	2,444.94	-765.20	1,034.72	936.27	98.44	10.511	
11,900.00	9,378.69	12,270.05	9,696.63	49.48	51.07	-107.90	2,544.92	-765.82	1,034.48	933.93	100.55	10.289	
12,000.00	9,378.27	12,370.05	9,695.40	50.56	52.12	-107.86	2,644.91	-766.44	1,034.24	931.56	102.68	10.072	
12,100.00	9,377.85	12,470.05	9,694.17	51.66	53.20	-107.81	2,744.90	-767.06	1,034.01	929.15	104.86	9.861	
12,200.00	9,377.43	12,570.04	9,692.95	52.78	54.29	-107.77	2,844.89	-767.68	1,033.77	926.71	107.07	9.656	
12,300.00	9,377.01	12,670.04	9,691.72	53.91	55.39	-107.73	2,944.87	-768.30	1,033.54	924.24	109.30	9.456	
12,400.00	9,376.59	12,770.04	9,690.49	55.05	56.52	-107.69	3,044.86	-768.92	1,033.30	921.74	111.57	9.262	
12,500.00	9,376.18	12,870.03	9,689.26	56.21	57.65	-107.64	3,144.85	-769.53	1,033.07	919.21	113.86	9.073	
12,600.00	9,375.76	12,970.03	9,688.04	57.38	58.80	-107.60	3,244.83	-770.15	1,032.84	916.66	116.18	8.890	
12,700.00	9,375.34	13,070.03	9,686.81	58.57	59.96	-107.56	3,344.82	-770.77	1,032.61	914.08	118.53	8.712	
12,800.00	9,374.92	13,170.02	9,685.58	59.76	61.13	-107.51	3,444.81	-771.39	1,032.37	911.48	120.89	8.540	
12,900.00	9,374.50	13,270.02	9,684.35	60.96	62.31	-107.47	3,544.80	-772.01	1,032.14	908.86	123.28	8.372	
13,000.00	9,374.08	13,370.02	9,683.12	62.18	63.51	-107.43	3,644.78	-772.63	1,031.91	906.22	125.69	8.210	
13,100.00	9,373.66	13,470.01	9,681.90	63.40	64.71	-107.38	3,744.77	-773.25	1,031.68	903.57	128.12	8.053	
13,200.00	9,373.25	13,570.01	9,680.67	64.64	65.92	-107.34	3,844.76	-773.87	1,031.45	900.89	130.56	7.900	
13,300.00	9,372.83	13,670.01	9,679.44	65.88	67.15	-107.30	3,944.75	-774.49	1,031.22	898.20	133.02	7.752	
13,400.00	9,372.41	13,770.00	9,678.21	67.12	68.38	-107.25	4,044.73	-775.11	1,031.00	895.49	135.50	7.609	
13,500.00	9,371.99	13,870.00	9,676.99	68.38	69.61	-107.21	4,144.72	-775.73	1,030.77	892.77	138.00	7.470	
13,600.00	9,371.57	13,970.00	9,675.76	69.64	70.86	-107.17	4,244.71	-776.35	1,030.54	890.04	140.50	7.335	
13,700.00	9,371.15	14,069.99	9,674.53	70.91	72.11	-107.13	4,344.69	-776.97	1,030.31	887.29	143.03	7.204	
13,800.00	9,370.73	14,169.99	9,673.30	72.19	73.37	-107.08	4,444.68	-777.59	1,030.09	884.53	145.56	7.077	
13,900.00	9,370.32	14,269.99	9,672.07	73.47	74.64	-107.04	4,544.67	-778.20	1,029.86	881.75	148.11	6.953	
14,000.00	9,369.90	14,369.98	9,670.85	74.76	75.91	-107.00	4,644.66	-778.82	1,029.64	878.97	150.67	6.834	
14,100.00	9,369.48	14,469.98	9,669.62	76.05	77.19	-106.95	4,744.64	-779.44	1,029.41	876.18	153.24	6.718	
14,200.00	9,369.06	14,569.98	9,668.39	77.35	78.47	-106.91	4,844.63	-780.06	1,029.19	873.37	155.82	6.605	
14,300.00	9,368.64	14,669.97	9,667.16	78.65	79.76	-106.87	4,944.62	-780.68	1,028.97	870.56	158.41	6.496	
14,400.00	9,368.22	14,769.97	9,665.94	79.96	81.05	-106.82	5,044.61	-781.30	1,028.74	867.74	161.01	6.389	
14,500.00	9,367.81	14,869.97	9,664.71	81.27	82.35	-106.78	5,144.59	-781.92	1,028.52	864.90	163.62	6.286	
14,600.00	9,367.39	14,969.96	9,663.48	82.59	83.65	-106.74	5,244.58	-782.54	1,028.30	862.07	166.24	6.186	
14,700.00	9,366.97	15,069.96	9,662.25	83.91	84.96	-106.69	5,344.57	-783.16	1,028.08	859.22	168.86	6.088	
14,800.00	9,366.55	15,169.96	9,661.02	85.23	86.27	-106.65	5,444.55	-783.78	1,027.86	856.36	171.50	5.993	
14,900.00	9,366.13	15,269.95	9,659.80	86.56	87.58	-106.61	5,544.54	-784.40	1,027.64	853.50	174.14	5.901	
15,000.00	9,365.71	15,369.95	9,658.57	87.89	88.90	-106.56	5,644.53	-785.02	1,027.42	850.63	176.79	5.812	
15,100.00	9,365.29	15,469.95	9,657.34	89.22	90.22	-106.52	5,744.52	-785.64	1,027.20	847.76	179.44	5.724	
15,200.00	9,364.88	15,569.94	9,656.11	90.56	91.55	-106.48	5,844.50	-786.26	1,026.99	844.88	182.11	5.639	
15,300.00	9,364.46	15,669.94	9,654.89	91.90	92.88	-106.43	5,944.49	-786.87	1,026.77	841.99	184.78	5.557	
15,400.00	9,364.04	15,769.94	9,653.66	93.24	94.21	-106.39	6,044.48	-787.49	1,026.55	839.10	187.45	5.476	
15,500.00	9,363.62	15,869.93	9,652.43	94.59	95.55	-106.34	6,144.47	-788.11	1,026.34	836.21	190.13	5.398	

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: Eider Federal
 Site Error: 0.00 usft
 Reference Well: 202H
 Well Error: 0.00 usft
 Reference Wellbore: OH
 Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (Ensign 155)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: USA Compass
 Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 301H - OH - Plan 1 04-06-18														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														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			
15,600.00	9,363.20	15,969.93	9,651.20	95.93	96.88	-106.30	6,244.45	-788.73	1,026.12	833.30	192.82	5.322			
15,700.00	9,362.78	16,069.93	9,649.97	97.28	98.22	-106.26	6,344.44	-789.35	1,025.91	830.40	195.51	5.247			
15,800.00	9,362.36	16,169.92	9,648.75	98.64	99.57	-106.21	6,444.43	-789.97	1,025.69	827.49	198.21	5.175			
15,900.00	9,361.95	16,269.92	9,647.52	99.99	100.91	-106.17	6,544.41	-790.59	1,025.48	824.57	200.91	5.104			
16,000.00	9,361.53	16,369.92	9,646.29	101.35	102.26	-106.13	6,644.40	-791.21	1,025.27	821.65	203.61	5.035			
16,100.00	9,361.11	16,469.91	9,645.06	102.71	103.61	-106.08	6,744.39	-791.83	1,025.05	818.73	206.32	4.968			
16,200.00	9,360.69	16,569.91	9,643.84	104.07	104.97	-106.04	6,844.38	-792.45	1,024.84	815.80	209.04	4.903			
16,300.00	9,360.27	16,669.91	9,642.61	105.44	106.32	-106.00	6,944.36	-793.07	1,024.63	812.87	211.76	4.839			
16,400.00	9,359.85	16,769.90	9,641.38	106.80	107.68	-105.95	7,044.35	-793.69	1,024.42	809.94	214.48	4.776			
16,500.00	9,359.43	16,869.90	9,640.15	108.17	109.04	-105.91	7,144.34	-794.31	1,024.21	807.00	217.21	4.715			
16,600.00	9,359.02	16,969.90	9,638.92	109.54	110.40	-105.86	7,244.33	-794.92	1,024.00	804.06	219.94	4.656			
16,700.00	9,358.60	17,069.89	9,637.70	110.91	111.76	-105.82	7,344.31	-795.54	1,023.79	801.12	222.67	4.598			
16,800.00	9,358.18	17,169.89	9,636.47	112.28	113.13	-105.78	7,444.30	-796.16	1,023.58	798.17	225.41	4.541			
16,840.20	9,358.01	17,208.09	9,636.00	112.84	113.65	-105.76	7,482.50	-796.40	1,023.50	797.02	226.49	4.519			
16,842.72	9,358.00	17,208.09	9,636.00	112.87	113.65	-105.76	7,482.50	-796.40	1,023.50	796.98	226.52	4.518			

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 302H - OH - Plan 1 10-11-17														Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Gyro, 4600-MWD+IFR1+MS														Offset Well Error:	0.00 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	0.90	0.00	0.00	-90.57	-0.30	-30.00	30.01						
100.00	100.00	99.10	100.00	0.14	0.07	-90.57	-0.30	-30.00	30.00	29.80	0.20	147.364			
200.00	200.00	199.10	200.00	0.49	0.20	-90.57	-0.30	-30.00	30.00	29.31	0.69	43.430			
300.00	300.00	299.10	300.00	0.85	0.33	-90.57	-0.30	-30.00	30.00	28.82	1.18	25.412			
400.00	400.00	399.10	400.00	1.21	0.46	-90.57	-0.30	-30.00	30.00	28.33	1.67	17.958			
500.00	500.00	499.10	500.00	1.57	0.59	-90.57	-0.30	-30.00	30.00	27.84	2.16	13.884			
600.00	600.00	599.10	600.00	1.93	0.72	-90.57	-0.30	-30.00	30.00	27.35	2.65	11.317			
700.00	700.00	699.10	700.00	2.29	0.85	-90.57	-0.30	-30.00	30.00	26.86	3.14	9.551			
800.00	800.00	799.10	800.00	2.65	0.99	-90.57	-0.30	-30.00	30.00	26.37	3.63	8.261			
900.00	900.00	899.10	900.00	3.00	1.12	-90.57	-0.30	-30.00	30.00	25.88	4.12	7.279			
1,000.00	1,000.00	999.10	1,000.00	3.36	1.25	-90.57	-0.30	-30.00	30.00	25.39	4.61	6.505			
1,100.00	1,100.00	1,099.10	1,100.00	3.72	1.38	-90.57	-0.30	-30.00	30.00	24.90	5.10	5.880			
1,200.00	1,200.00	1,199.10	1,200.00	4.08	1.51	-90.57	-0.30	-30.00	30.00	24.41	5.59	5.364			
1,300.00	1,300.00	1,299.10	1,300.00	4.44	1.65	-90.57	-0.30	-30.00	30.00	23.92	6.08	4.932			
1,400.00	1,400.00	1,399.10	1,400.00	4.80	1.78	-90.57	-0.30	-30.00	30.00	23.43	6.57	4.564			
1,500.00	1,500.00	1,499.10	1,500.00	5.15	1.91	-90.57	-0.30	-30.00	30.00	22.94	7.06	4.247			
1,600.00	1,600.00	1,599.10	1,600.00	5.51	2.04	-90.57	-0.30	-30.00	30.00	22.45	7.55	3.972			
1,700.00	1,700.00	1,699.10	1,700.00	5.87	2.17	-90.57	-0.30	-30.00	30.00	21.96	8.04	3.730			
1,800.00	1,800.00	1,799.10	1,800.00	6.23	2.30	-90.57	-0.30	-30.00	30.00	21.47	8.53	3.515			
1,900.00	1,900.00	1,899.10	1,900.00	6.59	2.44	-90.57	-0.30	-30.00	30.00	20.98	9.02	3.324			
2,000.00	2,000.00	1,999.10	2,000.00	6.95	2.57	-90.57	-0.30	-30.00	30.00	20.49	9.52	3.153			
2,100.00	2,100.00	2,099.10	2,100.00	7.31	2.70	-90.57	-0.30	-30.00	30.00	20.00	10.01	2.998			
2,200.00	2,200.00	2,199.10	2,200.00	7.66	2.83	-90.57	-0.30	-30.00	30.00	19.51	10.50	2.858			
2,300.00	2,300.00	2,299.10	2,300.00	8.02	2.96	-90.57	-0.30	-30.00	30.00	19.02	10.99	2.731			
2,400.00	2,400.00	2,399.10	2,400.00	8.38	3.10	-90.57	-0.30	-30.00	30.00	18.53	11.48	2.614			
2,500.00	2,500.00	2,499.10	2,500.00	8.74	3.23	-90.57	-0.30	-30.00	30.00	18.03	11.97	2.507 CC, ES			
2,600.00	2,599.98	2,599.08	2,599.98	9.08	3.36	147.34	-0.30	-30.00	31.46	19.01	12.44	2.528			
2,700.00	2,699.84	2,698.94	2,699.84	9.42	3.49	151.80	-0.30	-30.00	35.97	23.07	12.91	2.787			
2,800.00	2,799.49	2,798.59	2,799.49	9.75	3.62	156.94	-0.30	-30.00	43.45	30.08	13.37	3.249			
2,900.00	2,899.11	2,898.21	2,899.11	10.09	3.75	160.73	-0.30	-30.00	51.59	37.74	13.84	3.726			
3,000.00	2,998.73	2,997.83	2,998.73	10.43	3.88	163.48	-0.30	-30.00	59.89	45.57	14.32	4.183			
3,100.00	3,098.35	3,097.45	3,098.35	10.78	4.02	165.56	-0.30	-30.00	68.29	53.50	14.79	4.616			
3,200.00	3,197.97	3,197.07	3,197.97	11.12	4.15	167.18	-0.30	-30.00	76.76	61.49	15.27	5.027			
3,300.00	3,297.59	3,296.69	3,297.59	11.47	4.28	168.48	-0.30	-30.00	85.28	69.53	15.75	5.415			
3,400.00	3,397.21	3,396.31	3,397.21	11.82	4.41	169.55	-0.30	-30.00	93.84	77.61	16.23	5.781			
3,500.00	3,496.83	3,495.93	3,496.83	12.17	4.54	170.43	-0.30	-30.00	102.43	85.71	16.71	6.128			
3,600.00	3,596.45	3,595.55	3,596.45	12.53	4.67	171.18	-0.30	-30.00	111.03	93.83	17.20	6.455			
3,700.00	3,696.07	3,695.17	3,696.07	12.88	4.80	171.82	-0.30	-30.00	119.65	101.97	17.69	6.765			
3,800.00	3,795.69	3,794.79	3,795.69	13.24	4.94	172.37	-0.30	-30.00	128.28	110.11	18.17	7.059			
3,900.00	3,895.31	3,894.41	3,895.31	13.60	5.07	172.86	-0.30	-30.00	136.93	118.27	18.66	7.337			
4,000.00	3,994.93	3,994.03	3,994.93	13.95	5.20	173.28	-0.30	-30.00	145.58	126.43	19.15	7.601			
4,100.00	4,094.55	4,093.65	4,094.55	14.31	5.33	173.66	-0.30	-30.00	154.24	134.60	19.64	7.852			
4,200.00	4,194.17	4,193.27	4,194.17	14.67	5.46	174.00	-0.30	-30.00	162.91	142.77	20.13	8.091			
4,300.00	4,293.78	4,292.88	4,293.78	15.04	5.59	174.30	-0.30	-30.00	171.58	150.95	20.63	8.318			
4,400.00	4,393.40	4,392.50	4,393.40	15.40	5.72	174.58	-0.30	-30.00	180.25	159.13	21.12	8.534			
4,500.00	4,493.02	4,492.12	4,493.02	15.76	5.85	174.83	-0.30	-30.00	188.93	167.31	21.62	8.740			
4,600.00	4,592.64	4,591.74	4,592.64	16.12	5.99	175.06	-0.30	-30.00	197.61	175.50	22.11	8.937			
4,700.00	4,692.26	4,691.36	4,692.26	16.49	6.04	174.86	-1.72	-30.47	206.02	183.49	22.53	9.143			
4,800.00	4,791.88	4,790.98	4,791.88	16.85	6.07	174.07	-5.29	-31.65	214.04	191.12	22.92	9.337			
4,900.00	4,891.50	4,890.60	4,891.50	17.22	6.11	173.34	-8.89	-32.84	222.09	198.76	23.33	9.519			
5,000.00	4,991.12	4,990.22	4,991.12	17.59	6.17	172.65	-12.50	-34.03	230.17	206.41	23.76	9.689			
5,100.00	5,090.74	5,090.15	5,090.74	17.95	6.25	172.01	-16.11	-35.22	238.28	214.08	24.20	9.845			

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 302H - OH - Plan 1 10-11-17													Offset Site Error:
Survey Program: O-Scientific Gyro, 4600-MWD+IFR1+MS													Offset Well Error:
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	
5,200.00	5,190.36	5,190.99	5,191.51	18.32	6.35	171.42	-19.71	-36.41	246.42	221.75	24.67	9.988	
5,300.00	5,289.98	5,290.63	5,291.08	18.69	6.47	170.86	-23.32	-37.60	254.59	229.43	25.16	10.120	
5,400.00	5,389.60	5,390.26	5,390.64	19.06	6.60	170.33	-26.92	-38.79	262.77	237.11	25.66	10.241	
5,500.00	5,489.22	5,489.90	5,490.20	19.43	6.75	169.84	-30.53	-39.98	270.98	244.80	26.18	10.351	
5,600.00	5,588.84	5,589.53	5,589.77	19.79	6.92	169.38	-34.13	-41.17	279.21	252.49	26.72	10.451	
5,700.00	5,688.46	5,689.17	5,689.33	20.16	7.10	168.94	-37.74	-42.36	287.45	260.19	27.27	10.543	
5,800.00	5,788.12	5,788.84	5,788.93	20.53	7.30	168.53	-41.35	-43.55	295.23	267.41	27.83	10.609	
5,900.00	5,887.98	5,888.69	5,888.70	20.89	7.50	168.02	-44.96	-44.74	300.00	271.60	28.39	10.565	
6,000.00	5,987.96	5,988.61	5,988.55	21.24	7.72	-68.77	-48.58	-45.93	301.39	272.42	28.96	10.407	
6,100.00	6,087.96	6,088.54	6,088.41	21.58	7.95	-69.50	-52.19	-47.13	301.21	271.68	29.53	10.199	
6,200.00	6,187.96	6,188.47	6,188.26	21.93	8.18	-70.22	-55.81	-48.32	301.09	270.97	30.11	9.999	
6,300.00	6,287.96	6,288.39	6,288.12	22.27	8.43	-70.94	-59.42	-49.52	301.01	270.31	30.70	9.804	
6,400.00	6,387.96	6,388.32	6,387.97	22.62	8.68	-71.67	-63.04	-50.71	300.98	269.68	31.30	9.616	
6,408.77	6,396.73	6,397.08	6,396.73	22.65	8.71	-71.73	-63.36	-50.81	300.98	269.63	31.35	9.600	
6,500.00	6,487.96	6,488.25	6,487.83	22.96	8.95	-72.39	-66.66	-51.90	301.00	269.10	31.91	9.434	
6,600.00	6,587.96	6,588.17	6,587.68	23.31	9.21	-73.12	-70.27	-53.10	301.07	268.55	32.52	9.258	
6,700.00	6,687.96	6,688.10	6,687.54	23.65	9.49	-73.84	-73.89	-54.29	301.19	268.05	33.14	9.089	
6,800.00	6,787.96	6,788.03	6,787.39	24.00	9.77	-74.57	-77.50	-55.48	301.35	267.59	33.76	8.925	
6,900.00	6,887.96	6,887.96	6,887.25	24.34	10.05	-75.29	-81.12	-56.68	301.56	267.17	34.40	8.768	
7,000.00	6,987.96	6,987.88	6,987.10	24.69	10.34	-76.01	-84.74	-57.87	301.82	266.79	35.03	8.616	
7,100.00	7,087.96	7,087.81	7,086.96	25.04	10.63	-76.73	-88.35	-59.07	302.13	266.46	35.67	8.470	
7,200.00	7,187.96	7,187.74	7,186.81	25.39	10.93	-77.45	-91.97	-60.26	302.49	266.17	36.32	8.329	
7,300.00	7,287.96	7,287.67	7,286.67	25.73	11.23	-78.17	-95.59	-61.45	302.89	265.93	36.96	8.194	
7,400.00	7,387.96	7,387.59	7,386.52	26.08	11.54	-78.88	-99.20	-62.65	303.34	265.73	37.62	8.064	
7,500.00	7,487.96	7,487.52	7,486.38	26.43	11.84	-79.59	-102.82	-63.84	303.84	265.57	38.27	7.939	
7,600.00	7,587.96	7,587.45	7,586.23	26.78	12.15	-80.30	-106.43	-65.03	304.39	265.46	38.93	7.819	
7,700.00	7,687.96	7,687.38	7,686.09	27.13	12.47	-81.01	-110.05	-66.23	304.98	265.39	39.59	7.703	
7,800.00	7,787.96	7,787.30	7,785.94	27.48	12.78	-81.72	-113.67	-67.42	305.62	265.36	40.26	7.592	
7,900.00	7,887.96	7,887.23	7,885.80	27.82	13.10	-82.42	-117.28	-68.61	306.30	265.38	40.92	7.485	
8,000.00	7,987.96	7,987.16	7,985.65	28.17	13.42	-83.12	-120.90	-69.81	307.03	265.44	41.59	7.382	
8,100.00	8,087.96	8,087.09	8,085.51	28.52	13.74	-83.81	-124.51	-71.00	307.81	265.54	42.26	7.283	
8,200.00	8,187.96	8,187.01	8,185.36	28.87	14.06	-84.50	-128.13	-72.20	308.63	265.69	42.94	7.188	
8,300.00	8,287.96	8,286.94	8,285.21	29.22	14.39	-85.19	-131.75	-73.39	309.49	265.88	43.61	7.097	
8,400.00	8,387.96	8,386.87	8,385.07	29.57	14.71	-85.87	-135.36	-74.58	310.40	266.11	44.29	7.009	
8,500.00	8,487.96	8,486.79	8,484.92	29.93	15.04	-86.55	-138.98	-75.78	311.35	266.39	44.97	6.924	
8,600.00	8,587.96	8,586.72	8,584.78	30.28	15.37	-87.23	-142.60	-76.97	312.35	266.70	45.65	6.843	
8,700.00	8,687.96	8,686.65	8,684.63	30.63	15.70	-87.90	-146.21	-78.16	313.39	267.06	46.33	6.765	
8,800.00	8,787.96	8,786.58	8,784.49	30.98	16.03	-88.57	-149.83	-79.36	314.47	267.46	47.01	6.689	
8,900.00	8,887.96	8,886.50	8,884.34	31.33	16.37	-89.23	-153.44	-80.55	315.60	267.90	47.70	6.617	
9,000.00	8,987.62	8,985.87	8,983.63	31.68	16.70	-90.54	-157.04	-81.74	316.77	268.40	48.38	6.548	
9,100.00	9,083.91	9,081.13	9,078.83	32.00	17.02	-91.27	-160.49	-82.88	317.98	268.97	49.07	6.482	
9,200.00	9,172.61	9,162.94	9,160.32	32.27	17.34	-101.72	-155.44	-84.14	327.72	278.11	49.61	6.606	
9,300.00	9,249.87	9,247.48	9,240.28	32.49	17.66	-107.90	-124.40	-85.68	340.06	289.91	50.15	6.781	
9,400.00	9,312.29	9,312.17	9,301.76	32.66	17.97	-113.43	-58.94	-87.45	354.52	303.90	50.63	7.003	
9,500.00	9,357.15	9,357.24	9,350.61	32.85	18.21	-117.85	48.24	-89.34	367.96	316.90	51.07	7.205	
9,600.00	9,382.50	9,377.22	9,368.52	33.06	18.35	-120.57	195.97	-91.09	376.82	325.39	51.43	7.327	
9,700.00	9,387.89	9,389.70	9,383.63	33.28	18.39	-121.13	347.14	-92.23	378.68	327.00	51.68	7.327	
9,800.00	9,387.48	9,389.70	9,382.63	33.55	18.46	-121.05	447.13	-92.85	378.38	326.38	52.01	7.275	
9,900.00	9,387.06	10,089.70	9,581.63	33.88	18.66	-120.97	547.12	-93.46	378.09	325.56	52.54	7.197	
10,000.00	9,386.64	10,189.70	9,580.62	34.26	18.90	-120.89	647.11	-94.08	377.80	324.65	53.16	7.107	
10,100.00	9,386.22	10,289.70	9,579.62	34.69	19.16	-120.82	747.10	-94.70	377.51	323.65	53.86	7.009	
10,200.00	9,385.80	10,389.70	9,578.61	35.18	19.45	-120.74	847.09	-95.32	377.22	322.58	54.64	6.904	

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Offset Design Eider Federal - 302H - OH - Plan 1 10-11-17													Offset Site Error: 0.00 usft
Survey Program: 0-Scientific Gyro, 4600-MWD+IFR1+MS													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	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	9,385.38	10,489.69	9,577.61	35.72	19.77	-120.66	947.09	-95.94	376.93	321.43	55.50	6.792	
10,400.00	9,384.96	10,589.69	9,576.60	36.31	20.11	-120.59	1,047.08	-96.56	376.64	320.21	56.43	6.674	
10,500.00	9,384.55	10,689.69	9,575.60	36.95	20.48	-120.51	1,147.07	-97.18	376.36	318.93	57.43	6.553	
10,600.00	9,384.13	10,789.69	9,574.59	37.62	20.86	-120.43	1,247.06	-97.79	376.07	317.57	58.50	6.429	
10,700.00	9,383.71	10,889.69	9,573.59	38.34	21.27	-120.35	1,347.05	-98.41	375.78	316.16	59.62	6.303	
10,800.00	9,383.29	10,989.69	9,572.58	39.10	21.70	-120.27	1,447.04	-99.03	375.50	314.69	60.81	6.175	
10,900.00	9,382.87	11,089.68	9,571.58	39.90	22.14	-120.20	1,547.03	-99.65	375.21	313.16	62.05	6.047	
11,000.00	9,382.45	11,189.68	9,570.57	40.73	22.60	-120.12	1,647.02	-100.27	374.93	311.59	63.34	5.919	
11,100.00	9,382.04	11,289.68	9,569.57	41.60	23.08	-120.04	1,747.02	-100.89	374.65	309.96	64.69	5.792	
11,200.00	9,381.62	11,389.68	9,568.57	42.49	23.57	-119.96	1,847.01	-101.51	374.36	308.29	66.07	5.666	
11,300.00	9,381.20	11,489.68	9,567.56	43.42	24.08	-119.88	1,947.00	-102.13	374.08	306.58	67.51	5.541	
11,400.00	9,380.78	11,589.67	9,566.56	44.37	24.60	-119.80	2,046.99	-102.74	373.80	304.82	68.98	5.419	
11,500.00	9,380.36	11,689.67	9,565.55	45.35	25.13	-119.72	2,146.98	-103.36	373.52	303.03	70.49	5.299	
11,600.00	9,379.94	11,789.67	9,564.55	46.35	25.68	-119.64	2,246.97	-103.98	373.24	301.21	72.03	5.181	
11,700.00	9,379.52	11,889.67	9,563.54	47.37	26.23	-119.57	2,346.96	-104.60	372.96	299.35	73.61	5.066	
11,800.00	9,379.11	11,989.67	9,562.54	48.41	26.80	-119.49	2,446.96	-105.22	372.68	297.46	75.22	4.954	
11,900.00	9,378.69	12,089.67	9,561.53	49.48	27.37	-119.41	2,546.95	-105.84	372.40	295.54	76.86	4.845	
12,000.00	9,378.27	12,189.66	9,560.53	50.56	27.96	-119.33	2,646.94	-106.46	372.13	293.60	78.53	4.739	
12,100.00	9,377.85	12,289.66	9,559.52	51.66	28.55	-119.25	2,746.93	-107.07	371.85	291.63	80.22	4.635	
12,200.00	9,377.43	12,389.66	9,558.52	52.78	29.15	-119.17	2,846.92	-107.69	371.58	289.63	81.94	4.535	
12,300.00	9,377.01	12,489.66	9,557.52	53.91	29.76	-119.09	2,946.91	-108.31	371.30	287.62	83.68	4.437	
12,400.00	9,376.59	12,589.66	9,556.51	55.05	30.38	-119.01	3,046.90	-108.93	371.03	285.58	85.44	4.342	
12,500.00	9,376.18	12,689.66	9,555.51	56.21	31.00	-118.93	3,146.89	-109.55	370.75	283.53	87.22	4.251	
12,600.00	9,375.76	12,789.65	9,554.50	57.38	31.63	-118.85	3,246.88	-110.17	370.48	281.46	89.02	4.162	
12,700.00	9,375.34	12,889.65	9,553.50	58.57	32.26	-118.77	3,346.88	-110.79	370.21	279.37	90.84	4.075	
12,800.00	9,374.92	12,989.65	9,552.49	59.76	32.90	-118.69	3,446.87	-111.40	369.94	277.26	92.67	3.992	
12,900.00	9,374.50	13,089.65	9,551.49	60.96	33.55	-118.61	3,546.86	-112.02	369.67	275.14	94.52	3.911	
13,000.00	9,374.08	13,189.65	9,550.48	62.18	34.20	-118.53	3,646.85	-112.64	369.40	273.01	96.39	3.832	
13,100.00	9,373.66	13,289.65	9,549.48	63.40	34.85	-118.44	3,746.84	-113.26	369.13	270.86	98.27	3.756	
13,200.00	9,373.25	13,389.64	9,548.47	64.64	35.51	-118.36	3,846.83	-113.88	368.86	268.70	100.16	3.683	
13,300.00	9,372.83	13,489.64	9,547.47	65.88	36.17	-118.28	3,946.83	-114.50	368.59	266.53	102.06	3.611	
13,400.00	9,372.41	13,589.64	9,546.47	67.12	36.84	-118.20	4,046.82	-115.12	368.32	264.34	103.98	3.542	
13,500.00	9,371.99	13,689.64	9,545.46	68.38	37.51	-118.12	4,146.81	-115.73	368.06	262.15	105.91	3.475	
13,600.00	9,371.57	13,789.64	9,544.46	69.64	38.18	-118.04	4,246.80	-116.35	367.79	259.95	107.84	3.410	
13,700.00	9,371.15	13,889.64	9,543.45	70.91	38.86	-117.96	4,346.79	-116.97	367.53	257.74	109.79	3.347	
13,800.00	9,370.73	13,989.63	9,542.45	72.19	39.54	-117.88	4,446.78	-117.59	367.26	255.52	111.75	3.287	
13,900.00	9,370.32	14,089.63	9,541.44	73.47	40.23	-117.79	4,546.77	-118.21	367.00	253.29	113.72	3.227	
14,000.00	9,369.90	14,189.63	9,540.44	74.76	40.91	-117.71	4,646.76	-118.83	366.74	251.05	115.69	3.170	
14,100.00	9,369.48	14,289.63	9,539.43	76.05	41.60	-117.63	4,746.76	-119.45	366.48	248.81	117.67	3.114	
14,200.00	9,369.06	14,389.63	9,538.43	77.35	42.29	-117.55	4,846.75	-120.06	366.22	246.55	119.66	3.060	
14,300.00	9,368.64	14,489.62	9,537.42	78.65	42.99	-117.47	4,946.74	-120.68	365.96	244.30	121.66	3.008	
14,400.00	9,368.22	14,589.62	9,536.42	79.96	43.69	-117.38	5,046.73	-121.30	365.70	242.03	123.66	2.957	
14,500.00	9,367.81	14,689.62	9,535.41	81.27	44.39	-117.30	5,146.72	-121.92	365.44	239.76	125.67	2.908	
14,600.00	9,367.39	14,789.62	9,534.41	82.59	45.09	-117.22	5,246.71	-122.54	365.18	237.49	127.69	2.860	
14,700.00	9,366.97	14,889.62	9,533.41	83.91	45.79	-117.14	5,346.70	-123.16	364.92	235.21	129.72	2.813	
14,800.00	9,366.55	14,989.62	9,532.40	85.23	46.49	-117.05	5,446.70	-123.78	364.67	232.92	131.74	2.768	
14,900.00	9,366.13	15,089.61	9,531.40	86.56	47.20	-116.97	5,546.69	-124.39	364.41	230.63	133.78	2.724	
15,000.00	9,365.71	15,189.61	9,530.39	87.89	47.91	-116.89	5,646.68	-125.01	364.16	228.34	135.82	2.681	
15,100.00	9,365.29	15,289.61	9,529.39	89.22	48.62	-116.80	5,746.67	-125.63	363.90	226.04	137.86	2.640	
15,200.00	9,364.88	15,389.61	9,528.38	90.56	49.33	-116.72	5,846.66	-126.25	363.65	223.74	139.91	2.599	
15,300.00	9,364.46	15,489.61	9,527.38	91.90	50.05	-116.64	5,946.65	-126.87	363.40	221.43	141.97	2.560	
15,400.00	9,364.04	15,589.61	9,526.37	93.24	50.76	-116.55	6,046.64	-127.49	363.15	219.12	144.02	2.521	

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: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

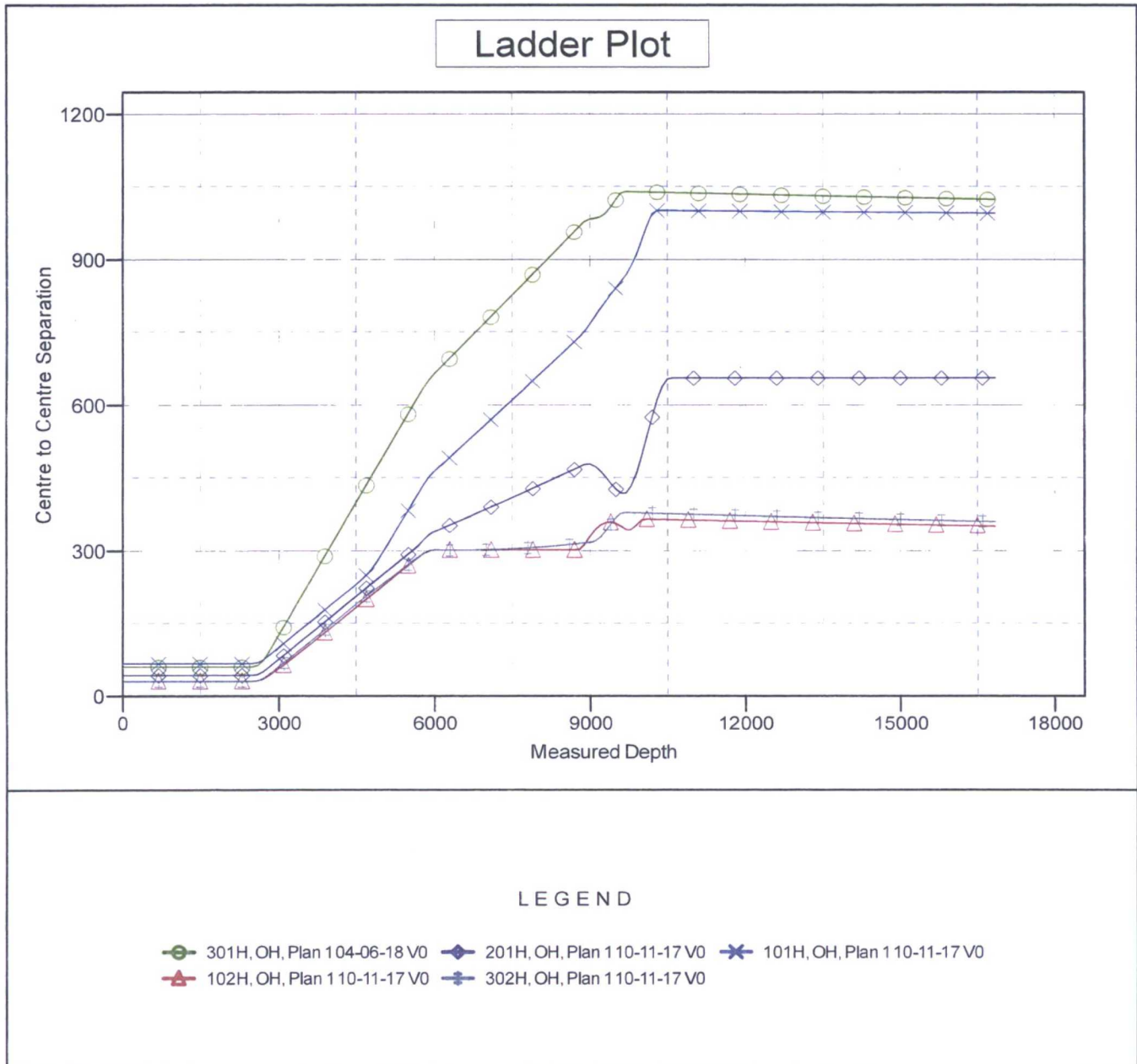
Offset Design Eider Federal - 302H - OH - Plan 1 10-11-17														Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Gyro 4600-MWD+IFR1+MS														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured 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			
15,500.00	9,363.62	15,689.60	9,525.37	94.59	51.48	-116.47	6,146.63	-128.11	362.89	216.81	146.09	2.484			
15,600.00	9,363.20	15,789.60	9,524.36	95.93	52.20	-116.39	6,246.63	-128.72	362.64	214.49	148.15	2.448			
15,700.00	9,362.78	15,889.60	9,523.36	97.28	52.91	-116.30	6,346.62	-129.34	362.39	212.17	150.22	2.412			
15,800.00	9,362.36	15,989.60	9,522.36	98.64	53.63	-116.22	6,446.61	-129.96	362.15	209.85	152.30	2.378			
15,900.00	9,361.95	16,089.60	9,521.35	99.99	54.36	-116.13	6,546.60	-130.58	361.90	207.52	154.38	2.344			
16,000.00	9,361.53	16,189.60	9,520.35	101.35	55.08	-116.05	6,646.59	-131.20	361.65	205.19	156.46	2.311			
16,100.00	9,361.11	16,289.59	9,519.34	102.71	55.80	-115.97	6,746.58	-131.82	361.40	202.86	158.54	2.280			
16,200.00	9,360.69	16,389.59	9,518.34	104.07	56.53	-115.88	6,846.57	-132.44	361.16	200.53	160.63	2.248			
16,300.00	9,360.27	16,489.59	9,517.33	105.44	57.25	-115.80	6,946.56	-133.05	360.91	198.19	162.72	2.218			
16,400.00	9,359.85	16,589.59	9,516.33	106.80	57.98	-115.71	7,046.56	-133.67	360.67	195.86	164.81	2.188			
16,500.00	9,359.43	16,689.59	9,515.32	108.17	58.71	-115.63	7,146.55	-134.29	360.43	193.52	166.91	2.159			
16,600.00	9,359.02	16,789.59	9,514.32	109.54	59.44	-115.54	7,246.54	-134.91	360.19	191.18	169.01	2.131			
16,700.00	9,358.60	16,889.58	9,513.31	110.91	60.17	-115.46	7,346.53	-135.53	359.94	188.83	171.11	2.104			
16,800.00	9,358.18	16,989.58	9,512.31	112.28	60.90	-115.37	7,446.52	-136.15	359.70	186.49	173.22	2.077			
16,835.75	9,358.03	17,025.33	9,511.95	112.77	61.16	-115.34	7,482.27	-136.37	359.62	185.65	173.97	2.067			
16,842.72	9,358.00	17,030.36	9,511.90	112.87	61.20	-115.34	7,487.30	-136.40	359.61	185.51	174.10	2.066 SF			

Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Reference Depths are relative to RKB @ 3546.30usft (Ensign 155)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 202H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.36°



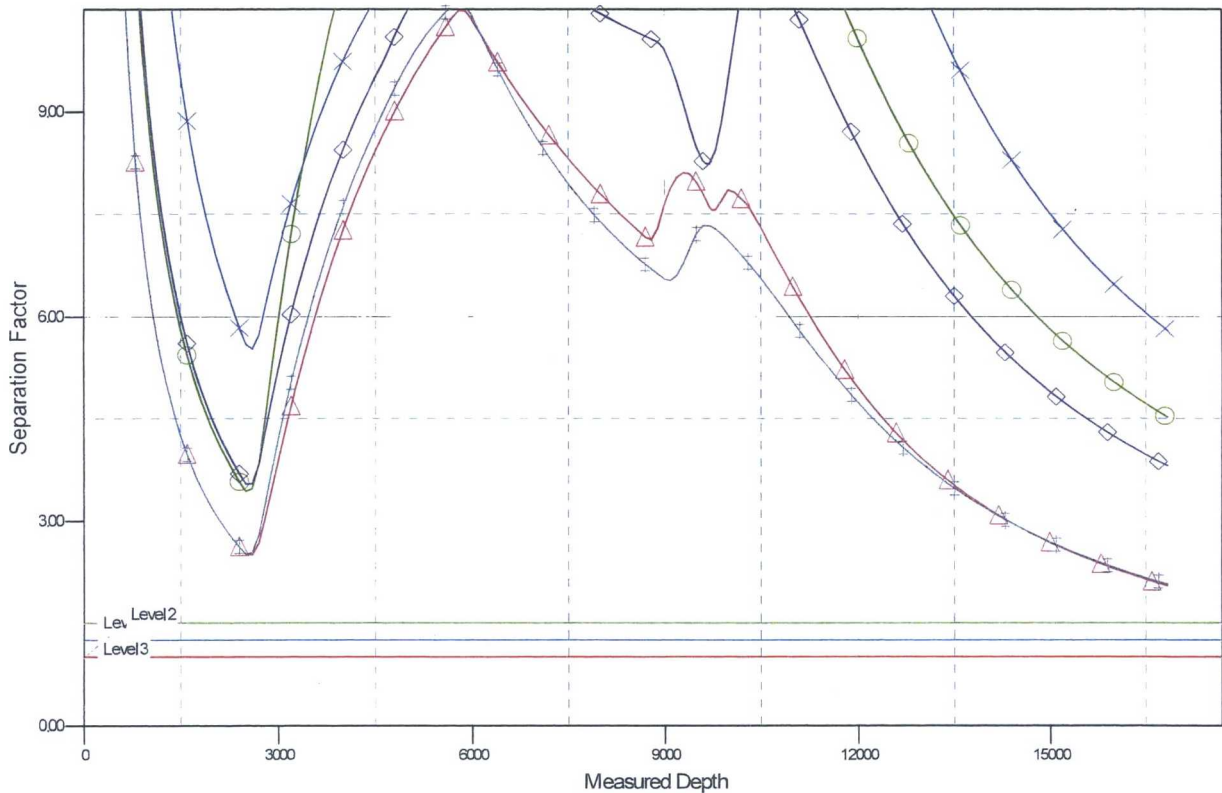
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Eider Federal
Site Error: 0.00 usft
Reference Well: 202H
Well Error: 0.00 usft
Reference Wellbore: OH
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Reference Datum

Reference Depths are relative to RKB @ 3546.30usft (Ensign 155)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 202H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.36°

Separation Factor Plot



LEGEND

301H, OH, Plan 104-06-18 V0 201H, OH, Plan 110-11-17 V0 101H, OH, Plan 110-11-17 V0
102H, OH, Plan 110-11-17 V0 302H, OH, Plan 110-11-17 V0



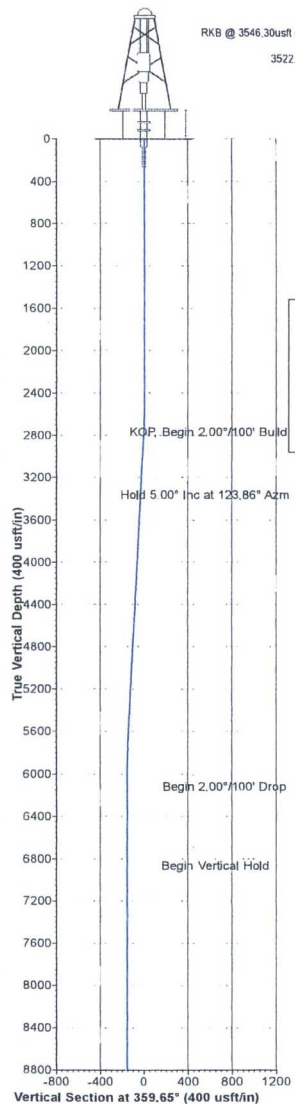
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH
Design: Plan 1 04-06-18
Rig: Ensign 155



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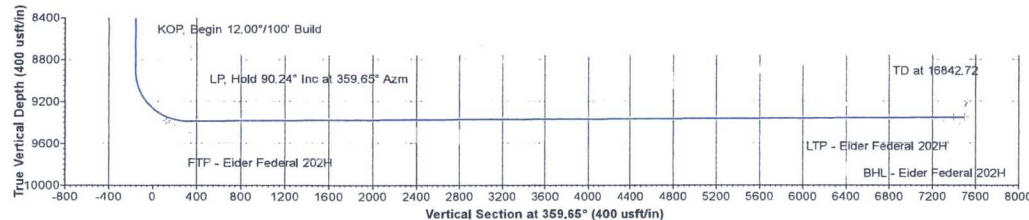
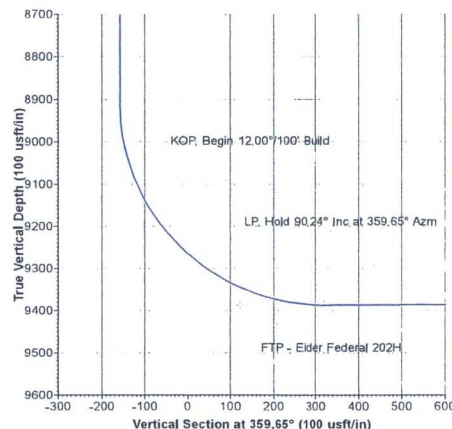
Azimuths to Grid North
True North: -0.36°
Magnetic North: 6.39°
Magnetic Field
Strength: 47961.5nT
Dip Angle: 59.87°
Date: 4/6/2018
Model: MVHD



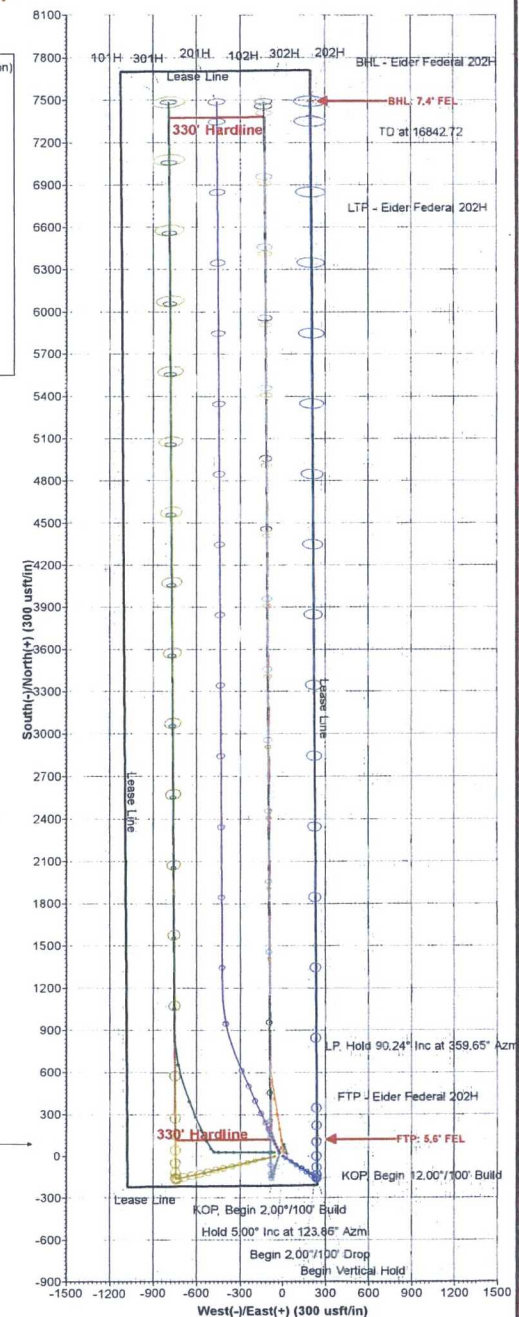
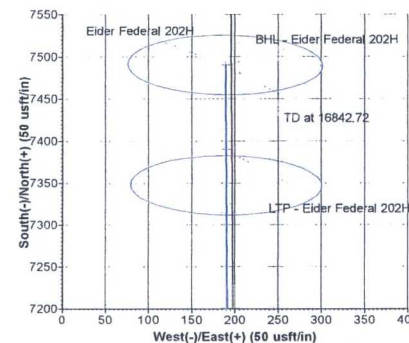
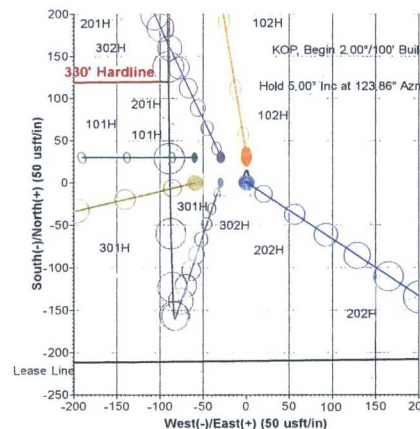
WELL DETAILS						
3522.30						
+N/S	+E/W	North	East	Latitude	Longitude	
0.00	0.00	42544.50	711440.50	32° 10' 2.16739 N	103° 10' 0.06910 W	

DESIGN TARGET DETAILS						
Name	TVD	+N/S	+E/W	North	East	Latitude
BHL - Eider Federal 202H	9358.00	7489.70	188.60	432734.20	711629.10	32° 11' 16.27173 N
LTP - Eider Federal 202H	9358.00	7389.57	189.19	432634.07	711629.69	32° 11' 15.28080 N
FTP - Eider Federal 202H	9388.00	122.37	234.16	425366.87	711674.66	32° 10' 3.36360 W

SECTION DETAILS											
Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Diag	TFace	Vsect	Target	Annotation
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 123.86° Azm
3	2750.00	5.00	123.86	2749.88	-6.07	9.95	2.00	123.86	-6.13	0.00	Begin 2.00°/100' Drop
4	5747.04	5.00	123.86	5735.32	-151.63	225.95	0.00	0.00	-153.00	0.00	Begin Vertical Hold
5	5997.04	0.00	0.00	5995.00	-157.70	235.00	2.00	180.00	-159.13	0.00	KOP, Begin 12.00°/100' Build
6	8922.58	0.00	0.00	8910.54	-157.70	235.00	0.00	0.00	-159.13	0.00	LP, Hold 90.24° Inc at 359.65° Azm
7	9674.58	90.24	359.65	9388.00	321.75	232.09	12.00	359.65	320.33	0.00	TD at 16842.72
8	16842.72	90.24	359.65	9358.00	7489.70	188.60	0.00	0.00	7488.41	0.00	BHL - Eider Federal 202H



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 202H, Grid North
Latitude: 32° 10' 2.16739 N
Longitude: 103° 39' 0.06910 W
Grid East: 711440.50
Grid North: 425244.50
Scale Factor: 1.000
Geomagnetic Model: MVHD
Sample Date: 06-Apr-18
Magnetic Declination: 6.75°
Dip Angle from Horizontal: 59.87°
Magnetic Field Strength: 47961.50706462nT
To convert a Magnetic Direction to a Grid Direction, Add 6.39°
To convert a Magnetic Direction to a True Direction, Add 6.75° East
To convert a True Direction to a Grid Direction, Subtract 0.36°





PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Eider Federal

202H

OH

Plan: Plan 1 04-06-18

Standard Planning Report

06 April, 2018



Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH
Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
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	Eider Federal				
Site Position:		Northing:	425,274.00 usft	Latitude:	32° 10' 2.46309 N
From:	Map	Easting:	711,380.40 usft	Longitude:	103° 39' 0.76609 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.36 °

Well	202H				
Well Position	+N/-S	-29.50 usft	Northing:	425,244.50 usft	Latitude: 32° 10' 2.16739 N
	+E/-W	60.10 usft	Easting:	711,440.50 usft	Longitude: 103° 39' 0.06910 W
Position Uncertainty	0.00 usft		Wellhead Elevation:		Ground Level: 3,522.30 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	4/6/2018	6.75	59.87	47,961.50706463

Design	Plan 1 04-06-18				
Audit Notes:					
Version:		Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	359.65	

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	
2,750.00	5.00	123.86	2,749.68	-6.07	9.05	2.00	2.00	0.00	123.86	
5,747.04	5.00	123.86	5,735.32	-151.63	225.95	0.00	0.00	0.00	0.00	
5,997.04	0.00	0.01	5,985.00	-157.70	235.00	2.00	-2.00	0.00	180.00	
8,922.58	0.00	0.00	8,910.54	-157.70	235.00	0.00	0.00	0.00	0.00	
9,674.58	90.24	359.65	9,388.00	321.75	232.09	12.00	12.00	0.00	359.65	
16,842.72	90.24	359.65	9,358.00	7,489.70	188.60	0.00	0.00	0.00	0.00	BHL - Eider Federa

Database: USA Compass
 Company: COG Operating LLC
 Project: Lea County, NM (NAD27 NME)
 Site: Eider Federal
 Well: 202H
 Wellbore: OH
 Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
 TVD Reference: RKB @ 3546.30usft (Ensign 155)
 MD Reference: RKB @ 3546.30usft (Ensign 155)
 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
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	123.86	2,599.98	-0.97	1.45	-0.98	2.00	2.00	0.00
2,700.00	4.00	123.86	2,699.84	-3.89	5.79	-3.92	2.00	2.00	0.00
2,750.00	5.00	123.86	2,749.68	-6.07	9.05	-6.13	2.00	2.00	0.00
Hold 5.00° Inc at 123.86° Azm									
2,800.00	5.00	123.86	2,799.49	-8.50	12.67	-8.58	0.00	0.00	0.00
2,900.00	5.00	123.86	2,899.11	-13.36	19.91	-13.48	0.00	0.00	0.00
3,000.00	5.00	123.86	2,998.73	-18.22	27.14	-18.38	0.00	0.00	0.00
3,100.00	5.00	123.86	3,098.35	-23.07	34.38	-23.28	0.00	0.00	0.00
3,200.00	5.00	123.86	3,197.97	-27.93	41.62	-28.18	0.00	0.00	0.00
3,300.00	5.00	123.86	3,297.59	-32.79	48.86	-33.08	0.00	0.00	0.00
3,400.00	5.00	123.86	3,397.21	-37.64	56.09	-37.98	0.00	0.00	0.00
3,500.00	5.00	123.86	3,496.83	-42.50	63.33	-42.88	0.00	0.00	0.00
3,600.00	5.00	123.86	3,596.45	-47.35	70.57	-47.78	0.00	0.00	0.00
3,700.00	5.00	123.86	3,696.07	-52.21	77.80	-52.69	0.00	0.00	0.00
3,800.00	5.00	123.86	3,795.69	-57.07	85.04	-57.59	0.00	0.00	0.00
3,900.00	5.00	123.86	3,895.31	-61.92	92.28	-62.49	0.00	0.00	0.00
4,000.00	5.00	123.86	3,994.93	-66.78	99.51	-67.39	0.00	0.00	0.00
4,100.00	5.00	123.86	4,094.55	-71.64	106.75	-72.29	0.00	0.00	0.00
4,200.00	5.00	123.86	4,194.17	-76.49	113.99	-77.19	0.00	0.00	0.00
4,300.00	5.00	123.86	4,293.78	-81.35	121.23	-82.09	0.00	0.00	0.00
4,400.00	5.00	123.86	4,393.40	-86.21	128.46	-86.99	0.00	0.00	0.00
4,500.00	5.00	123.86	4,493.02	-91.06	135.70	-91.89	0.00	0.00	0.00
4,600.00	5.00	123.86	4,592.64	-95.92	142.94	-96.79	0.00	0.00	0.00
4,700.00	5.00	123.86	4,692.26	-100.78	150.17	-101.69	0.00	0.00	0.00
4,800.00	5.00	123.86	4,791.88	-105.63	157.41	-106.59	0.00	0.00	0.00
4,900.00	5.00	123.86	4,891.50	-110.49	164.65	-111.49	0.00	0.00	0.00
5,000.00	5.00	123.86	4,991.12	-115.35	171.88	-116.39	0.00	0.00	0.00
5,100.00	5.00	123.86	5,090.74	-120.20	179.12	-121.29	0.00	0.00	0.00
5,200.00	5.00	123.86	5,190.36	-125.06	186.36	-126.19	0.00	0.00	0.00
5,300.00	5.00	123.86	5,289.98	-129.92	193.60	-131.10	0.00	0.00	0.00
5,400.00	5.00	123.86	5,389.60	-134.77	200.83	-136.00	0.00	0.00	0.00
5,500.00	5.00	123.86	5,489.22	-139.63	208.07	-140.90	0.00	0.00	0.00
5,600.00	5.00	123.86	5,588.84	-144.48	215.31	-145.80	0.00	0.00	0.00
5,700.00	5.00	123.86	5,688.46	-149.34	222.54	-150.70	0.00	0.00	0.00
5,747.04	5.00	123.86	5,735.32	-151.63	225.95	-153.00	0.00	0.00	0.00
Begin 2.00°/100' Drop									
5,800.00	3.94	123.86	5,788.12	-153.93	229.38	-155.32	2.00	-2.00	0.00
5,900.00	1.94	123.86	5,887.98	-156.78	233.64	-158.21	2.00	-2.00	0.00
5,997.04	0.00	0.01	5,985.00	-157.70	235.00	-159.13	2.00	-2.00	0.00
Begin Vertical Hold									
8,922.58	0.00	0.00	8,910.54	-157.70	235.00	-159.13	0.00	0.00	0.00
KOP, Begin 12.00°/100' Build									
9,000.00	9.29	359.65	8,987.62	-151.44	234.96	-152.87	12.00	12.00	0.00
9,100.00	21.29	359.65	9,083.91	-125.11	234.80	-126.55	12.00	12.00	0.00
9,200.00	33.29	359.65	9,172.61	-79.35	234.52	-80.78	12.00	12.00	0.00
9,300.00	45.29	359.65	9,249.87	-16.14	234.14	-17.57	12.00	12.00	0.00
9,400.00	57.29	359.65	9,312.29	61.75	233.67	60.32	12.00	12.00	0.00
9,500.00	69.29	359.65	9,357.15	150.91	233.13	149.49	12.00	12.00	0.00
9,600.00	81.29	359.65	9,382.50	247.46	232.54	246.03	12.00	12.00	0.00
9,674.58	90.24	359.65	9,388.00	321.75	232.09	320.33	12.00	12.00	0.00

Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: Eider Federal
Well: 202H
Wellbore: OH
Design: Plan 1 04-06-18

Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
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)
LP, Hold 90.24° Inc at 359.65° Azm									
9,700.00	90.24	359.65	9,387.89	347.18	231.94	345.75	0.00	0.00	0.00
9,800.00	90.24	359.65	9,387.48	447.17	231.33	445.75	0.00	0.00	0.00
9,900.00	90.24	359.65	9,387.06	547.17	230.72	545.75	0.00	0.00	0.00
10,000.00	90.24	359.65	9,386.64	647.17	230.12	645.75	0.00	0.00	0.00
10,100.00	90.24	359.65	9,386.22	747.17	229.51	745.75	0.00	0.00	0.00
10,200.00	90.24	359.65	9,385.80	847.16	228.90	845.75	0.00	0.00	0.00
10,300.00	90.24	359.65	9,385.38	947.16	228.30	945.75	0.00	0.00	0.00
10,400.00	90.24	359.65	9,384.96	1,047.16	227.69	1,045.75	0.00	0.00	0.00
10,500.00	90.24	359.65	9,384.55	1,147.15	227.08	1,145.75	0.00	0.00	0.00
10,600.00	90.24	359.65	9,384.13	1,247.15	226.48	1,245.75	0.00	0.00	0.00
10,700.00	90.24	359.65	9,383.71	1,347.15	225.87	1,345.74	0.00	0.00	0.00
10,800.00	90.24	359.65	9,383.29	1,447.15	225.26	1,445.74	0.00	0.00	0.00
10,900.00	90.24	359.65	9,382.87	1,547.14	224.66	1,545.74	0.00	0.00	0.00
11,000.00	90.24	359.65	9,382.45	1,647.14	224.05	1,645.74	0.00	0.00	0.00
11,100.00	90.24	359.65	9,382.04	1,747.14	223.44	1,745.74	0.00	0.00	0.00
11,200.00	90.24	359.65	9,381.62	1,847.14	222.84	1,845.74	0.00	0.00	0.00
11,300.00	90.24	359.65	9,381.20	1,947.13	222.23	1,945.74	0.00	0.00	0.00
11,400.00	90.24	359.65	9,380.78	2,047.13	221.62	2,045.74	0.00	0.00	0.00
11,500.00	90.24	359.65	9,380.36	2,147.13	221.02	2,145.74	0.00	0.00	0.00
11,600.00	90.24	359.65	9,379.94	2,247.12	220.41	2,245.74	0.00	0.00	0.00
11,700.00	90.24	359.65	9,379.52	2,347.12	219.80	2,345.74	0.00	0.00	0.00
11,800.00	90.24	359.65	9,379.11	2,447.12	219.20	2,445.73	0.00	0.00	0.00
11,900.00	90.24	359.65	9,378.69	2,547.12	218.59	2,545.73	0.00	0.00	0.00
12,000.00	90.24	359.65	9,378.27	2,647.11	217.98	2,645.73	0.00	0.00	0.00
12,100.00	90.24	359.65	9,377.85	2,747.11	217.38	2,745.73	0.00	0.00	0.00
12,200.00	90.24	359.65	9,377.43	2,847.11	216.77	2,845.73	0.00	0.00	0.00
12,300.00	90.24	359.65	9,377.01	2,947.11	216.16	2,945.73	0.00	0.00	0.00
12,400.00	90.24	359.65	9,376.59	3,047.10	215.56	3,045.73	0.00	0.00	0.00
12,500.00	90.24	359.65	9,376.18	3,147.10	214.95	3,145.73	0.00	0.00	0.00
12,600.00	90.24	359.65	9,375.76	3,247.10	214.34	3,245.73	0.00	0.00	0.00
12,700.00	90.24	359.65	9,375.34	3,347.09	213.73	3,345.73	0.00	0.00	0.00
12,800.00	90.24	359.65	9,374.92	3,447.09	213.13	3,445.73	0.00	0.00	0.00
12,900.00	90.24	359.65	9,374.50	3,547.09	212.52	3,545.73	0.00	0.00	0.00
13,000.00	90.24	359.65	9,374.08	3,647.09	211.91	3,645.72	0.00	0.00	0.00
13,100.00	90.24	359.65	9,373.66	3,747.08	211.31	3,745.72	0.00	0.00	0.00
13,200.00	90.24	359.65	9,373.25	3,847.08	210.70	3,845.72	0.00	0.00	0.00
13,300.00	90.24	359.65	9,372.83	3,947.08	210.09	3,945.72	0.00	0.00	0.00
13,400.00	90.24	359.65	9,372.41	4,047.08	209.49	4,045.72	0.00	0.00	0.00
13,500.00	90.24	359.65	9,371.99	4,147.07	208.88	4,145.72	0.00	0.00	0.00
13,600.00	90.24	359.65	9,371.57	4,247.07	208.27	4,245.72	0.00	0.00	0.00
13,700.00	90.24	359.65	9,371.15	4,347.07	207.67	4,345.72	0.00	0.00	0.00
13,800.00	90.24	359.65	9,370.73	4,447.07	207.06	4,445.72	0.00	0.00	0.00
13,900.00	90.24	359.65	9,370.32	4,547.06	206.45	4,545.72	0.00	0.00	0.00
14,000.00	90.24	359.65	9,369.90	4,647.06	205.85	4,645.72	0.00	0.00	0.00
14,100.00	90.24	359.65	9,369.48	4,747.06	205.24	4,745.71	0.00	0.00	0.00
14,200.00	90.24	359.65	9,369.06	4,847.05	204.63	4,845.71	0.00	0.00	0.00
14,300.00	90.24	359.65	9,368.64	4,947.05	204.03	4,945.71	0.00	0.00	0.00
14,400.00	90.24	359.65	9,368.22	5,047.05	203.42	5,045.71	0.00	0.00	0.00
14,500.00	90.24	359.65	9,367.81	5,147.05	202.81	5,145.71	0.00	0.00	0.00
14,600.00	90.24	359.65	9,367.39	5,247.04	202.21	5,245.71	0.00	0.00	0.00
14,700.00	90.24	359.65	9,366.97	5,347.04	201.60	5,345.71	0.00	0.00	0.00
14,800.00	90.24	359.65	9,366.55	5,447.04	200.99	5,445.71	0.00	0.00	0.00

Database: USA Compass
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
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Local Co-ordinate Reference: Well 202H
TVD Reference: RKB @ 3546.30usft (Ensign 155)
MD Reference: RKB @ 3546.30usft (Ensign 155)
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)
14,900.00	90.24	359.65	9,366.13	5,547.04	200.39	5,545.71	0.00	0.00	0.00
15,000.00	90.24	359.65	9,365.71	5,647.03	199.78	5,645.71	0.00	0.00	0.00
15,100.00	90.24	359.65	9,365.29	5,747.03	199.17	5,745.71	0.00	0.00	0.00
15,200.00	90.24	359.65	9,364.88	5,847.03	198.57	5,845.71	0.00	0.00	0.00
15,300.00	90.24	359.65	9,364.46	5,947.02	197.96	5,945.70	0.00	0.00	0.00
15,400.00	90.24	359.65	9,364.04	6,047.02	197.35	6,045.70	0.00	0.00	0.00
15,500.00	90.24	359.65	9,363.62	6,147.02	196.75	6,145.70	0.00	0.00	0.00
15,600.00	90.24	359.65	9,363.20	6,247.02	196.14	6,245.70	0.00	0.00	0.00
15,700.00	90.24	359.65	9,362.78	6,347.01	195.53	6,345.70	0.00	0.00	0.00
15,800.00	90.24	359.65	9,362.36	6,447.01	194.93	6,445.70	0.00	0.00	0.00
15,900.00	90.24	359.65	9,361.95	6,547.01	194.32	6,545.70	0.00	0.00	0.00
16,000.00	90.24	359.65	9,361.53	6,647.01	193.71	6,645.70	0.00	0.00	0.00
16,100.00	90.24	359.65	9,361.11	6,747.00	193.11	6,745.70	0.00	0.00	0.00
16,200.00	90.24	359.65	9,360.69	6,847.00	192.50	6,845.70	0.00	0.00	0.00
16,300.00	90.24	359.65	9,360.27	6,947.00	191.89	6,945.70	0.00	0.00	0.00
16,400.00	90.24	359.65	9,359.85	7,046.99	191.29	7,045.69	0.00	0.00	0.00
16,500.00	90.24	359.65	9,359.43	7,146.99	190.68	7,145.69	0.00	0.00	0.00
16,600.00	90.24	359.65	9,359.02	7,246.99	190.07	7,245.69	0.00	0.00	0.00
16,700.00	90.24	359.65	9,358.60	7,346.99	189.47	7,345.69	0.00	0.00	0.00
16,800.00	90.24	359.65	9,358.18	7,446.98	188.86	7,445.69	0.00	0.00	0.00
16,842.72	90.24	359.65	9,358.00	7,489.70	188.60	7,488.41	0.00	0.00	0.00
TD at 16842.72									

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
- Shape									
BHL - Eider Federal 2	0.00	0.00	9,358.00	7,489.70	188.60	432,734.20	711,629.10	32° 11' 16.27173 N	03° 38' 57.32101 W
- plan hits target center									
- Point									
LTP - Eider Federal 2i	0.00	0.00	9,358.00	7,389.57	189.19	432,634.07	711,629.68	32° 11' 15.28080 N	03° 38' 57.32160 W
- plan misses target center by 0.42usft at 16742.58usft MD (9358.42 TVD, 7389.57 N, 189.21 E)									
- Point									
FTP - Eider Federal 2	0.00	0.00	9,388.00	122.37	234.16	425,366.87	711,674.65	32° 10' 3.36360 N	03° 38' 57.33600 W
- plan misses target center by 39.32usft at 9488.34usft MD (9352.90 TVD, 140.06 N, 233.19 E)									
- Point									

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
2,500.00	2,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2,750.00	2,749.68	-6.07	9.05	Hold 5.00° Inc at 123.86° Azm
5,747.04	5,735.32	-151.63	225.95	Begin 2.00°/100' Drop
5,997.04	5,985.00	-157.70	235.00	Begin Vertical Hold
8,922.58	8,910.54	-157.70	235.00	KOP, Begin 12.00°/100' Build
9,674.58	9,388.00	321.75	232.09	LP, Hold 90.24° Inc at 359.65° Azm
16,842.72	9,358.00	7,489.70	188.60	TD at 16842.72