

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018**SUNDRY NOTICES AND REPORTS ON WELL**
Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.**Carlsbad Field Office**
OCD Artesia5. Lease Serial No.
NM 142907
6. If Indian, Allottee or Tribe Name**SUBMIT IN TRIPLICATE - Other instructions on page 2**

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

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other8. Well Name and No.
ROAD RUNNER FEDERAL COM 2H2. Name of Operator
COG OPERATING LLCContact: MAYTE X REYES
E-Mail: mreyes1@concho.com9. API Well No.
30-015-441473a. Address
2208 WEST MAIN STREET
ARTESIA, NM 882103b. Phone No. (include area code)
Ph: 575-748-694510. Field and Pool or Exploratory Area
COTTONWOOD DRAW; BS

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

Sec 25 T25S R26E SWSE 210FSL 1980FEL

11. County or Parish, State

EDDY 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 APD
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

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 recomple 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 recompletion 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 Operating LLC, respectfully requests approval for the following changes to the original approved APD.

NM OIL CONSERVATION
ARTESIA DISTRICT

JUL 17 2017

Due to problem zone @ 2,150' operator would like approval on the following changes to the casing program.

Set 13-3/8" surface casing @ 300'. Cement to surface with 500 sx Class C (14.8 ppg, 1.35 cf/sk)

Set 9-5/8" intermediate @ 2375'. Cement to surface with 750 sx Class C (14.8 ppg, 1.35 cf/sk)

Set 5-5/8" lead & 250 sx Class C (14.8 ppg, 1.35 cf/sk) Tail.

Set 5.5" production casing @ 17,369'. Cement to 1,800' with 600 sx Toned Lite Blend (14.8 ppg, 1.35 cf/sk)

3.48 cf/sk) Lead & 2800 sx 50:50:2 Class H Blend (14.4 ppg, 1.25 cf/sk).

AC Report Attached.

Accepted for record - NMOCD
BC 7-18-17**SEE ATTACHED FOR RECEIVED**
CONDITIONS OF APPROVAL

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

Electronic Submission #381124 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Carlsbad
Committed to AFMSS for processing by MUSTAFA HAQUE on 07/12/2017 ()

Name (Printed/Typed) MAYTE X REYES

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 07/12/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USEApproved By MUSTAFA HAQUE

Title

PETROLEUM ENGINEER
JUL 12 2017

Date 7/12/2017

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

BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and with intent to make in 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)

**** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ****

Additional data for EC transaction #381124 that would not fit on the form

32. Additional remarks, continued

Directional Plan Attached.

Revisions to Operator-Submitted EC Data for Sundry Notice #381124

	Operator Submitted	BLM Revised (AFMSS)
Sundry Type:	APDCH NOI	APDCH NOI
Lease:	NMNM112907	NMNM112907
Agreement:		
Operator:	COG OPERATING LLC 2208 WEST MAIN STREET ARTESIA, NM 88210 Ph: 575-748-6940	COG OPERATING LLC 600 W ILLINOIS AVENUE MIDLAND, TX 79701 Ph: 432.685.4385
Admin Contact:	MAYTE X REYES REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945	MAYTE X REYES REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945
Tech Contact:	MAYTE X REYES REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945	MAYTE X REYES REGULATORY ANALYST E-Mail: mreyes1@concho.com Ph: 575-748-6945
Location:		
State:	NM	NM
County:	EDDY	EDDY
Field/Pool:	COTTONWOOD DRAW; BS	COTTONWOOD DRAW
Well/Facility:	ROAD RUNNER FEDERAL COM 2H Sec 25 T25S R26E SWSE 210FSL 1980FEL	ROAD RUNNER FEDERAL COM 2H Sec 25 T25S R26E SWSE 210FSL 1965FEL 32.094112 N Lat, 104.244316 W Lon



COG Operating LLC
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 2H
Plan: Plan #2 (Road Runner Federal Com 2H/Wellbore #1)
Latshaw 44

INTEGRITY
Directional Services

WELL DETAILS: Road Runner Federal Com 2H

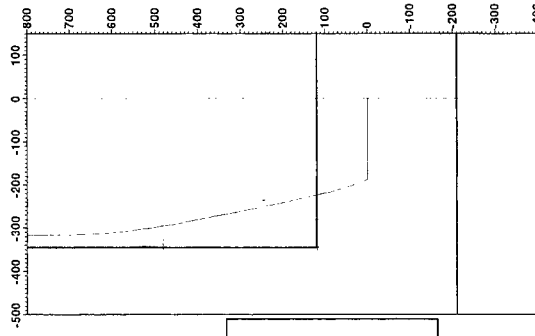
Ground Elevation: 3248.60
RKB Elevation: LB=25' @ 3273.60ft (Latshaw 44)
Rig Name: Latshaw 44

Northing	Easting	Latitude	Longitude
397929.7000	527721.5000	32.0939931	-104.2438162

Planned Section Details

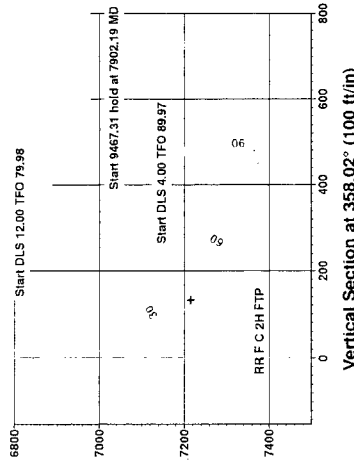
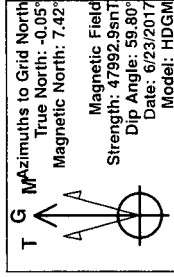
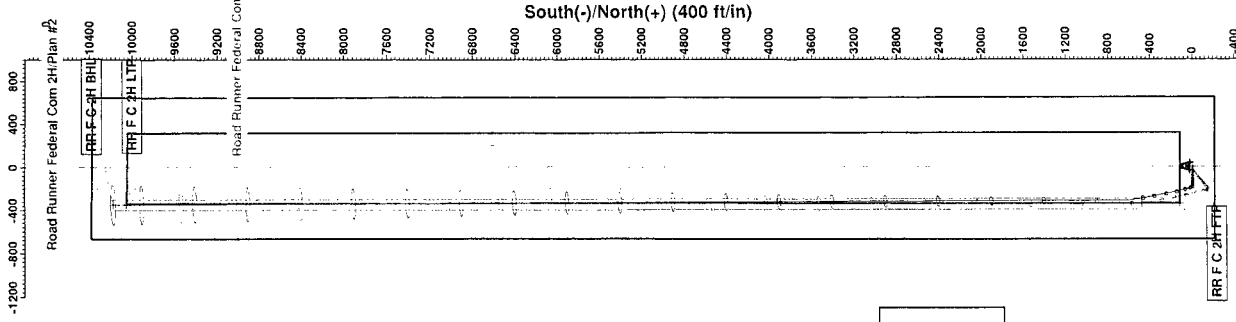
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	3200.00	0.00	0.00	3200.00	0.00	0.00	0.00	0.00	0.00
3	3500.00	3.00	270.00	3495.86	0.00	-7.85	1.00	270.00	0.27
4	6907.35	3.00	270.00	6902.54	0.00	-186.18	0.00	0.00	6.44
5	7857.75	90.57	350.00	7375.00	470.59	-294.17	12.00	79.98	480.49
6	7902.19	90.57	359.78	7372.57	713.75	-315.91	4.00	89.97	724.25
7	17369.50	90.57	359.78	7279.00	10180.52	-352.60	0.00	0.00	10186.62

South(-)/North(+) (100 ft/in)



West(-)/East(+) (100 ft/in)

South(-)/North(+) (400 ft/in)



True Vertical Depth (200 ft/in)

Vertical Section at 358.02° (200 ft/in)

Vertical Section at 358.02° (200 ft/in)



COG Operating L L C

Eddy County, NM (NAD 27 NME)

Sec. 25, T 26 S. , R 26 E

Road Runner Federal Com 2H

Wellbore #1

Plan: Plan #2

NM OIL CONSERVATION
ARTESIA DISTRICT

JUL 17 2017

RECEIVED

Standard Survey Report

28 June, 2017

INTEGRITY
Directional Services



Integrity Directional Services, LLC

Survey Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S. , R 26 E
Well: Road Runner Federal Com 2H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Project	Eddy County, NM (NAD 27 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 Sec. 25, T 26 S. , R 26 E

Site Position:		Northing:	397,929.7000 usft	Latitude:	32.0939931
From:	Map	Easting:	527,721.5000 usft	Longitude:	-104.2438162
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.05 °

Well Road Runner Federal Com 2H

Well Position	+N/-S	0.00 ft	Northing:	397,929.7000 usft	Latitude:	32.0939931
	+E/-W	0.00 ft	Easting:	527,721.5000 usft	Longitude:	-104.2438162
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,248.60 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/23/2017	7.47	59.80	47,993

Design Plan #2

Audit Notes:

Version:	Phase:	PLAN	Tie On Depth:	0.00
-----------------	---------------	------	----------------------	------

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	358.02

Survey Tool Program Date 6/28/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,368.95	Plan #2 (Wellbore #1)	MWD	MWD - Standard

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	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
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 2H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	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
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 1.00									
3,300.00	1.00	270.00	3,299.99	0.00	-0.87	0.03	1.00	1.00	0.00
3,400.00	2.00	270.00	3,399.96	0.00	-3.49	0.12	1.00	1.00	0.00
3,500.00	3.00	270.00	3,499.86	0.00	-7.85	0.27	1.00	1.00	0.00
Start 3407.35 hold at 3500.00 MD									
3,600.00	3.00	270.00	3,599.73	0.00	-13.09	0.45	0.00	0.00	0.00
3,700.00	3.00	270.00	3,699.59	0.00	-18.32	0.63	0.00	0.00	0.00
3,800.00	3.00	270.00	3,799.45	0.00	-23.55	0.82	0.00	0.00	0.00
3,900.00	3.00	270.00	3,899.31	0.00	-28.79	1.00	0.00	0.00	0.00
4,000.00	3.00	270.00	3,999.18	0.00	-34.02	1.18	0.00	0.00	0.00
4,100.00	3.00	270.00	4,099.04	0.00	-39.25	1.36	0.00	0.00	0.00
4,200.00	3.00	270.00	4,198.90	0.00	-44.49	1.54	0.00	0.00	0.00
4,300.00	3.00	270.00	4,298.77	0.00	-49.72	1.72	0.00	0.00	0.00
4,400.00	3.00	270.00	4,398.63	0.00	-54.95	1.90	0.00	0.00	0.00
4,500.00	3.00	270.00	4,498.49	0.00	-60.19	2.08	0.00	0.00	0.00
4,600.00	3.00	270.00	4,598.36	0.00	-65.42	2.26	0.00	0.00	0.00
4,700.00	3.00	270.00	4,698.22	0.00	-70.66	2.45	0.00	0.00	0.00
4,800.00	3.00	270.00	4,798.08	0.00	-75.89	2.63	0.00	0.00	0.00
4,900.00	3.00	270.00	4,897.94	0.00	-81.12	2.81	0.00	0.00	0.00
5,000.00	3.00	270.00	4,997.81	0.00	-86.36	2.99	0.00	0.00	0.00
5,100.00	3.00	270.00	5,097.67	0.00	-91.59	3.17	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 2H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,200.00	3.00	270.00	5,197.53	0.00	-96.82	3.35	0.00	0.00	0.00
5,300.00	3.00	270.00	5,297.40	0.00	-102.06	3.53	0.00	0.00	0.00
5,400.00	3.00	270.00	5,397.26	0.00	-107.29	3.71	0.00	0.00	0.00
5,500.00	3.00	270.00	5,497.12	0.00	-112.52	3.89	0.00	0.00	0.00
5,600.00	3.00	270.00	5,596.99	0.00	-117.76	4.08	0.00	0.00	0.00
5,700.00	3.00	270.00	5,696.85	0.00	-122.99	4.26	0.00	0.00	0.00
5,800.00	3.00	270.00	5,796.71	0.00	-128.22	4.44	0.00	0.00	0.00
5,900.00	3.00	270.00	5,896.57	0.00	-133.46	4.62	0.00	0.00	0.00
6,000.00	3.00	270.00	5,996.44	0.00	-138.69	4.80	0.00	0.00	0.00
6,100.00	3.00	270.00	6,096.30	0.00	-143.93	4.98	0.00	0.00	0.00
6,200.00	3.00	270.00	6,196.16	0.00	-149.16	5.16	0.00	0.00	0.00
6,300.00	3.00	270.00	6,296.03	0.00	-154.39	5.34	0.00	0.00	0.00
6,400.00	3.00	270.00	6,395.89	0.00	-159.63	5.53	0.00	0.00	0.00
6,500.00	3.00	270.00	6,495.75	0.00	-164.86	5.71	0.00	0.00	0.00
6,600.00	3.00	270.00	6,595.61	0.00	-170.09	5.89	0.00	0.00	0.00
6,700.00	3.00	270.00	6,695.48	0.00	-175.33	6.07	0.00	0.00	0.00
6,800.00	3.00	270.00	6,795.34	0.00	-180.56	6.25	0.00	0.00	0.00
6,900.00	3.00	270.00	6,895.20	0.00	-185.79	6.43	0.00	0.00	0.00
6,907.35	3.00	270.00	6,902.54	0.00	-186.18	6.44	0.00	0.00	0.00
Start DLS 12.00 TFO 79.98									
7,000.00	12.00	335.92	6,994.41	8.83	-192.55	15.48	12.00	9.72	71.15
7,100.00	23.81	343.26	7,089.40	37.76	-202.65	44.75	12.00	11.81	7.33
7,200.00	35.75	345.86	7,176.04	85.59	-215.65	93.00	12.00	11.93	2.60
7,300.00	47.71	347.28	7,250.54	150.23	-230.99	158.14	12.00	11.96	1.42
7,400.00	59.69	348.24	7,309.64	228.86	-247.99	237.30	12.00	11.98	0.96
7,500.00	71.67	348.99	7,350.75	318.03	-265.91	327.04	12.00	11.98	0.75
7,600.00	83.65	349.64	7,372.09	413.85	-283.98	423.43	12.00	11.98	0.65
7,657.75	90.57	350.00	7,375.00	470.59	-294.17	480.49	12.00	11.98	0.62
Start DLS 4.00 TFO 89.97									
7,700.00	90.57	351.69	7,374.58	512.29	-300.89	522.40	4.00	0.00	4.00
7,800.00	90.57	355.69	7,373.59	611.66	-311.88	622.09	4.00	0.00	4.00
7,900.00	90.57	359.69	7,372.59	711.56	-315.90	722.06	4.00	0.00	4.00
7,902.19	90.57	359.78	7,372.57	713.75	-315.91	724.25	4.00	0.00	4.00
Start 9467.31 hold at 7902.19 MD									
8,000.00	90.57	359.78	7,371.61	811.55	-316.29	822.01	0.00	0.00	0.00
8,100.00	90.57	359.78	7,370.62	911.54	-316.68	921.96	0.00	0.00	0.00
8,200.00	90.57	359.78	7,369.63	1,011.54	-317.07	1,021.91	0.00	0.00	0.00
8,300.00	90.57	359.78	7,368.64	1,111.53	-317.46	1,121.86	0.00	0.00	0.00
8,400.00	90.57	359.78	7,367.65	1,211.53	-317.84	1,221.80	0.00	0.00	0.00
8,500.00	90.57	359.78	7,366.66	1,311.52	-318.23	1,321.75	0.00	0.00	0.00
8,600.00	90.57	359.78	7,365.68	1,411.52	-318.62	1,421.70	0.00	0.00	0.00
8,700.00	90.57	359.78	7,364.69	1,511.51	-319.01	1,521.65	0.00	0.00	0.00
8,800.00	90.57	359.78	7,363.70	1,611.50	-319.39	1,621.59	0.00	0.00	0.00
8,900.00	90.57	359.78	7,362.71	1,711.50	-319.78	1,721.54	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 2H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,000.00	90.57	359.78	7,361.72	1,811.49	-320.17	1,821.49	0.00	0.00	0.00
9,100.00	90.57	359.78	7,360.73	1,911.49	-320.56	1,921.44	0.00	0.00	0.00
9,200.00	90.57	359.78	7,359.74	2,011.48	-320.94	2,021.39	0.00	0.00	0.00
9,300.00	90.57	359.78	7,358.76	2,111.48	-321.33	2,121.33	0.00	0.00	0.00
9,400.00	90.57	359.78	7,357.77	2,211.47	-321.72	2,221.28	0.00	0.00	0.00
9,500.00	90.57	359.78	7,356.78	2,311.47	-322.11	2,321.23	0.00	0.00	0.00
9,600.00	90.57	359.78	7,355.79	2,411.46	-322.49	2,421.18	0.00	0.00	0.00
9,700.00	90.57	359.78	7,354.80	2,511.45	-322.88	2,521.13	0.00	0.00	0.00
9,800.00	90.57	359.78	7,353.81	2,611.45	-323.27	2,621.07	0.00	0.00	0.00
9,900.00	90.57	359.78	7,352.83	2,711.44	-323.66	2,721.02	0.00	0.00	0.00
10,000.00	90.57	359.78	7,351.84	2,811.44	-324.04	2,820.97	0.00	0.00	0.00
10,100.00	90.57	359.78	7,350.85	2,911.43	-324.43	2,920.92	0.00	0.00	0.00
10,200.00	90.57	359.78	7,349.86	3,011.43	-324.82	3,020.86	0.00	0.00	0.00
10,300.00	90.57	359.78	7,348.87	3,111.42	-325.21	3,120.81	0.00	0.00	0.00
10,400.00	90.57	359.78	7,347.88	3,211.41	-325.59	3,220.76	0.00	0.00	0.00
10,500.00	90.57	359.78	7,346.90	3,311.41	-325.98	3,320.71	0.00	0.00	0.00
10,600.00	90.57	359.78	7,345.91	3,411.40	-326.37	3,420.66	0.00	0.00	0.00
10,700.00	90.57	359.78	7,344.92	3,511.40	-326.76	3,520.60	0.00	0.00	0.00
10,800.00	90.57	359.78	7,343.93	3,611.39	-327.14	3,620.55	0.00	0.00	0.00
10,900.00	90.57	359.78	7,342.94	3,711.39	-327.53	3,720.50	0.00	0.00	0.00
11,000.00	90.57	359.78	7,341.95	3,811.38	-327.92	3,820.45	0.00	0.00	0.00
11,100.00	90.57	359.78	7,340.97	3,911.38	-328.31	3,920.40	0.00	0.00	0.00
11,200.00	90.57	359.78	7,339.98	4,011.37	-328.69	4,020.34	0.00	0.00	0.00
11,300.00	90.57	359.78	7,338.99	4,111.36	-329.08	4,120.29	0.00	0.00	0.00
11,400.00	90.57	359.78	7,338.00	4,211.36	-329.47	4,220.24	0.00	0.00	0.00
11,500.00	90.57	359.78	7,337.01	4,311.35	-329.86	4,320.19	0.00	0.00	0.00
11,600.00	90.57	359.78	7,336.02	4,411.35	-330.24	4,420.13	0.00	0.00	0.00
11,700.00	90.57	359.78	7,335.04	4,511.34	-330.63	4,520.08	0.00	0.00	0.00
11,800.00	90.57	359.78	7,334.05	4,611.34	-331.02	4,620.03	0.00	0.00	0.00
11,900.00	90.57	359.78	7,333.06	4,711.33	-331.41	4,719.98	0.00	0.00	0.00
12,000.00	90.57	359.78	7,332.07	4,811.32	-331.79	4,819.93	0.00	0.00	0.00
12,100.00	90.57	359.78	7,331.08	4,911.32	-332.18	4,919.87	0.00	0.00	0.00
12,200.00	90.57	359.78	7,330.09	5,011.31	-332.57	5,019.82	0.00	0.00	0.00
12,300.00	90.57	359.78	7,329.11	5,111.31	-332.96	5,119.77	0.00	0.00	0.00
12,400.00	90.57	359.78	7,328.12	5,211.30	-333.34	5,219.72	0.00	0.00	0.00
12,500.00	90.57	359.78	7,327.13	5,311.30	-333.73	5,319.67	0.00	0.00	0.00
12,600.00	90.57	359.78	7,326.14	5,411.29	-334.12	5,419.61	0.00	0.00	0.00
12,700.00	90.57	359.78	7,325.15	5,511.29	-334.51	5,519.56	0.00	0.00	0.00
12,800.00	90.57	359.78	7,324.16	5,611.28	-334.89	5,619.51	0.00	0.00	0.00
12,900.00	90.57	359.78	7,323.18	5,711.27	-335.28	5,719.46	0.00	0.00	0.00
13,000.00	90.57	359.78	7,322.19	5,811.27	-335.67	5,819.40	0.00	0.00	0.00
13,100.00	90.57	359.78	7,321.20	5,911.26	-336.06	5,919.35	0.00	0.00	0.00
13,200.00	90.57	359.78	7,320.21	6,011.26	-336.44	6,019.30	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 2H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,300.00	90.57	359.78	7,319.22	6,111.25	-336.83	6,119.25	0.00	0.00	0.00
13,400.00	90.57	359.78	7,318.23	6,211.25	-337.22	6,219.20	0.00	0.00	0.00
13,500.00	90.57	359.78	7,317.25	6,311.24	-337.61	6,319.14	0.00	0.00	0.00
13,600.00	90.57	359.78	7,316.26	6,411.23	-337.99	6,419.09	0.00	0.00	0.00
13,700.00	90.57	359.78	7,315.27	6,511.23	-338.38	6,519.04	0.00	0.00	0.00
13,800.00	90.57	359.78	7,314.28	6,611.22	-338.77	6,618.99	0.00	0.00	0.00
13,900.00	90.57	359.78	7,313.29	6,711.22	-339.16	6,718.94	0.00	0.00	0.00
14,000.00	90.57	359.78	7,312.30	6,811.21	-339.54	6,818.88	0.00	0.00	0.00
14,100.00	90.57	359.78	7,311.31	6,911.21	-339.93	6,918.83	0.00	0.00	0.00
14,200.00	90.57	359.78	7,310.33	7,011.20	-340.32	7,018.78	0.00	0.00	0.00
14,300.00	90.57	359.78	7,309.34	7,111.19	-340.71	7,118.73	0.00	0.00	0.00
14,400.00	90.57	359.78	7,308.35	7,211.19	-341.09	7,218.67	0.00	0.00	0.00
14,500.00	90.57	359.78	7,307.36	7,311.18	-341.48	7,318.62	0.00	0.00	0.00
14,600.00	90.57	359.78	7,306.37	7,411.18	-341.87	7,418.57	0.00	0.00	0.00
14,700.00	90.57	359.78	7,305.38	7,511.17	-342.26	7,518.52	0.00	0.00	0.00
14,800.00	90.57	359.78	7,304.40	7,611.17	-342.64	7,618.47	0.00	0.00	0.00
14,900.00	90.57	359.78	7,303.41	7,711.16	-343.03	7,718.41	0.00	0.00	0.00
15,000.00	90.57	359.78	7,302.42	7,811.16	-343.42	7,818.36	0.00	0.00	0.00
15,100.00	90.57	359.78	7,301.43	7,911.15	-343.81	7,918.31	0.00	0.00	0.00
15,200.00	90.57	359.78	7,300.44	8,011.14	-344.19	8,018.26	0.00	0.00	0.00
15,300.00	90.57	359.78	7,299.45	8,111.14	-344.58	8,118.21	0.00	0.00	0.00
15,400.00	90.57	359.78	7,298.47	8,211.13	-344.97	8,218.15	0.00	0.00	0.00
15,500.00	90.57	359.78	7,297.48	8,311.13	-345.36	8,318.10	0.00	0.00	0.00
15,600.00	90.57	359.78	7,296.49	8,411.12	-345.74	8,418.05	0.00	0.00	0.00
15,700.00	90.57	359.78	7,295.50	8,511.12	-346.13	8,518.00	0.00	0.00	0.00
15,800.00	90.57	359.78	7,294.51	8,611.11	-346.52	8,617.94	0.00	0.00	0.00
15,900.00	90.57	359.78	7,293.52	8,711.10	-346.91	8,717.89	0.00	0.00	0.00
16,000.00	90.57	359.78	7,292.54	8,811.10	-347.29	8,817.84	0.00	0.00	0.00
16,100.00	90.57	359.78	7,291.55	8,911.09	-347.68	8,917.79	0.00	0.00	0.00
16,200.00	90.57	359.78	7,290.56	9,011.09	-348.07	9,017.74	0.00	0.00	0.00
16,300.00	90.57	359.78	7,289.57	9,111.08	-348.46	9,117.68	0.00	0.00	0.00
16,400.00	90.57	359.78	7,288.58	9,211.08	-348.84	9,217.63	0.00	0.00	0.00
16,500.00	90.57	359.78	7,287.59	9,311.07	-349.23	9,317.58	0.00	0.00	0.00
16,600.00	90.57	359.78	7,286.61	9,411.07	-349.62	9,417.53	0.00	0.00	0.00
16,700.00	90.57	359.78	7,285.62	9,511.06	-350.01	9,517.48	0.00	0.00	0.00
16,800.00	90.57	359.78	7,284.63	9,611.05	-350.39	9,617.42	0.00	0.00	0.00
16,900.00	90.57	359.78	7,283.64	9,711.05	-350.78	9,717.37	0.00	0.00	0.00
17,000.00	90.57	359.78	7,282.65	9,811.04	-351.17	9,817.32	0.00	0.00	0.00
17,100.00	90.57	359.78	7,281.66	9,911.04	-351.56	9,917.27	0.00	0.00	0.00
17,200.00	90.57	359.78	7,280.68	10,011.03	-351.94	10,017.21	0.00	0.00	0.00
17,300.00	90.57	359.78	7,279.69	10,111.03	-352.33	10,117.16	0.00	0.00	0.00
17,369.50	90.57	359.78	7,279.00	10,180.52	-352.60	10,186.62	0.00	0.00	0.00

TD at 17369.50



Integrity Directional Services, LLC

Survey Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 2H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Design Targets

Target Name

- hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
2H Drilling Window 5C - plan misses target center by 592.53ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E) - Rectangle (sides W100.00 H9,698.86 D0.00)	0.00	359.95	0.00	482.14	-344.43	398,411.8390	527,377.0707	32.0953193	-104.2449271
RR F C 2H FTP - plan misses target center by 120.10ft at 7271.18ft MD (7230.52 TVD, 130.03 N, -226.36 E) - Point	0.00	0.00	7,214.76	120.00	-345.00	398,049.6997	527,376.5007	32.0943238	-104.2449299
RR F C 2H BHL - plan hits target center - Point	0.00	0.00	7,279.00	10,180.52	-352.60	408,110.2000	527,368.9000	32.1219805	-104.2449278
RR F C 2H LTP - plan misses target center by 3.88ft at 17239.43ft MD (7280.29 TVD, 10050.46 N, -352.10 E) - Point	0.00	0.00	7,280.29	10,050.48	-348.21	407,980.1570	527,373.2865	32.1216230	-104.2449140

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
3200	3200	0	0	Start Build 1.00
3500	3500	0	-8	Start 3407.35 hold at 3500.00 MD
6907	6903	0	-186	Start DLS 12.00 TFO 79.98
7658	7375	471	-294	Start DLS 4.00 TFO 89.97
7902	7373	714	-316	Start 9467.31 hold at 7902.19 MD
17,369	7279	10,181	-353	TD at 17369.50

Checked By: _____ Approved By: _____ Date: _____



COG Operating L L C

Eddy County, NM (NAD 27 NME)

Sec. 25, T 26 S. , R 26 E

Road Runner Federal Com 2H

Wellbore #1

Plan #2

Anticollision Report

28 June, 2017





Integrity Directional Services, LLC

Anticollision Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S. , R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Reference	Plan #2
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD + Stations Interval 100.00ft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 10,000.00 ft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Circular Conic
Casing Method:	Not applied

Survey Tool Program Date 6/28/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,368.95	Plan #2 (Wellbore #1)	MWD	MWD - Standard

Summary

Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Sec. 25, T 26 S. , R 26 E						
Road Runner Federal Com 12H - Wellbore #1 - Plan #2	2,734.74	2,733.84	30.00	17.99	2.498	CC, ES
Road Runner Federal Com 12H - Wellbore #1 - Plan #2	17,369.50	17,941.55	488.90	115.43	1.309	Level 3, SF

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 12H - Wellbore #1 - Plan #2													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													Offset Well Error: 0.00 ft
Reference Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-89.81	0.10	-30.00	30.01				
100.00	100.00	99.10	99.10	0.08	0.08	-89.81	0.10	-30.00	30.00	29.83	0.17	178.768	
200.00	200.00	199.10	199.10	0.31	0.31	-89.81	0.10	-30.00	30.00	29.38	0.62	48.695	
300.00	300.00	299.10	299.10	0.53	0.53	-89.81	0.10	-30.00	30.00	28.93	1.07	28.153	
400.00	400.00	399.10	399.10	0.76	0.76	-89.81	0.10	-30.00	30.00	28.49	1.52	19.800	
500.00	500.00	499.10	499.10	0.98	0.98	-89.81	0.10	-30.00	30.00	28.04	1.96	15.270	
600.00	600.00	599.10	599.10	1.21	1.21	-89.81	0.10	-30.00	30.00	27.59	2.41	12.427	
700.00	700.00	699.10	699.10	1.43	1.43	-89.81	0.10	-30.00	30.00	27.14	2.86	10.476	
800.00	800.00	799.10	799.10	1.66	1.66	-89.81	0.10	-30.00	30.00	26.69	3.31	9.055	
900.00	900.00	899.10	899.10	1.88	1.88	-89.81	0.10	-30.00	30.00	26.24	3.76	7.973	
1,000.00	1,000.00	999.10	999.10	2.11	2.11	-89.81	0.10	-30.00	30.00	25.79	4.21	7.122	
1,100.00	1,100.00	1,099.10	1,099.10	2.33	2.33	-89.81	0.10	-30.00	30.00	25.34	4.66	6.435	
1,200.00	1,200.00	1,199.10	1,199.10	2.56	2.55	-89.81	0.10	-30.00	30.00	24.89	5.11	5.869	
1,300.00	1,300.00	1,299.10	1,299.10	2.78	2.78	-89.81	0.10	-30.00	30.00	24.44	5.56	5.395	
1,400.00	1,400.00	1,399.10	1,399.10	3.01	3.00	-89.81	0.10	-30.00	30.00	23.99	6.01	4.991	
1,500.00	1,500.00	1,499.10	1,499.10	3.23	3.23	-89.81	0.10	-30.00	30.00	23.54	6.46	4.644	
1,600.00	1,600.00	1,599.10	1,599.10	3.46	3.45	-89.81	0.10	-30.00	30.00	23.09	6.91	4.342	
1,700.00	1,700.00	1,699.10	1,699.10	3.68	3.68	-89.81	0.10	-30.00	30.00	22.64	7.36	4.077	
1,800.00	1,800.00	1,799.10	1,799.10	3.91	3.90	-89.81	0.10	-30.00	30.00	22.19	7.81	3.842	
1,900.00	1,900.00	1,899.10	1,899.10	4.13	4.13	-89.81	0.10	-30.00	30.00	21.74	8.26	3.633	
2,000.00	2,000.00	1,999.10	1,999.10	4.35	4.35	-89.81	0.10	-30.00	30.00	21.29	8.71	3.445	
2,100.00	2,100.00	2,099.10	2,099.10	4.58	4.58	-89.81	0.10	-30.00	30.00	20.84	9.16	3.276	
2,200.00	2,200.00	2,199.10	2,199.10	4.80	4.80	-89.81	0.10	-30.00	30.00	20.39	9.61	3.123	
2,300.00	2,300.00	2,299.10	2,299.10	5.03	5.03	-89.81	0.10	-30.00	30.00	19.94	10.06	2.983	
2,400.00	2,400.00	2,399.10	2,399.10	5.25	5.25	-89.81	0.10	-30.00	30.00	19.49	10.51	2.856	

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



Integrity Directional Services, LLC

Anticollision Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S. , R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 12H - Wellbore #1 - Plan #2														Offset Site Error:	0.00 ft
Survey Program: 0-MWD														Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Distance									
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
2,500.00	2,500.00	2,499.10	2,499.10	5.48	5.48	-89.81	0.10	-30.00	30.00	19.04	10.96	2.738			
2,600.00	2,600.00	2,599.10	2,599.10	5.70	5.70	-89.81	0.10	-30.00	30.00	18.60	11.40	2.630			
2,700.00	2,700.00	2,699.10	2,699.10	5.93	5.93	-89.81	0.10	-30.00	30.00	18.15	11.85	2.531			
2,734.74	2,734.74	2,733.84	2,733.84	6.01	6.00	-89.81	0.10	-30.00	30.00	17.99	12.01	2.498	CC, ES		
2,800.00	2,800.00	2,798.71	2,798.70	6.15	6.14	-90.31	-0.17	-30.32	30.32	18.03	12.29	2.467			
2,900.00	2,900.00	2,897.79	2,897.72	6.38	6.32	-94.08	-2.35	-32.92	33.03	20.34	12.69	2.602			
3,000.00	3,000.00	2,997.63	2,997.43	6.60	6.50	-98.79	-5.71	-36.92	37.40	24.30	13.10	2.854			
3,100.00	3,100.00	3,097.49	3,097.15	6.83	6.69	-102.49	-9.07	-40.93	41.96	28.45	13.51	3.105			
3,200.00	3,200.00	3,197.35	3,196.88	7.05	6.88	-105.46	-12.43	-44.93	46.67	32.74	13.93	3.350			
3,300.00	3,299.99	3,297.25	3,296.63	7.26	7.07	-18.17	-15.79	-48.93	50.65	36.31	14.33	3.533			
3,400.00	3,399.96	3,397.18	3,396.43	7.46	7.27	-21.14	-19.15	-52.94	53.09	38.36	14.73	3.605			
3,500.00	3,499.86	3,497.12	3,496.23	7.66	7.47	-24.60	-22.51	-56.95	54.08	38.95	15.13	3.574			
3,600.00	3,599.73	3,597.06	3,596.03	7.87	7.67	-28.35	-25.87	-60.95	54.48	38.95	15.54	3.507			
3,700.00	3,699.59	3,696.99	3,695.83	8.07	7.88	-32.03	-29.24	-64.96	55.12	39.17	15.95	3.456			
3,800.00	3,799.45	3,796.93	3,795.63	8.28	8.08	-35.62	-32.60	-68.97	55.98	39.61	16.36	3.421			
3,900.00	3,899.31	3,896.86	3,895.43	8.49	8.29	-39.08	-35.96	-72.97	57.05	40.26	16.78	3.399			
4,000.00	3,999.18	3,996.80	3,995.23	8.70	8.50	-42.40	-39.32	-76.98	58.32	41.11	17.21	3.389			
4,100.00	4,099.04	4,096.74	4,095.03	8.92	8.72	-45.57	-42.68	-80.99	59.78	42.14	17.63	3.390			
4,200.00	4,198.90	4,196.67	4,194.83	9.13	8.93	-48.58	-46.04	-84.99	61.41	43.34	18.06	3.400			
4,300.00	4,298.77	4,296.61	4,294.63	9.35	9.15	-51.43	-49.41	-89.00	63.20	44.70	18.50	3.417			
4,400.00	4,398.63	4,396.54	4,394.42	9.57	9.37	-54.12	-52.77	-93.01	65.14	46.21	18.93	3.441			
4,500.00	4,498.49	4,496.48	4,494.22	9.79	9.58	-56.64	-56.13	-97.01	67.22	47.85	19.37	3.470			
4,600.00	4,498.36	4,496.42	4,494.02	10.01	9.80	-59.01	-59.49	-101.02	69.41	49.60	19.81	3.504			
4,700.00	4,498.22	4,496.35	4,493.82	10.23	10.03	-61.23	-62.85	-105.03	71.72	51.47	20.25	3.541			
4,800.00	4,498.08	4,496.29	4,493.62	10.45	10.25	-63.31	-66.22	-109.03	74.13	53.44	20.70	3.582			
4,900.00	4,497.94	4,496.22	4,493.42	10.67	10.47	-65.26	-69.58	-113.04	76.64	55.49	21.15	3.624			
5,000.00	4,497.81	4,496.16	4,493.22	10.90	10.70	-67.08	-72.94	-117.05	79.22	57.63	21.59	3.669			
5,100.00	5,097.67	5,096.10	5,093.02	11.12	10.92	-68.78	-76.30	-121.05	81.88	59.83	22.05	3.714			
5,200.00	5,197.53	5,196.03	5,192.82	11.35	11.15	-70.38	-79.66	-125.06	84.61	62.11	22.50	3.761			
5,300.00	5,297.40	5,295.97	5,292.61	11.58	11.38	-71.88	-83.03	-129.07	87.40	64.44	22.95	3.808			
5,400.00	5,397.26	5,395.90	5,392.41	11.80	11.60	-73.28	-86.39	-133.07	90.24	66.83	23.41	3.855			
5,500.00	5,497.12	5,495.84	5,492.21	12.03	11.83	-74.59	-89.75	-137.08	93.13	69.27	23.86	3.903			
5,600.00	5,596.99	5,595.77	5,592.01	12.26	12.06	-75.83	-93.11	-141.09	96.08	71.76	24.32	3.950			
5,700.00	5,696.85	5,695.71	5,691.81	12.49	12.29	-76.99	-96.47	-145.09	99.06	74.28	24.78	3.998			
5,800.00	5,796.71	5,795.65	5,791.61	12.72	12.52	-78.09	-99.84	-149.10	102.08	76.84	25.24	4.044			
5,900.00	5,896.57	5,895.58	5,891.41	12.95	12.75	-79.12	-103.20	-153.11	105.14	79.44	25.70	4.091			
6,000.00	5,996.44	5,995.52	5,991.21	13.18	12.98	-80.09	-106.56	-157.11	108.23	82.06	26.16	4.137			
6,100.00	6,096.30	6,095.45	6,091.01	13.41	13.22	-81.01	-109.92	-161.12	111.34	84.72	26.63	4.182			
6,200.00	6,196.16	6,195.39	6,190.81	13.64	13.45	-81.87	-113.28	-165.13	114.49	87.40	27.09	4.226			
6,300.00	6,296.03	6,295.33	6,290.60	13.87	13.68	-82.69	-116.65	-169.13	117.66	90.10	27.56	4.270			
6,400.00	6,395.89	6,395.26	6,390.40	14.11	13.92	-83.47	-120.01	-173.14	120.85	92.83	28.02	4.313			
6,500.00	6,495.75	6,495.20	6,490.20	14.34	14.15	-84.21	-123.37	-177.15	124.07	95.58	28.49	4.355			
6,600.00	6,595.61	6,595.13	6,590.00	14.57	14.38	-84.91	-126.73	-181.15	127.30	98.34	28.96	4.396			
6,700.00	6,695.48	6,695.07	6,689.80	14.81	14.62	-85.57	-130.09	-185.16	130.55	101.13	29.42	4.437			
6,800.00	6,795.34	6,795.01	6,789.60	15.04	14.85	-86.21	-133.46	-189.16	133.82	103.93	29.89	4.477			
6,900.00	6,895.20	6,894.94	6,889.40	15.27	15.09	-86.81	-136.82	-193.17	137.10	106.74	30.36	4.515			
6,907.35	6,902.54	6,902.28	6,896.73	15.29	15.11	-86.85	-137.06	-193.47	137.35	106.95	30.40	4.518			
6,925.00	6,920.16	6,919.91	6,914.33	15.33	15.15	-118.70	-137.66	-194.17	138.24	107.76	30.48	4.535			
6,950.00	6,945.06	6,944.79	6,939.17	15.39	15.21	-139.47	-138.49	-195.17	140.60	110.01	30.60	4.595			
6,975.00	6,969.83	6,969.50	6,963.85	15.45	15.26	-148.51	-139.33	-196.16	144.24	113.52	30.72	4.696			
7,000.00	6,994.41	6,993.98	6,988.30	15.51	15.32	-153.47	-140.15	-197.14	149.14	118.30	30.84	4.836			
7,025.00	7,018.72	7,018.17	7,012.45	15.58	15.38	-156.67	-140.96	-198.11	155.29	124.34	30.96	5.017			

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



Integrity Directional Services, LLC

Anticollision Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S. , R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 12H - Wellbore #1 - Plan #2													Offset Site Error:	0.00 ft
Survey Program: 0-MWD													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
7,050.00	7,042.70	7,041.99	7,036.24	15.64	15.44	-158.96	-141.76	-199.07	162.70	131.62	31.08	5.236		
7,075.00	7,066.28	7,065.38	7,059.60	15.70	15.49	-160.72	-142.55	-200.00	171.34	140.14	31.19	5.493		
7,100.00	7,089.40	7,088.28	7,082.47	15.77	15.55	-162.13	-143.32	-200.92	181.19	149.87	31.31	5.786		
7,125.00	7,112.00	7,110.62	7,104.78	15.83	15.60	-163.29	-144.07	-201.82	192.23	160.80	31.43	6.116		
7,150.00	7,134.01	7,132.35	7,126.48	15.90	15.65	-164.27	-144.80	-202.69	204.43	172.88	31.55	6.479		
7,175.00	7,155.38	7,153.40	7,147.50	15.97	15.70	-165.09	-145.51	-203.53	217.76	186.09	31.67	6.876		
7,200.00	7,176.04	7,173.71	7,167.79	16.04	15.75	-165.79	-146.20	-204.35	232.18	200.39	31.79	7.304		
7,225.00	7,195.94	7,193.24	7,187.29	16.12	15.79	-166.38	-146.85	-205.13	247.65	215.74	31.91	7.761		
7,250.00	7,215.03	7,211.92	7,205.94	16.20	15.84	-166.86	-147.48	-205.88	264.14	232.11	32.03	8.246		
7,275.00	7,233.24	7,229.71	7,223.70	16.28	15.88	-167.24	-148.08	-206.59	281.59	249.43	32.16	8.756		
7,300.00	7,250.54	7,246.55	7,240.52	16.37	15.92	-167.53	-148.65	-207.27	299.96	267.67	32.29	9.290		
7,325.00	7,266.87	7,262.40	7,256.36	16.47	15.96	-167.72	-149.18	-207.90	319.19	286.75	32.43	9.844		
7,350.00	7,282.19	7,277.22	7,271.15	16.58	15.99	-167.82	-149.68	-208.50	339.23	306.66	32.57	10.416		
7,375.00	7,296.46	7,290.97	7,284.88	16.69	16.02	-167.81	-150.14	-209.05	360.03	327.31	32.72	11.004		
7,400.00	7,309.64	7,303.60	7,297.50	16.82	16.05	-167.68	-150.56	-209.56	381.53	348.65	32.87	11.606		
7,425.00	7,321.69	7,317.78	7,311.63	16.96	16.13	-168.38	-150.97	-211.06	403.54	370.46	33.09	12.196		
7,450.00	7,332.58	7,440.40	7,432.97	17.11	16.33	-170.67	-137.95	-218.18	424.40	390.96	33.44	12.692		
7,475.00	7,342.27	7,637.37	7,608.75	17.27	16.62	-172.63	-55.45	-241.64	441.21	407.32	33.89	13.018		
7,500.00	7,350.75	7,981.38	7,785.22	17.44	17.65	-173.13	224.82	-301.80	446.67	411.58	35.09	12.729		
7,525.00	7,357.99	8,092.88	7,793.95	17.63	18.46	-172.90	333.83	-322.31	439.99	403.90	36.08	12.193		
7,550.00	7,363.97	8,118.04	7,793.88	17.82	18.66	-172.98	358.67	-326.36	433.91	397.43	36.48	11.895		
7,575.00	7,368.68	8,143.46	7,793.81	18.03	18.86	-173.11	383.83	-330.01	429.05	392.16	36.89	11.632		
7,600.00	7,372.09	8,169.07	7,793.73	18.24	19.07	-173.30	409.23	-333.23	425.43	388.12	37.31	11.403		
7,625.00	7,374.21	8,194.78	7,793.66	18.46	19.28	-173.54	434.79	-336.01	423.06	385.31	37.75	11.208		
7,650.00	7,375.02	8,220.51	7,793.59	18.70	19.51	-173.84	460.41	-338.33	421.94	383.74	38.20	11.045		
7,657.75	7,375.00	8,228.47	7,793.57	18.77	19.58	-173.95	468.35	-338.95	421.86	383.51	38.35	11.001		
7,700.00	7,374.58	8,271.80	7,793.45	19.17	19.97	-174.51	511.60	-341.58	421.74	382.60	39.14	10.776		
7,775.30	7,373.83	8,348.39	7,793.24	19.90	20.69	-175.51	588.16	-343.07	421.62	381.03	40.59	10.387		
7,800.00	7,373.59	8,373.01	7,793.17	20.15	20.94	-175.78	612.78	-343.10	421.65	380.56	41.08	10.263		
7,900.00	7,372.59	8,472.91	7,792.90	21.20	22.00	-176.29	712.68	-343.20	422.09	378.89	43.20	9.772		
7,902.19	7,372.57	8,475.10	7,792.89	21.22	22.02	-176.29	714.87	-343.20	422.10	378.86	43.24	9.761		
8,000.00	7,371.61	8,572.90	7,792.62	22.33	23.15	-176.34	812.68	-343.30	422.78	377.30	45.48	9.296		
8,100.00	7,370.62	8,672.90	7,792.35	23.55	24.39	-176.38	912.67	-343.40	423.48	375.54	47.94	8.833		
8,200.00	7,369.63	8,772.90	7,792.08	24.85	25.70	-176.43	1,012.67	-343.49	424.17	373.63	50.54	8.392		
8,300.00	7,368.64	8,872.89	7,791.80	26.21	27.06	-176.47	1,112.67	-343.59	424.87	371.60	53.27	7.976		
8,400.00	7,367.65	8,972.89	7,791.53	27.62	28.48	-176.52	1,212.66	-343.69	425.57	369.46	56.10	7.585		
8,500.00	7,366.66	9,072.89	7,791.26	29.08	29.94	-176.56	1,312.66	-343.79	426.26	367.24	59.02	7.222		
8,600.00	7,365.68	9,172.88	7,790.98	30.58	31.44	-176.61	1,412.66	-343.89	426.96	364.93	62.02	6.884		
8,700.00	7,364.69	9,272.88	7,790.71	32.11	32.98	-176.65	1,512.65	-343.99	427.66	362.56	65.09	6.570		
8,800.00	7,363.70	9,372.88	7,790.44	33.68	34.54	-176.70	1,612.65	-344.09	428.35	360.14	68.22	6.279		
8,900.00	7,362.71	9,472.88	7,790.16	35.26	36.13	-176.74	1,712.65	-344.19	429.05	357.66	71.39	6.010		
9,000.00	7,361.72	9,572.87	7,789.89	36.87	37.74	-176.78	1,812.64	-344.29	429.75	355.14	74.61	5.760		
9,100.00	7,360.73	9,672.87	7,789.62	38.50	39.36	-176.83	1,912.64	-344.39	430.44	352.58	77.87	5.528		
9,200.00	7,359.74	9,772.87	7,789.34	40.15	41.01	-176.87	2,012.64	-344.49	431.14	349.98	81.16	5.312		
9,300.00	7,358.76	9,872.86	7,789.07	41.81	42.67	-176.91	2,112.63	-344.59	431.84	347.36	84.48	5.112		
9,400.00	7,357.77	9,972.86	7,788.80	43.49	44.34	-176.96	2,212.63	-344.69	432.54	344.71	87.83	4.925		
9,500.00	7,356.78	10,072.86	7,788.52	45.18	46.02	-177.00	2,312.63	-344.79	433.24	342.04	91.20	4.750		
9,600.00	7,355.79	10,172.85	7,788.25	46.87	47.72	-177.04	2,412.62	-344.89	433.94	339.34	94.59	4.587		
9,700.00	7,354.80	10,272.85	7,787.97	48.58	49.42	-177.09	2,512.62	-344.98	434.64	336.63	98.00	4.435		
9,800.00	7,353.81	10,372.85	7,787.70	50.30	51.14	-177.13	2,612.62	-345.08	435.34	333.90	101.43	4.292		
9,900.00	7,352.83	10,472.85	7,787.43	52.02	52.86	-177.17	2,712.61	-345.18	436.03	331.16	104.88	4.158		
10,000.00	7,351.84	10,572.84	7,787.15	53.75	54.58	-177.21	2,812.61	-345.28	436.73	328.40	108.33	4.031		

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

Integrity Directional Services, LLC

Anticollision Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S. , R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 12H - Wellbore #1 - Plan #2														Offset Site Error:	0.00 ft
Survey Program: 0-MWPD														Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
10,100.00	7,350.85	10,672.84	7,786.88	55.49	56.32	-177.26	2,912.61	-345.38	437.43	325.63	111.81	3.912			
10,200.00	7,349.86	10,772.84	7,786.61	57.23	58.06	-177.30	3,012.60	-345.48	438.14	322.85	115.29	3.800			
10,300.00	7,348.87	10,872.83	7,786.33	58.98	59.80	-177.34	3,112.60	-345.58	438.84	320.06	118.78	3.695			
10,400.00	7,347.88	10,972.83	7,786.06	60.73	61.55	-177.38	3,212.60	-345.68	439.54	317.25	122.28	3.594			
10,500.00	7,346.90	11,072.83	7,785.79	62.49	63.31	-177.42	3,312.59	-345.78	440.24	314.44	125.79	3.500			
10,600.00	7,345.91	11,172.82	7,785.51	64.25	65.06	-177.46	3,412.59	-345.88	440.94	311.63	129.31	3.410			
10,700.00	7,344.92	11,272.82	7,785.24	66.01	66.83	-177.51	3,512.59	-345.98	441.64	308.80	132.84	3.325			
10,800.00	7,343.93	11,372.82	7,784.97	67.78	68.59	-177.55	3,612.58	-346.08	442.34	305.97	136.37	3.244			
10,900.00	7,342.94	11,472.82	7,784.69	69.55	70.36	-177.59	3,712.58	-346.18	443.04	303.13	139.91	3.167			
11,000.00	7,341.95	11,572.81	7,784.42	71.33	72.13	-177.63	3,812.58	-346.28	443.75	300.29	143.46	3.093			
11,100.00	7,340.97	11,672.81	7,784.15	73.10	73.91	-177.67	3,912.57	-346.38	444.45	297.44	147.01	3.023			
11,200.00	7,339.98	11,772.81	7,783.87	74.88	75.68	-177.71	4,012.57	-346.47	445.15	294.59	150.56	2.957			
11,300.00	7,338.99	11,872.80	7,783.60	76.66	77.46	-177.75	4,112.57	-346.57	445.85	291.73	154.12	2.893			
11,400.00	7,338.00	11,972.80	7,783.32	78.45	79.24	-177.79	4,212.56	-346.67	446.56	288.87	157.69	2.832			
11,500.00	7,337.01	12,072.80	7,783.05	80.23	81.03	-177.83	4,312.56	-346.77	447.26	286.00	161.26	2.774			
11,600.00	7,336.02	12,172.80	7,782.78	82.02	82.81	-177.87	4,412.55	-346.87	447.96	283.13	164.83	2.718			
11,700.00	7,335.04	12,272.79	7,782.50	83.81	84.60	-177.91	4,512.55	-346.97	448.67	280.26	168.41	2.664			
11,800.00	7,334.05	12,372.79	7,782.23	85.60	86.39	-177.95	4,612.55	-347.07	449.37	277.38	171.99	2.613			
11,900.00	7,333.06	12,472.79	7,781.96	87.39	88.18	-177.99	4,712.54	-347.17	450.08	274.50	175.57	2.563			
12,000.00	7,332.07	12,572.78	7,781.68	89.19	89.97	-178.03	4,812.54	-347.27	450.78	271.62	179.16	2.516			
12,100.00	7,331.08	12,672.78	7,781.41	90.98	91.76	-178.07	4,912.54	-347.37	451.49	268.74	182.75	2.471			
12,200.00	7,330.09	12,772.78	7,781.14	92.78	93.56	-178.11	5,012.53	-347.47	452.19	265.85	186.34	2.427			
12,300.00	7,329.11	12,872.77	7,780.86	94.58	95.35	-178.15	5,112.53	-347.57	452.89	262.96	189.93	2.385			
12,400.00	7,328.12	12,972.77	7,780.59	96.38	97.15	-178.19	5,212.53	-347.67	453.60	260.07	193.53	2.344			
12,500.00	7,327.13	13,072.77	7,780.32	98.18	98.95	-178.23	5,312.52	-347.77	454.31	257.18	197.13	2.305			
12,600.00	7,326.14	13,172.77	7,780.04	99.98	100.75	-178.27	5,412.52	-347.86	455.01	254.28	200.73	2.267			
12,700.00	7,325.15	13,272.76	7,779.77	101.78	102.55	-178.31	5,512.52	-347.96	455.72	251.39	204.33	2.230			
12,800.00	7,324.16	13,372.76	7,779.50	103.58	104.35	-178.35	5,612.51	-348.06	456.42	248.49	207.93	2.195			
12,900.00	7,323.18	13,472.76	7,779.22	105.39	106.15	-178.39	5,712.51	-348.16	457.13	245.59	211.54	2.161			
13,000.00	7,322.19	13,572.75	7,778.95	107.19	107.96	-178.42	5,812.51	-348.26	457.84	242.69	215.15	2.128			
13,100.00	7,321.20	13,672.75	7,778.67	109.00	109.76	-178.46	5,912.50	-348.36	458.54	239.79	218.76	2.096			
13,200.00	7,320.21	13,772.75	7,778.40	110.80	111.56	-178.50	6,012.50	-348.46	459.25	236.88	222.37	2.065			
13,300.00	7,319.22	13,872.74	7,778.13	112.61	113.37	-178.54	6,112.50	-348.56	459.96	233.98	225.98	2.035			
13,400.00	7,318.23	13,972.74	7,777.85	114.42	115.18	-178.58	6,212.49	-348.66	460.66	231.07	229.59	2.006			
13,500.00	7,317.25	14,072.74	7,777.58	116.23	116.98	-178.62	6,312.49	-348.76	461.37	228.16	233.21	1.978			
13,600.00	7,316.26	14,172.74	7,777.31	118.04	118.79	-178.65	6,412.49	-348.86	462.08	225.25	236.83	1.951			
13,700.00	7,315.27	14,272.73	7,777.03	119.85	120.60	-178.69	6,512.48	-348.96	462.79	222.34	240.44	1.925			
13,800.00	7,314.28	14,372.73	7,776.76	121.66	122.41	-178.73	6,612.48	-349.06	463.50	219.43	244.06	1.899			
13,900.00	7,313.29	14,472.73	7,776.49	123.47	124.22	-178.77	6,712.48	-349.16	464.20	216.52	247.68	1.874			
14,000.00	7,312.30	14,572.72	7,776.21	125.28	126.03	-178.80	6,812.47	-349.26	464.91	213.61	251.30	1.850			
14,100.00	7,311.31	14,672.72	7,775.94	127.09	127.84	-178.84	6,912.47	-349.35	465.62	210.70	254.93	1.826			
14,200.00	7,310.33	14,772.72	7,775.67	128.90	129.65	-178.88	7,012.47	-349.45	466.33	207.78	258.55	1.804			
14,300.00	7,309.34	14,872.72	7,775.39	130.72	131.46	-178.92	7,112.46	-349.55	467.04	204.87	262.17	1.781			
14,400.00	7,308.35	14,972.71	7,775.12	132.53	133.27	-178.95	7,212.46	-349.65	467.75	201.95	265.80	1.760			
14,500.00	7,307.36	15,072.71	7,774.85	134.34	135.08	-178.99	7,312.46	-349.75	468.46	199.04	269.42	1.739			
14,600.00	7,306.37	15,172.71	7,774.57	136.16	136.89	-179.03	7,412.45	-349.85	469.17	196.12	273.05	1.718			
14,700.00	7,305.38	15,272.70	7,774.30	137.97	138.71	-179.06	7,512.45	-349.95	469.88	193.20	276.68	1.698			
14,800.00	7,304.40	15,372.70	7,774.02	139.79	140.52	-179.10	7,612.45	-350.05	470.59	190.28	280.31	1.679			
14,900.00	7,303.41	15,472.70	7,773.75	141.60	142.33	-179.14	7,712.44	-350.15	471.30	187.36	283.93	1.660			
15,000.00	7,302.42	15,572.69	7,773.48	143.42	144.15	-179.17	7,812.44	-350.25	472.01	184.45	287.56	1.641			
15,100.00	7,301.43	15,672.69	7,773.20	145.23	145.96	-179.21	7,912.44	-350.35	472.72	181.53	291.19	1.623			
15,200.00	7,300.44	15,772.69	7,772.93	147.05	147.78	-179.24	8,012.43	-350.45	473.43	178.61	294.82	1.606			

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



Integrity Directional Services, LLC

Anticollision Report



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S. , R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 12H - Wellbore #1 - Plan #2													Offset Site Error:	0.00 ft
Survey Program: 0-MWD													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
15,300.00	7,299.45	15,872.69	7,772.66	148.86	149.59	-179.28	8,112.43	-350.55	474.14	175.69	298.46	1.589		
15,400.00	7,298.47	15,972.68	7,772.38	150.68	151.41	-179.32	8,212.43	-350.65	474.85	172.77	302.09	1.572		
15,500.00	7,297.48	16,072.68	7,772.11	152.50	153.22	-179.35	8,312.42	-350.75	475.56	169.84	305.72	1.556		
15,600.00	7,296.49	16,172.68	7,771.84	154.32	155.04	-179.39	8,412.42	-350.84	476.28	166.92	309.35	1.540		
15,700.00	7,295.50	16,272.67	7,771.56	156.13	156.85	-179.42	8,512.42	-350.94	476.99	164.00	312.99	1.524		
15,800.00	7,294.51	16,372.67	7,771.29	157.95	158.67	-179.46	8,612.41	-351.04	477.70	161.08	316.62	1.509		
15,900.00	7,293.52	16,472.67	7,771.02	159.77	160.49	-179.49	8,712.41	-351.14	478.41	158.16	320.26	1.494 Level 3		
16,000.00	7,292.54	16,572.66	7,770.74	161.59	162.30	-179.53	8,812.41	-351.24	479.12	155.23	323.89	1.479 Level 3		
16,100.00	7,291.55	16,672.66	7,770.47	163.41	164.12	-179.56	8,912.40	-351.34	479.84	152.31	327.53	1.465 Level 3		
16,200.00	7,290.56	16,772.66	7,770.20	165.22	165.94	-179.60	9,012.40	-351.44	480.55	149.39	331.16	1.451 Level 3		
16,300.00	7,289.57	16,872.66	7,769.92	167.04	167.76	-179.63	9,112.40	-351.54	481.26	146.46	334.80	1.437 Level 3		
16,400.00	7,288.58	16,972.65	7,769.65	168.86	169.57	-179.67	9,212.39	-351.64	481.98	143.54	338.44	1.424 Level 3		
16,500.00	7,287.59	17,072.65	7,769.37	170.68	171.39	-179.70	9,312.39	-351.74	482.69	140.61	342.07	1.411 Level 3		
16,600.00	7,286.61	17,172.65	7,769.10	172.50	173.21	-179.74	9,412.39	-351.84	483.40	137.69	345.71	1.398 Level 3		
16,700.00	7,285.62	17,272.64	7,768.83	174.32	175.03	-179.77	9,512.38	-351.94	484.12	134.77	349.35	1.386 Level 3		
16,800.00	7,284.63	17,372.64	7,768.55	176.14	176.85	-179.81	9,612.38	-352.04	484.83	131.84	352.99	1.373 Level 3		
16,900.00	7,283.64	17,472.64	7,768.28	177.96	178.67	-179.84	9,712.38	-352.14	485.54	128.92	356.63	1.361 Level 3		
17,000.00	7,282.65	17,572.63	7,768.01	179.78	180.49	-179.87	9,812.37	-352.24	486.26	125.99	360.27	1.350 Level 3		
17,100.00	7,281.66	17,672.63	7,767.73	181.60	182.30	-179.91	9,912.37	-352.33	486.97	123.07	363.91	1.338 Level 3		
17,200.00	7,280.68	17,772.63	7,767.46	183.42	184.12	-179.94	10,012.37	-352.43	487.69	120.14	367.55	1.327 Level 3		
17,300.00	7,279.69	17,872.63	7,767.19	185.24	185.94	-179.98	10,112.36	-352.53	488.40	117.21	371.19	1.316 Level 3		
17,369.50	7,279.00	17,941.55	7,767.00	186.28	187.20	180.00	10,181.29	-352.60	488.90	115.43	373.47	1.309 Level 3, SF		

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



Integrity Directional Services, LLC

Anticollision Report



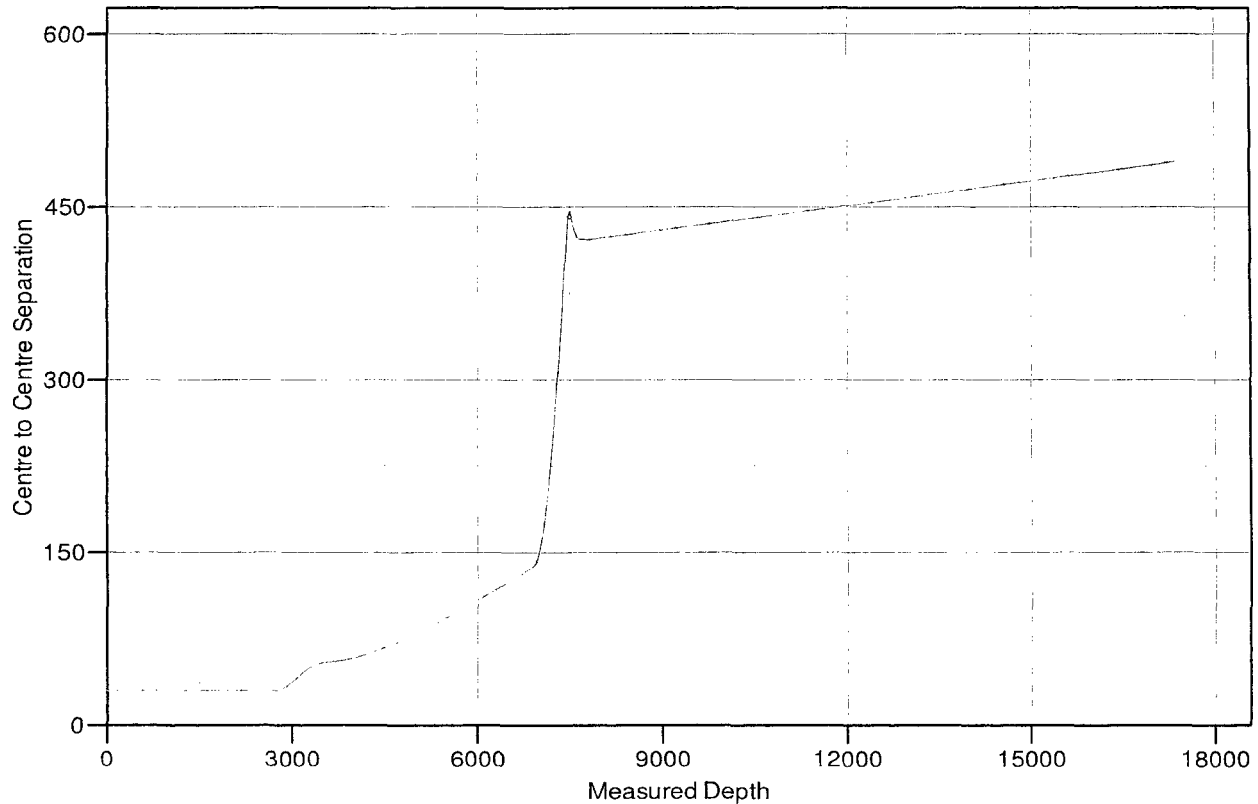
Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S., R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Reference Depths are relative to LB=25' @ 3273.60ft (Latshaw 44)
Offset Depths are relative to Offset Datum
Central Meridian is -104.333333

Coordinates are relative to: Road Runner Federal Com 2H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.05°

Ladder Plot



LEGEND

100 Federal Com 12H, Wellbore #1, Plan #2 V0



Integrity Directional Services, LLC
Anticollision Report



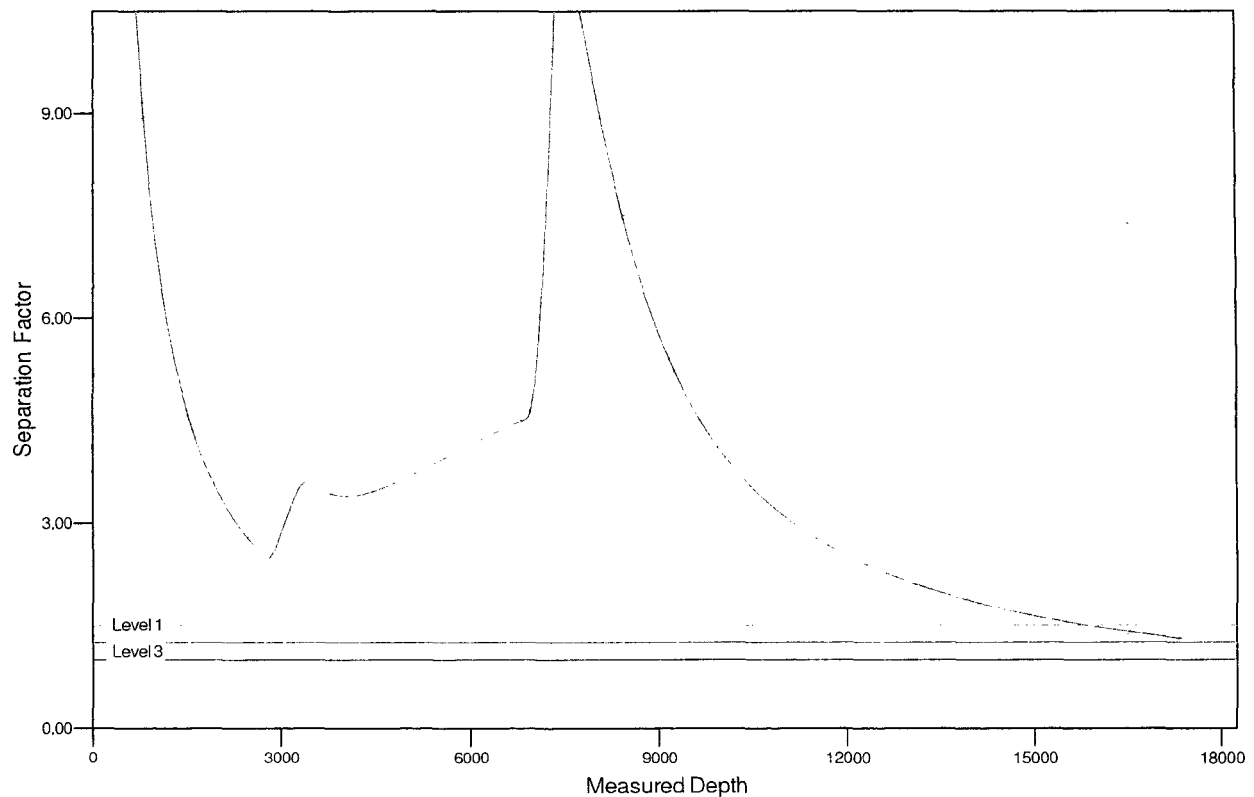
Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S., R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 2H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 2H
TVD Reference: LB=25' @ 3273.60ft (Latshaw 44)
MD Reference: LB=25' @ 3273.60ft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Multi User Db
Offset TVD Reference: Offset Datum

Reference Depths are relative to LB=25' @ 3273.60ft (Latshaw 44)
Offset Depths are relative to Offset Datum
Central Meridian is -104.333333

Coordinates are relative to: Road Runner Federal Com 2H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.05°

Separation Factor Plot



LEGEND

1er Federal Com 12H, Wellbore #1, Plan #2 V0

**PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NM112907
WELL NAME & NO.:	Road Runner Federal Com – 2H
SURFACE HOLE FOOTAGE:	210'/FSL & 1965'/FEL
BOTTOM HOLE FOOTAGE:	200'/FNL & 1980'/FEL, sec. 24
LOCATION:	Sec. 25, T. 25 S, R. 26 E
COUNTY:	Eddy County

All previous COAs still apply, except for the following:

A. CASING

Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) for Water Basin:

After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.

No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

A MINIMUM OF TWO CASING STRINGS CEMENTED TO SURFACE IS REQUIRED IN HIGH CAVE/KARST AREAS. THE CEMENT MUST BE IN A SOLID SHEATH. THEREFORE, ONE INCH OPERATIONS ARE NOT SUFFICIENT TO PROTECT CAVE KARST RESOURCES. A CASING DESIGN

THAT HAS A ONE INCH JOB PERFORMED DOES NOT COUNT AS A SOLID SHEATH.

High Cave Karst

Possibility of water flows in the Castile and Salado

Possibility of lost circulation in the Castile, Salado and Delaware

1. The **13-3/8** inch surface casing shall be set at approximately **300** feet and cemented to the surface. **If salt is encountered, set casing at least 25 feet above the salt.**
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry.**
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
 - d. If cement falls back, remedial cementing will be done prior to drilling out that string.
2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:
☒ Cement to surface. If cement does not circulate see A.1.a, c-d above.

MHH 07122017