

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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

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.

Carlsbad Field Office
OCD Artesia

NMNM112907

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 ☐ Other

8. Well Name and No.

ROAD RUNNER FEDERAL COM 12H

2. Name of Operator

COG OPERATING LLC

Contact: MAYTE X REYES

E-Mail: mreyes1@concho.com

9. API Well No.

30-015-44148

3a. Address

2208 WEST MAIN STREET
ARTESIA, NM 88210

3b. Phone No. (include area code)

Ph: 575-748-6945

10. 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 1995FEL

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

☐ Subsequent Report

☐ Final Abandonment Notice

☐ Acidize

☐ Alter Casing

☐ Casing Repair

☐ Change Plans

☐ Convert to Injection

☐ Deepen

☐ Hydraulic Fracturing

☐ New Construction

☐ Plug and Abandon

☐ Plug Back

☐ Production (Start/Resume)

☐ Reclamation

☐ Recomplete

☐ Temporarily Abandon

☐ Water Disposal

☐ Water Shut-Off

☐ Well Integrity

☒ Other
Change to Original A
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 Operating LLC, respectfully requests approval for the following changes to the original approved APD.

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) Tail.

Set 5.5" production casing @ 17,940'. Cement to 1,800' with 600 sx Tuned Lite Blend (10.3 ppg, 3.48 cf/sk) Lead & 2800 sx 50:50:2 Class H Blend (14.4 ppg, 1.25 cf/sk) Tail.

AC Report Attached.

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

NM OIL CONSERVATION
ARTESIA DISTRICT

JUL 17 2017

PC 7-18-17
Accepted for record - NMOCD

RECEIVED

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

Electronic Submission #381136 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 USE

Approved By MUSTAFA HAQUE

Title

PETROLEUM ENGINEER

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 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)

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

Additional data for EC transaction #381136 that would not fit on the form

32. Additional remarks, continued

Directional Plan Attached.



COG Operating L L C

Eddy County, NM (NAD 27 NME)

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

Road Runner Federal Com 12H

Wellbore #1

Plan #2

NM OIL CONSERVATION
ARTESIA DISTRICT

JUL 17 2017

RECEIVED

Anticollision Report

28 June, 2017

INTEGRITY
Directional Services



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 12H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
MD Reference: KB=25' @ 3272.70ft (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	17,940.74	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 2H - Wellbore #1 - Plan #2	2,750.00	2,750.90	30.00	17.92	2.483 CC, ES	
Road Runner Federal Com 2H - Wellbore #1 - Plan #2	17,941.55	17,365.43	488.88	115.47	1.309 Level 3, SF	

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 2H - 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		Minimum Separation		Separation Factor		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		
0.00	0.00	0.90	0.90	0.00	0.00	90.19	-0.10	30.00	30.00					
100.00	100.00	100.90	100.90	0.08	0.09	90.19	-0.10	30.00	30.00	29.83	0.17	175.854		
200.00	200.00	200.90	200.90	0.31	0.31	90.19	-0.10	30.00	30.00	29.38	0.62	48.377		
300.00	300.00	300.90	300.90	0.53	0.54	90.19	-0.10	30.00	30.00	28.93	1.07	28.046		
400.00	400.00	400.90	400.90	0.76	0.76	90.19	-0.10	30.00	30.00	28.48	1.52	19.747		
500.00	500.00	500.90	500.90	0.98	0.99	90.19	-0.10	30.00	30.00	28.03	1.97	15.238		
600.00	600.00	600.90	600.90	1.21	1.21	90.19	-0.10	30.00	30.00	27.58	2.42	12.406		
700.00	700.00	700.90	700.90	1.43	1.43	90.19	-0.10	30.00	30.00	27.13	2.87	10.461		
800.00	800.00	800.90	800.90	1.66	1.66	90.19	-0.10	30.00	30.00	26.68	3.32	9.044		
900.00	900.00	900.90	900.90	1.88	1.88	90.19	-0.10	30.00	30.00	26.23	3.77	7.964		
1,000.00	1,000.00	1,000.90	1,000.90	2.11	2.11	90.19	-0.10	30.00	30.00	25.78	4.22	7.115		
1,100.00	1,100.00	1,100.90	1,100.90	2.33	2.33	90.19	-0.10	30.00	30.00	25.33	4.67	6.430		
1,200.00	1,200.00	1,200.90	1,200.90	2.56	2.56	90.19	-0.10	30.00	30.00	24.88	5.12	5.865		
1,300.00	1,300.00	1,300.90	1,300.90	2.78	2.78	90.19	-0.10	30.00	30.00	24.44	5.56	5.391		
1,400.00	1,400.00	1,400.90	1,400.90	3.01	3.01	90.19	-0.10	30.00	30.00	23.99	6.01	4.988		
1,500.00	1,500.00	1,500.90	1,500.90	3.23	3.23	90.19	-0.10	30.00	30.00	23.54	6.46	4.641		
1,600.00	1,600.00	1,600.90	1,600.90	3.46	3.46	90.19	-0.10	30.00	30.00	23.09	6.91	4.339		
1,700.00	1,700.00	1,700.90	1,700.90	3.68	3.68	90.19	-0.10	30.00	30.00	22.64	7.36	4.074		
1,800.00	1,800.00	1,800.90	1,800.90	3.91	3.91	90.19	-0.10	30.00	30.00	22.19	7.81	3.840		
1,900.00	1,900.00	1,900.90	1,900.90	4.13	4.13	90.19	-0.10	30.00	30.00	21.74	8.26	3.631		
2,000.00	2,000.00	2,000.90	2,000.90	4.35	4.36	90.19	-0.10	30.00	30.00	21.29	8.71	3.444		
2,100.00	2,100.00	2,100.90	2,100.90	4.58	4.58	90.19	-0.10	30.00	30.00	20.84	9.16	3.275		
2,200.00	2,200.00	2,200.90	2,200.90	4.80	4.81	90.19	-0.10	30.00	30.00	20.39	9.61	3.122		
2,300.00	2,300.00	2,300.90	2,300.90	5.03	5.03	90.19	-0.10	30.00	30.00	19.94	10.06	2.982		
2,400.00	2,400.00	2,400.90	2,400.90	5.25	5.26	90.19	-0.10	30.00	30.00	19.49	10.51	2.854		

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 12H
 Well Error: 0.00 ft
 Reference Wellbore: Wellbore #1
 Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
 TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
 MD Reference: KB=25' @ 3272.70ft (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 2H - 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		
2,500.00	2,500.00	2,500.90	2,500.90	5.48	5.48	90.19	-0.10	30.00	30.00	19.04	10.96	2.737		
2,600.00	2,600.00	2,600.90	2,600.90	5.70	5.71	90.19	-0.10	30.00	30.00	18.59	11.41	2.630		
2,700.00	2,700.00	2,700.90	2,700.90	5.93	5.93	90.19	-0.10	30.00	30.00	18.14	11.86	2.530		
2,750.00	2,750.00	2,750.90	2,750.90	6.04	6.04	90.19	-0.10	30.00	30.00	17.92	12.08	2.483 CC, ES		
2,800.00	2,800.00	2,800.90	2,800.90	6.14	6.15	-140.34	-0.10	30.00	30.33	18.04	12.30	2.467		
2,900.00	2,899.93	2,900.83	2,900.83	6.32	6.38	-144.16	-0.10	30.00	33.10	20.40	12.70	2.606		
3,000.00	2,999.79	3,000.69	3,000.69	6.50	6.60	-148.85	-0.10	30.00	37.47	24.36	13.11	2.858		
3,100.00	3,099.66	3,100.56	3,100.56	6.69	6.83	-152.54	-0.10	30.00	42.03	28.51	13.52	3.109		
3,200.00	3,199.52	3,200.42	3,200.42	6.88	7.05	-155.50	-0.10	30.00	46.74	32.81	13.94	3.354		
3,300.00	3,299.38	3,301.14	3,301.13	7.08	7.26	-158.24	-0.10	29.11	50.71	36.37	14.34	3.536		
3,400.00	3,399.25	3,401.93	3,401.89	7.27	7.46	-161.25	-0.10	26.44	53.13	38.40	14.74	3.605		
3,500.00	3,499.11	3,502.72	3,502.58	7.47	7.67	-164.76	-0.10	22.01	54.09	38.95	15.14	3.572		
3,600.00	3,598.97	3,602.66	3,602.38	7.68	7.87	-168.51	-0.10	16.78	54.50	38.95	15.55	3.505		
3,700.00	3,698.84	3,702.59	3,702.18	7.88	8.08	-172.19	-0.10	11.54	55.14	39.18	15.96	3.455		
3,800.00	3,798.70	3,802.53	3,801.98	8.09	8.29	-175.77	-0.10	6.31	56.01	39.63	16.38	3.420		
3,900.00	3,898.56	3,902.47	3,901.78	8.30	8.50	-179.22	-0.10	1.08	57.08	40.29	16.80	3.399		
4,000.00	3,998.42	4,002.40	4,001.58	8.51	8.71	177.46	-0.10	-4.15	58.36	41.14	17.22	3.389		
4,100.00	4,098.29	4,102.34	4,101.37	8.72	8.92	174.29	-0.10	-9.38	59.82	42.17	17.65	3.390		
4,200.00	4,198.15	4,202.27	4,201.17	8.94	9.14	171.28	-0.10	-14.61	61.46	43.38	18.08	3.400		
4,300.00	4,298.01	4,302.21	4,300.97	9.15	9.35	168.44	-0.10	-19.84	63.25	44.75	18.51	3.418		
4,400.00	4,397.88	4,402.14	4,400.77	9.37	9.57	165.76	-0.10	-25.07	65.20	46.25	18.94	3.442		
4,500.00	4,497.74	4,502.08	4,500.57	9.59	9.79	163.24	-0.10	-30.30	67.28	47.89	19.38	3.471		
4,600.00	4,597.60	4,602.02	4,600.37	9.81	10.01	160.87	-0.10	-35.53	69.48	49.65	19.82	3.505		
4,700.00	4,697.46	4,701.95	4,700.17	10.03	10.23	158.66	-0.10	-40.76	71.79	51.52	20.27	3.542		
4,800.00	4,797.33	4,801.89	4,799.97	10.26	10.45	156.58	-0.10	-45.99	74.20	53.49	20.71	3.583		
4,900.00	4,897.19	4,901.82	4,899.77	10.48	10.68	154.64	-0.10	-51.22	76.71	55.55	21.16	3.625		
5,000.00	4,997.05	5,001.76	4,999.57	10.71	10.90	152.82	-0.10	-56.45	79.29	57.69	21.61	3.670		
5,100.00	5,096.92	5,101.70	5,099.36	10.93	11.13	151.12	-0.10	-61.68	81.95	59.90	22.06	3.715		
5,200.00	5,196.78	5,201.63	5,199.16	11.16	11.35	149.53	-0.10	-66.91	84.68	62.17	22.51	3.762		
5,300.00	5,296.64	5,301.57	5,298.96	11.39	11.58	148.03	-0.10	-72.14	87.47	64.51	22.96	3.809		
5,400.00	5,396.51	5,401.50	5,398.76	11.61	11.81	146.63	-0.10	-77.37	90.32	66.90	23.42	3.857		
5,500.00	5,496.37	5,501.44	5,498.56	11.84	12.03	145.32	-0.10	-82.60	93.22	69.34	23.88	3.904		
5,600.00	5,596.23	5,601.38	5,598.36	12.07	12.26	144.09	-0.10	-87.83	96.16	71.83	24.33	3.952		
5,700.00	5,696.09	5,701.31	5,698.16	12.30	12.49	142.93	-0.10	-93.06	99.14	74.35	24.79	3.999		
5,800.00	5,795.96	5,801.25	5,797.96	12.53	12.72	141.83	-0.10	-98.29	102.17	76.91	25.25	4.046		
5,900.00	5,895.82	5,901.18	5,897.76	12.76	12.95	140.81	-0.10	-103.52	105.22	79.51	25.71	4.092		
6,000.00	5,995.68	6,001.12	5,997.55	13.00	13.18	139.84	-0.10	-108.75	108.31	82.14	26.18	4.138		
6,100.00	6,095.55	6,101.06	6,097.35	13.23	13.41	138.92	-0.10	-113.98	111.43	84.79	26.64	4.183		
6,200.00	6,195.41	6,200.99	6,197.15	13.46	13.64	138.05	-0.10	-119.21	114.58	87.47	27.10	4.227		
6,300.00	6,295.27	6,300.93	6,296.95	13.69	13.88	137.23	-0.10	-124.44	117.75	90.18	27.57	4.271		
6,400.00	6,395.13	6,400.86	6,396.75	13.93	14.11	136.46	-0.10	-129.67	120.94	92.91	28.04	4.314		
6,500.00	6,495.00	6,500.80	6,496.55	14.16	14.34	135.72	-0.10	-134.90	124.16	95.65	28.50	4.356		
6,600.00	6,594.86	6,600.74	6,596.35	14.40	14.57	135.02	-0.10	-140.13	127.39	98.42	28.97	4.397		
6,700.00	6,694.72	6,700.67	6,696.15	14.63	14.81	134.36	-0.10	-145.36	130.64	101.21	29.44	4.438		
6,800.00	6,794.59	6,800.61	6,795.95	14.87	15.04	133.72	-0.10	-150.59	133.91	104.00	29.91	4.478		
6,900.00	6,894.45	6,900.54	6,895.75	15.10	15.28	133.12	-0.10	-155.82	137.20	106.82	30.38	4.517		
7,000.00	6,994.31	6,979.16	6,973.93	15.34	15.46	132.20	5.21	-160.86	147.35	116.55	30.80	4.784		
7,100.00	7,094.18	7,050.00	7,042.70	15.57	15.64	130.69	20.73	-167.21	172.73	141.52	31.21	5.534		
7,200.00	7,194.04	7,117.65	7,105.42	15.81	15.81	129.07	44.78	-174.75	211.81	180.18	31.62	6.696		
7,300.00	7,293.90	7,175.00	7,155.38	16.05	15.97	127.77	71.86	-182.16	262.51	230.49	32.02	8.199		
7,310.85	7,304.74	7,181.03	7,160.44	16.07	15.99	127.64	75.05	-182.99	268.61	236.55	32.06	8.379		
7,325.00	7,318.87	7,188.47	7,166.61	16.10	16.01	93.03	79.07	-184.02	276.56	244.45	32.11	8.613		

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Integrity Directional Services, LLC

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Output errors are at 2.00 sigma
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Offset TVD Reference: Offset Datum

Offset Design Sec. 25, T 26 S. , R 26 E - Road Runner Federal Com 2H - 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		Highside Toolface (°)	Distance		Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)										
7,350.00	7,343.83	7,200.00	7,176.04	16.16	16.04	46.47		85.49	-185.65	290.23	258.03	32.20	9.014		
7,375.00	7,368.72	7,214.71	7,187.85	16.21	16.08	29.78		94.01	-187.77	303.37	271.07	32.29	9.394		
7,400.00	7,393.46	7,225.00	7,195.94	16.26	16.12	22.50		100.17	-189.29	316.01	283.63	32.37	9.762		
7,425.00	7,418.00	7,240.87	7,208.15	16.30	16.17	18.41		110.02	-191.67	328.07	295.61	32.47	10.104		
7,450.00	7,442.26	7,250.00	7,215.03	16.35	16.20	15.85		115.87	-193.07	339.66	307.11	32.54	10.437		
7,475.00	7,466.17	7,266.96	7,227.48	16.39	16.25	14.01		127.07	-195.70	350.61	317.97	32.64	10.741		
7,500.00	7,489.68	7,275.00	7,233.24	16.43	16.28	12.70		132.54	-196.97	361.10	328.39	32.71	11.040		
7,525.00	7,512.71	7,292.99	7,245.79	16.47	16.34	11.63		145.11	-199.85	370.91	338.09	32.81	11.304		
7,550.00	7,535.21	7,305.99	7,254.55	16.50	16.39	10.80		154.48	-201.97	380.19	347.30	32.90	11.557		
7,575.00	7,557.11	7,318.98	7,263.03	16.54	16.44	10.13		164.08	-204.11	388.90	355.92	32.98	11.791		
7,600.00	7,578.35	7,331.96	7,271.24	16.57	16.50	9.57		173.90	-206.27	397.02	363.95	33.07	12.005		
7,625.00	7,598.87	7,350.00	7,282.19	16.61	16.58	9.09		187.90	-209.32	404.60	371.42	33.18	12.193		
7,650.00	7,618.62	7,357.90	7,286.82	16.64	16.61	8.71		194.16	-210.67	411.46	378.21	33.25	12.375		
7,675.00	7,637.55	7,375.00	7,296.46	16.67	16.69	8.37		207.97	-213.62	417.82	384.46	33.36	12.524		
7,700.00	7,655.60	7,383.81	7,301.23	16.70	16.74	8.09		215.21	-215.15	423.49	390.05	33.44	12.665		
7,725.00	7,672.72	7,400.00	7,309.64	16.73	16.82	7.84		228.76	-217.99	428.61	395.05	33.55	12.774		
7,750.00	7,688.86	7,409.69	7,314.45	16.77	16.87	7.64		237.00	-219.70	433.06	399.42	33.64	12.873		
7,775.00	7,703.99	7,425.00	7,321.69	16.81	16.96	7.46		250.21	-222.41	436.93	403.16	33.77	12.940		
7,800.00	7,718.05	7,435.56	7,326.43	16.85	17.02	7.31		259.45	-224.30	440.15	406.28	33.87	12.994		
7,825.00	7,731.01	7,450.00	7,332.58	16.91	17.11	7.18		272.26	-226.88	442.76	408.74	34.02	13.015		
7,850.00	7,742.84	7,461.42	7,337.16	16.99	17.18	7.08		282.52	-228.94	444.74	410.57	34.17	13.016		
7,875.00	7,753.51	7,475.00	7,342.27	17.08	17.27	7.00		294.85	-231.39	446.09	411.74	34.35	12.987		
7,900.00	7,762.98	7,487.27	7,346.59	17.19	17.35	6.94		306.13	-233.61	446.82	412.27	34.54	12.935		
7,925.00	7,771.22	7,500.00	7,350.75	17.32	17.44	6.90		317.93	-235.91	446.91	412.15	34.76	12.858		
7,950.00	7,778.22	7,513.12	7,354.71	17.46	17.54	6.88		330.21	-238.29	446.37	411.38	34.99	12.756		
7,975.00	7,783.96	7,525.00	7,357.99	17.61	17.63	6.87		341.42	-240.45	445.21	409.98	35.23	12.636		
8,000.00	7,788.41	7,538.98	7,361.49	17.77	17.73	6.88		354.71	-242.98	443.41	407.91	35.50	12.489		
8,025.00	7,791.58	7,550.00	7,363.97	17.94	17.82	6.90		365.27	-244.98	441.00	405.23	35.76	12.330		
8,050.00	7,793.44	7,564.84	7,366.92	18.13	17.94	6.95		379.56	-247.66	437.94	401.87	36.07	12.142		
8,074.49	7,794.00	7,575.00	7,368.68	18.32	18.03	7.01		389.40	-249.49	434.36	398.02	36.34	11.952		
8,100.00	7,793.93	7,590.77	7,370.98	18.51	18.16	6.88		404.74	-252.33	430.62	393.94	36.67	11.742		
8,200.00	7,793.65	7,643.43	7,374.93	19.32	18.64	6.29		456.39	-261.67	422.33	384.37	37.96	11.126		
8,255.59	7,793.49	7,685.31	7,374.73	19.82	19.03	5.73		497.67	-268.69	421.78	382.93	38.85	10.857		
8,300.00	7,793.37	7,728.30	7,374.30	20.22	19.44	5.15		540.24	-274.70	421.68	382.01	39.67	10.631		
8,335.57	7,793.27	7,762.83	7,373.96	20.56	19.78	4.69		574.54	-278.60	421.63	381.29	40.34	10.451		
8,348.39	7,793.24	7,775.30	7,373.83	20.69	19.90	4.53		586.95	-279.81	421.62	381.03	40.59	10.387		
8,400.00	7,793.10	7,825.68	7,373.33	21.21	20.41	4.02		637.18	-283.58	421.71	380.09	41.62	10.132		
8,500.00	7,792.82	7,924.16	7,372.35	22.30	21.47	3.70		735.62	-286.00	422.27	378.50	43.76	9.649		
8,600.00	7,792.55	8,024.16	7,371.37	23.48	22.62	3.65		835.61	-286.39	422.96	376.87	46.10	9.175		
8,700.00	7,792.28	8,124.16	7,370.38	24.73	23.86	3.61		935.60	-286.77	423.66	375.06	48.60	8.718		
8,800.00	7,792.00	8,224.15	7,369.39	26.06	25.17	3.56		1,035.59	-287.16	424.35	373.12	51.23	8.283		
8,900.00	7,791.73	8,324.15	7,368.40	27.44	26.55	3.52		1,135.58	-287.55	425.05	371.06	53.99	7.873		
9,000.00	7,791.46	8,424.15	7,367.41	28.87	27.97	3.47		1,235.57	-287.94	425.74	368.90	56.84	7.490		
9,100.00	7,791.18	8,524.14	7,366.42	30.34	29.44	3.43		1,335.56	-288.32	426.44	366.65	59.79	7.133		
9,200.00	7,790.91	8,624.14	7,365.44	31.85	30.95	3.38		1,435.56	-288.71	427.14	364.33	62.80	6.801		
9,300.00	7,790.64	8,724.14	7,364.45	33.40	32.49	3.34		1,535.55	-289.10	427.83	361.95	65.89	6.494		
9,400.00	7,790.36	8,824.14	7,363.46	34.97	34.06	3.29		1,635.54	-289.49	428.53	359.51	69.02	6.208		
9,500.00	7,790.09	8,924.13	7,362.47	36.56	35.65	3.25		1,735.53	-289.87	429.23	357.02	72.21	5.944		
9,600.00	7,789.82	9,024.13	7,361.48	38.17	37.27	3.21		1,835.52	-290.26	429.93	354.49	75.44	5.699		
9,700.00	7,789.54	9,124.13	7,360.49	39.81	38.90	3.16		1,935.51	-290.65	430.62	351.92	78.71	5.471		
9,800.00	7,789.27	9,224.12	7,359.51	41.46	40.55	3.12		2,035.50	-291.04	431.32	349.31	82.01	5.260		
9,900.00	7,788.99	9,324.12	7,358.52	43.12	42.22	3.08		2,135.50	-291.42	432.02	346.68	85.33	5.063		

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 12H
 Well Error: 0.00 ft
 Reference Wellbore: Wellbore #1
 Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
 TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
 MD Reference: KB=25' @ 3272.70ft (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 2H - 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		Highside Toolface (°)	Distance		Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)					
10,000.00	7,788.72	9,424.12	7,357.53	44.79	43.89	3.03	2,235.49	-291.81	432.72	344.03	88.69	4.879	
10,100.00	7,788.45	9,524.11	7,356.54	46.48	45.58	2.99	2,335.48	-292.20	433.42	341.35	92.07	4.708	
10,200.00	7,788.17	9,624.11	7,355.55	48.18	47.28	2.95	2,435.47	-292.59	434.12	338.65	95.46	4.547	
10,300.00	7,787.90	9,724.11	7,354.56	49.89	48.99	2.90	2,535.46	-292.97	434.81	335.93	98.88	4.397	
10,400.00	7,787.63	9,824.11	7,353.58	51.60	50.71	2.86	2,635.45	-293.36	435.51	333.20	102.31	4.257	
10,500.00	7,787.35	9,924.10	7,352.59	53.32	52.44	2.82	2,735.44	-293.75	436.21	330.45	105.76	4.125	
10,600.00	7,787.08	10,024.10	7,351.60	55.05	54.17	2.78	2,835.44	-294.14	436.91	327.69	109.22	4.000	
10,700.00	7,786.81	10,124.10	7,350.61	56.79	55.91	2.73	2,935.43	-294.52	437.61	324.92	112.70	3.883	
10,800.00	7,786.53	10,224.09	7,349.62	58.53	57.65	2.69	3,035.42	-294.91	438.31	322.13	116.18	3.773	
10,900.00	7,786.26	10,324.09	7,348.63	60.28	59.40	2.65	3,135.41	-295.30	439.02	319.34	119.68	3.668	
11,000.00	7,785.99	10,424.09	7,347.65	62.03	61.15	2.61	3,235.40	-295.69	439.72	316.53	123.18	3.570	
11,100.00	7,785.71	10,524.09	7,346.66	63.78	62.91	2.57	3,335.39	-296.07	440.42	313.72	126.69	3.476	
11,200.00	7,785.44	10,624.08	7,345.67	65.54	64.67	2.53	3,435.38	-296.46	441.12	310.90	130.22	3.388	
11,300.00	7,785.17	10,724.08	7,344.68	67.31	66.44	2.48	3,535.38	-296.85	441.82	308.08	133.74	3.303	
11,400.00	7,784.89	10,824.08	7,343.69	69.07	68.21	2.44	3,635.37	-297.24	442.52	305.24	137.28	3.224	
11,500.00	7,784.62	10,924.07	7,342.70	70.84	69.98	2.40	3,735.36	-297.62	443.22	302.40	140.82	3.147	
11,600.00	7,784.34	11,024.07	7,341.72	72.61	71.75	2.36	3,835.35	-298.01	443.93	299.56	144.37	3.075	
11,700.00	7,784.07	11,124.07	7,340.73	74.39	73.53	2.32	3,935.34	-298.40	444.63	296.71	147.92	3.006	
11,800.00	7,783.80	11,224.06	7,339.74	76.17	75.31	2.28	4,035.33	-298.79	445.33	293.86	151.48	2.940	
11,900.00	7,783.52	11,324.06	7,338.75	77.95	77.09	2.24	4,135.32	-299.17	446.03	291.00	155.04	2.877	
12,000.00	7,783.25	11,424.06	7,337.76	79.73	78.88	2.20	4,235.31	-299.56	446.74	288.13	158.60	2.817	
12,100.00	7,782.98	11,524.06	7,336.77	81.51	80.66	2.16	4,335.31	-299.95	447.44	285.27	162.17	2.759	
12,200.00	7,782.70	11,624.05	7,335.79	83.30	82.45	2.12	4,435.30	-300.34	448.14	282.40	165.75	2.704	
12,300.00	7,782.43	11,724.05	7,334.80	85.09	84.24	2.08	4,535.29	-300.72	448.85	279.52	169.33	2.651	
12,400.00	7,782.16	11,824.05	7,333.81	86.88	86.03	2.04	4,635.28	-301.11	449.55	276.65	172.91	2.600	
12,500.00	7,781.88	11,924.04	7,332.82	88.67	87.82	2.00	4,735.27	-301.50	450.26	273.77	176.49	2.551	
12,600.00	7,781.61	12,024.04	7,331.83	90.46	89.62	1.96	4,835.26	-301.89	450.96	270.88	180.08	2.504	
12,700.00	7,781.34	12,124.04	7,330.84	92.25	91.41	1.92	4,935.25	-302.27	451.67	268.00	183.67	2.459	
12,800.00	7,781.06	12,224.03	7,329.86	94.05	93.21	1.88	5,035.25	-302.66	452.37	265.11	187.26	2.416	
12,900.00	7,780.79	12,324.03	7,328.87	95.84	95.01	1.84	5,135.24	-303.05	453.08	262.22	190.85	2.374	
13,000.00	7,780.52	12,424.03	7,327.88	97.64	96.81	1.80	5,235.23	-303.44	453.78	259.33	194.45	2.334	
13,100.00	7,780.24	12,524.03	7,326.89	99.44	98.61	1.76	5,335.22	-303.82	454.49	256.44	198.05	2.295	
13,200.00	7,779.97	12,624.02	7,325.90	101.24	100.41	1.72	5,435.21	-304.21	455.19	253.54	201.65	2.257	
13,300.00	7,779.69	12,724.02	7,324.91	103.04	102.21	1.68	5,535.20	-304.60	455.90	250.65	205.25	2.221	
13,400.00	7,779.42	12,824.02	7,323.93	104.84	104.02	1.64	5,635.19	-304.99	456.60	247.75	208.86	2.186	
13,500.00	7,779.15	12,924.01	7,322.94	106.64	105.82	1.61	5,735.19	-305.37	457.31	244.85	212.46	2.152	
13,600.00	7,778.87	13,024.01	7,321.95	108.45	107.63	1.57	5,835.18	-305.76	458.02	241.94	216.07	2.120	
13,700.00	7,778.60	13,124.01	7,320.96	110.25	109.43	1.53	5,935.17	-306.15	458.72	239.04	219.68	2.088	
13,800.00	7,778.33	13,224.00	7,319.97	112.06	111.24	1.49	6,035.16	-306.54	459.43	236.14	223.29	2.058	
13,900.00	7,778.05	13,324.00	7,318.98	113.86	113.04	1.45	6,135.15	-306.92	460.14	233.23	226.91	2.028	
14,000.00	7,777.78	13,424.00	7,318.00	115.67	114.85	1.41	6,235.14	-307.31	460.85	230.32	230.52	1.999	
14,100.00	7,777.51	13,524.00	7,317.01	117.48	116.66	1.38	6,335.13	-307.70	461.55	227.42	234.14	1.971	
14,200.00	7,777.23	13,623.99	7,316.02	119.28	118.47	1.34	6,435.13	-308.09	462.26	224.51	237.75	1.944	
14,300.00	7,776.96	13,723.99	7,315.03	121.09	120.28	1.30	6,535.12	-308.47	462.97	221.60	241.37	1.918	
14,400.00	7,776.69	13,823.99	7,314.04	122.90	122.09	1.26	6,635.11	-308.86	463.68	218.69	244.99	1.893	
14,500.00	7,776.41	13,923.98	7,313.05	124.71	123.90	1.23	6,735.10	-309.25	464.39	215.78	248.61	1.868	
14,600.00	7,776.14	14,023.98	7,312.07	126.52	125.71	1.19	6,835.09	-309.64	465.09	212.86	252.23	1.844	
14,700.00	7,775.86	14,123.98	7,311.08	128.33	127.52	1.15	6,935.08	-310.02	465.80	209.95	255.85	1.821	
14,800.00	7,775.59	14,223.98	7,310.09	130.14	129.34	1.11	7,035.07	-310.41	466.51	207.03	259.48	1.798	
14,900.00	7,775.32	14,323.97	7,309.10	131.95	131.15	1.08	7,135.07	-310.80	467.22	204.12	263.10	1.776	
15,000.00	7,775.04	14,423.97	7,308.11	133.76	132.96	1.04	7,235.06	-311.19	467.93	201.20	266.73	1.754	
15,100.00	7,774.77	14,523.97	7,307.12	135.58	134.78	1.00	7,335.05	-311.57	468.64	198.29	270.35	1.733	

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 12H
 Well Error: 0.00 ft
 Reference Wellbore: Wellbore #1
 Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
 TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
 MD Reference: KB=25' @ 3272.70ft (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 2H - 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
15,200.00	7,774.50	14,623.96	7,306.14	137.39	136.59	0.97	7,435.04	-311.96	469.35	195.37	273.98	1.713	
15,300.00	7,774.22	14,723.96	7,305.15	139.20	138.41	0.93	7,535.03	-312.35	470.06	192.45	277.61	1.693	
15,400.00	7,773.95	14,823.96	7,304.16	141.01	140.22	0.89	7,635.02	-312.74	470.77	189.54	281.24	1.674	
15,500.00	7,773.68	14,923.95	7,303.17	142.83	142.04	0.86	7,735.01	-313.12	471.48	186.62	284.86	1.655	
15,600.00	7,773.40	15,023.95	7,302.18	144.64	143.85	0.82	7,835.01	-313.51	472.19	183.70	288.49	1.637	
15,700.00	7,773.13	15,123.95	7,301.19	146.46	145.67	0.78	7,935.00	-313.90	472.90	180.78	292.12	1.619	
15,800.00	7,772.86	15,223.95	7,300.21	148.27	147.48	0.75	8,034.99	-314.29	473.61	177.86	295.76	1.601	
15,900.00	7,772.58	15,323.94	7,299.22	150.09	149.30	0.71	8,134.98	-314.67	474.32	174.94	299.39	1.584	
16,000.00	7,772.31	15,423.94	7,298.23	151.90	151.12	0.68	8,234.97	-315.06	475.04	172.02	303.02	1.568	
16,100.00	7,772.04	15,523.94	7,297.24	153.72	152.93	0.64	8,334.96	-315.45	475.75	169.10	306.65	1.551	
16,200.00	7,771.76	15,623.93	7,296.25	155.53	154.75	0.60	8,434.95	-315.84	476.46	166.17	310.28	1.536	
16,300.00	7,771.49	15,723.93	7,295.26	157.35	156.57	0.57	8,534.95	-316.22	477.17	163.25	313.92	1.520	
16,400.00	7,771.21	15,823.93	7,294.28	159.17	158.39	0.53	8,634.94	-316.61	477.88	160.33	317.55	1.505	
16,500.00	7,770.94	15,923.92	7,293.29	160.98	160.20	0.50	8,734.93	-317.00	478.59	157.41	321.19	1.490 Level 3	
16,600.00	7,770.67	16,023.92	7,292.30	162.80	162.02	0.46	8,834.92	-317.39	479.31	154.48	324.82	1.476 Level 3	
16,700.00	7,770.39	16,123.92	7,291.31	164.62	163.84	0.43	8,934.91	-317.77	480.02	151.56	328.46	1.461 Level 3	
16,800.00	7,770.12	16,223.92	7,290.32	166.44	165.66	0.39	9,034.90	-318.16	480.73	148.64	332.10	1.448 Level 3	
16,900.00	7,769.85	16,323.91	7,289.33	168.25	167.48	0.36	9,134.89	-318.55	481.45	145.71	335.73	1.434 Level 3	
17,000.00	7,769.57	16,423.91	7,288.35	170.07	169.30	0.32	9,234.88	-318.94	482.16	142.79	339.37	1.421 Level 3	
17,100.00	7,769.30	16,523.91	7,287.36	171.89	171.12	0.29	9,334.88	-319.32	482.87	139.87	343.01	1.408 Level 3	
17,200.00	7,769.03	16,623.90	7,286.37	173.71	172.94	0.25	9,434.87	-319.71	483.59	136.94	346.64	1.395 Level 3	
17,300.00	7,768.75	16,723.90	7,285.38	175.53	174.76	0.22	9,534.86	-320.10	484.30	134.02	350.28	1.383 Level 3	
17,400.00	7,768.48	16,823.90	7,284.39	177.35	176.58	0.19	9,634.85	-320.49	485.01	131.09	353.92	1.370 Level 3	
17,500.00	7,768.21	16,923.90	7,283.40	179.16	178.40	0.15	9,734.84	-320.87	485.73	128.17	357.56	1.358 Level 3	
17,600.00	7,767.93	17,023.89	7,282.42	180.98	180.22	0.12	9,834.83	-321.26	486.44	125.24	361.20	1.347 Level 3	
17,700.00	7,767.66	17,123.89	7,281.43	182.80	182.04	0.08	9,934.82	-321.65	487.16	122.32	364.84	1.335 Level 3	
17,800.00	7,767.39	17,223.89	7,280.44	184.62	183.86	0.05	10,034.82	-322.04	487.87	119.39	368.48	1.324 Level 3	
17,900.00	7,767.11	17,323.88	7,279.45	186.44	185.60	0.02	10,134.81	-322.42	488.58	116.54	372.04	1.313 Level 3	
17,940.79	7,767.00	17,364.67	7,279.05	187.18	186.21	0.00	10,175.59	-322.58	488.88	115.49	373.39	1.309 Level 3	
17,941.55	7,767.00	17,365.43	7,279.04	187.20	186.22	0.00	10,176.36	-322.58	488.88	115.47	373.41	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 12H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
MD Reference: KB=25' @ 3272.70ft (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 KB=25' @ 3272.70ft (Latshaw 44)

Offset Depths are relative to Offset Datum

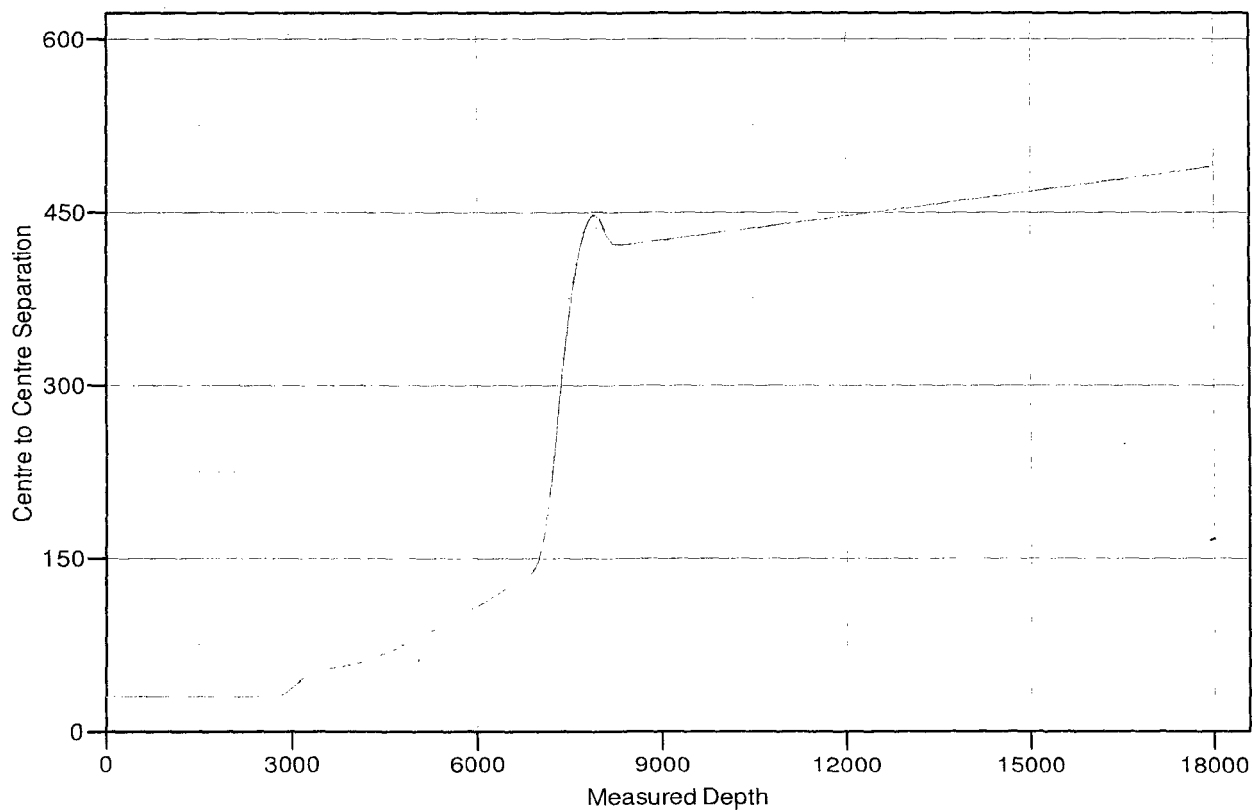
Central Meridian is -104.3333333

Coordinates are relative to: Road Runner Federal Com 12H

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

Grid Convergence at Surface is: 0.05°

Ladder Plot



LEGEND

Road Runner Federal Com 12H, Wellbore #1, Plan #2 V0



Integrity Directional Services, LLC

Anticollision Report



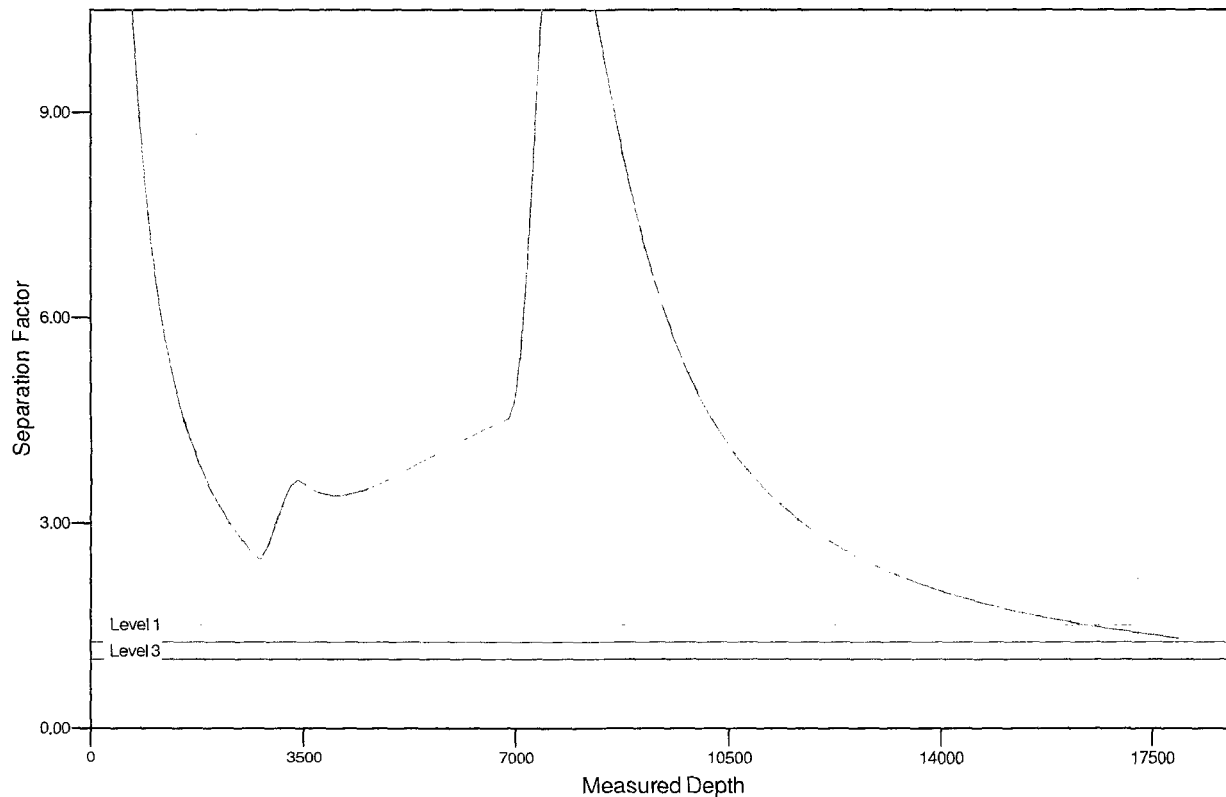
Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Reference Site: Sec. 25, T 26 S. , R 26 E
Site Error: 0.00 ft
Reference Well: Road Runner Federal Com 12H
Well Error: 0.00 ft
Reference Wellbore: Wellbore #1
Reference Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
MD Reference: KB=25' @ 3272.70ft (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 KB=25' @ 3272.70ft (Latshaw 44)
Offset Depths are relative to Offset Datum
Central Meridian is -104.333333

Coordinates are relative to: Road Runner Federal Com 12H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.05°

Separation Factor Plot



LEGEND

Road Runner Federal Com 12H, Wellbore #1, Plan #2 V0



COG Operating LLC
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 25, T 26 S., R 26 E
Well: Road Runner Federal Com 12H
Wellbore: Wellbore #1
Plan: Plan #2 (Road Runner Federal Com 12H/Wellbore #1)
Latshaw 44

INTEGRITY
Directional Services

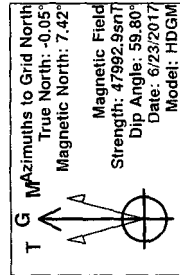
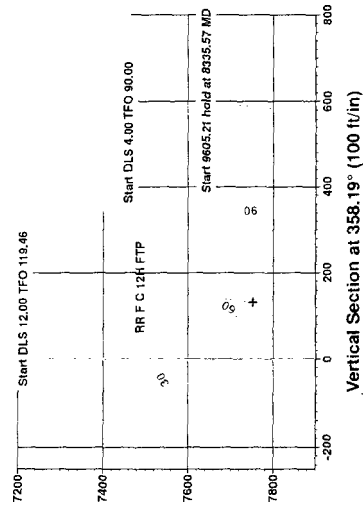
Road Runner Federal Com 12H Plan #2

WELL DETAILS: Road Runner Federal Com 12H
Ground Elevation: 3247.70
RKB Elevation: KB=25' @ 3272.70ft (Latshaw 44)
Rig Name: Latshaw 44

North	East	Latitude	Longitude
397929.8000	527691.5000	32.0939934	-104.2439131

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	2750.00	0.00	0.00	2750.00	0.00	0.00	0.00	0.00	0.00
3	2900.00	3.00	230.00	2899.93	-2.52	-3.01	2.00	230.00	-2.43
4	7310.85	3.00	230.00	7304.74	-150.91	-179.85	0.00	0.00	-145.14
5	8074.49	90.16	349.50	7794.00	315.64	-289.08	12.00	119.46	324.63
6	8335.57	90.16	359.94	7793.27	575.25	-313.06	4.00	90.00	584.87
7	17940.78	90.16	359.94	7767.00	10180.42	-322.60	0.00	0.00	10185.53



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

PROJECT DETAILS: Eddy County, NM (NAD 27 NME)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid

True Vertical Depth (200 ft/in)

RR F C 12H LTP

RR F C 12H BHL

TD at 17940.78

Start DLS 4.00 TFO 90.00

Start 9605.21 hold at 8335.57 MD

Vertical Section at 358.19° (200 ft/in)

RR F C 12H FTP

Vertical Section at 358.19° (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 12H

Wellbore #1

Plan: Plan #2

Standard Survey Report

28 June, 2017





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 12H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
MD Reference: KB=25' @ 3272.70ft (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 12H

Well Position	+N/-S	0.00 ft	Northing:	397,929.8000 usft	Latitude:	32.0939934
	+E/-W	0.00 ft	Easting:	527,691.5000 usft	Longitude:	-104.2439130
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,247.70 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	358.19

Survey Tool Program Date 6/28/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,940.74	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
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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
2,750.00	0.00	0.00	2,750.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
2,800.00	1.00	230.00	2,800.00	-0.28	-0.33	-0.27	2.00	2.00	0.00
2,900.00	3.00	230.00	2,899.93	-2.52	-3.01	-2.43	2.00	2.00	0.00
Start 4410.85 hold at 2900.00 MD									
3,000.00	3.00	230.00	2,999.79	-5.89	-7.02	-5.66	0.00	0.00	0.00
3,100.00	3.00	230.00	3,099.66	-9.25	-11.03	-8.90	0.00	0.00	0.00
3,200.00	3.00	230.00	3,199.52	-12.62	-15.04	-12.13	0.00	0.00	0.00
3,300.00	3.00	230.00	3,299.38	-15.98	-19.04	-15.37	0.00	0.00	0.00
3,400.00	3.00	230.00	3,399.25	-19.34	-23.05	-18.60	0.00	0.00	0.00
3,500.00	3.00	230.00	3,499.11	-22.71	-27.06	-21.84	0.00	0.00	0.00
3,600.00	3.00	230.00	3,598.97	-26.07	-31.07	-25.08	0.00	0.00	0.00
3,700.00	3.00	230.00	3,698.84	-29.44	-35.08	-28.31	0.00	0.00	0.00
3,800.00	3.00	230.00	3,798.70	-32.80	-39.09	-31.55	0.00	0.00	0.00
3,900.00	3.00	230.00	3,898.56	-36.16	-43.10	-34.78	0.00	0.00	0.00
4,000.00	3.00	230.00	3,998.42	-39.53	-47.11	-38.02	0.00	0.00	0.00
4,100.00	3.00	230.00	4,098.29	-42.89	-51.12	-41.25	0.00	0.00	0.00
4,200.00	3.00	230.00	4,198.15	-46.26	-55.13	-44.49	0.00	0.00	0.00
4,300.00	3.00	230.00	4,298.01	-49.62	-59.14	-47.72	0.00	0.00	0.00
4,400.00	3.00	230.00	4,397.88	-52.98	-63.15	-50.96	0.00	0.00	0.00
4,500.00	3.00	230.00	4,497.74	-56.35	-67.15	-54.19	0.00	0.00	0.00
4,600.00	3.00	230.00	4,597.60	-59.71	-71.16	-57.43	0.00	0.00	0.00
4,700.00	3.00	230.00	4,697.46	-63.08	-75.17	-60.66	0.00	0.00	0.00
4,800.00	3.00	230.00	4,797.33	-66.44	-79.18	-63.90	0.00	0.00	0.00
4,900.00	3.00	230.00	4,897.19	-69.81	-83.19	-67.14	0.00	0.00	0.00
5,000.00	3.00	230.00	4,997.05	-73.17	-87.20	-70.37	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 12H
Wellbore: Wellbore #1
Design: Plan #2

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MD Reference: KB=25' @ 3272.70ft (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)
5,100.00	3.00	230.00	5,096.92	-76.53	-91.21	-73.61	0.00	0.00	0.00
5,200.00	3.00	230.00	5,196.78	-79.90	-95.22	-76.84	0.00	0.00	0.00
5,300.00	3.00	230.00	5,296.64	-83.26	-99.23	-80.08	0.00	0.00	0.00
5,400.00	3.00	230.00	5,396.51	-86.63	-103.24	-83.31	0.00	0.00	0.00
5,500.00	3.00	230.00	5,496.37	-89.99	-107.25	-86.55	0.00	0.00	0.00
5,600.00	3.00	230.00	5,596.23	-93.35	-111.26	-89.78	0.00	0.00	0.00
5,700.00	3.00	230.00	5,696.09	-96.72	-115.26	-93.02	0.00	0.00	0.00
5,800.00	3.00	230.00	5,795.96	-100.08	-119.27	-96.25	0.00	0.00	0.00
5,900.00	3.00	230.00	5,895.82	-103.45	-123.28	-99.49	0.00	0.00	0.00
6,000.00	3.00	230.00	5,995.68	-106.81	-127.29	-102.73	0.00	0.00	0.00
6,100.00	3.00	230.00	6,095.55	-110.17	-131.30	-105.96	0.00	0.00	0.00
6,200.00	3.00	230.00	6,195.41	-113.54	-135.31	-109.20	0.00	0.00	0.00
6,300.00	3.00	230.00	6,295.27	-116.90	-139.32	-112.43	0.00	0.00	0.00
6,400.00	3.00	230.00	6,395.13	-120.27	-143.33	-115.67	0.00	0.00	0.00
6,500.00	3.00	230.00	6,495.00	-123.63	-147.34	-118.90	0.00	0.00	0.00
6,600.00	3.00	230.00	6,594.86	-126.99	-151.35	-122.14	0.00	0.00	0.00
6,700.00	3.00	230.00	6,694.72	-130.36	-155.36	-125.37	0.00	0.00	0.00
6,800.00	3.00	230.00	6,794.59	-133.72	-159.37	-128.61	0.00	0.00	0.00
6,900.00	3.00	230.00	6,894.45	-137.09	-163.37	-131.84	0.00	0.00	0.00
7,000.00	3.00	230.00	6,994.31	-140.45	-167.38	-135.08	0.00	0.00	0.00
7,100.00	3.00	230.00	7,094.18	-143.82	-171.39	-138.32	0.00	0.00	0.00
7,200.00	3.00	230.00	7,194.04	-147.18	-175.40	-141.55	0.00	0.00	0.00
7,300.00	3.00	230.00	7,293.90	-150.54	-179.41	-144.79	0.00	0.00	0.00
7,310.85	3.00	230.00	7,304.74	-150.91	-179.85	-145.14	0.00	0.00	0.00
Start DLS 12.00 TFO 119.46									
7,400.00	9.58	333.81	7,393.46	-145.74	-184.92	-139.81	12.00	7.38	116.45
7,500.00	21.37	342.80	7,489.68	-120.77	-194.02	-114.56	12.00	11.79	8.99
7,600.00	33.31	345.51	7,578.35	-76.61	-206.32	-70.04	12.00	11.94	2.71
7,700.00	45.28	346.90	7,655.60	-15.20	-221.29	-8.18	12.00	11.97	1.39
7,800.00	57.26	347.81	7,718.05	60.79	-238.29	68.31	12.00	11.98	0.91
7,900.00	69.24	348.50	7,762.98	148.04	-256.55	156.09	12.00	11.98	0.69
8,000.00	81.23	349.09	7,788.41	242.72	-275.29	251.32	12.00	11.99	0.59
8,074.49	90.16	349.50	7,794.00	315.64	-289.08	324.63	12.00	11.99	0.55
Start DLS 4.00 TFO 90.00									
8,100.00	90.16	350.52	7,793.93	340.76	-293.50	349.88	4.00	0.00	4.00
8,200.00	90.16	354.52	7,793.65	439.89	-306.52	449.37	4.00	0.00	4.00
8,300.00	90.16	358.52	7,793.37	539.68	-312.58	549.31	4.00	0.00	4.00
8,335.57	90.16	359.94	7,793.27	575.25	-313.06	584.87	4.00	0.00	4.00
Start 9605.21 hold at 8335.57 MD									
8,400.00	90.16	359.94	7,793.10	639.68	-313.12	649.27	0.00	0.00	0.00
8,500.00	90.16	359.94	7,792.82	739.68	-313.22	749.22	0.00	0.00	0.00
8,600.00	90.16	359.94	7,792.55	839.68	-313.32	849.18	0.00	0.00	0.00
8,700.00	90.16	359.94	7,792.28	939.67	-313.42	949.13	0.00	0.00	0.00
8,800.00	90.16	359.94	7,792.00	1,039.67	-313.52	1,049.08	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 12H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
TVD Reference: KB=25' @ 3272.70ft (Latshaw 44)
MD Reference: KB=25' @ 3272.70ft (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)
8,900.00	90.16	359.94	7,791.73	1,139.67	-313.62	1,149.03	0.00	0.00	0.00
9,000.00	90.16	359.94	7,791.46	1,239.67	-313.72	1,248.99	0.00	0.00	0.00
9,100.00	90.16	359.94	7,791.18	1,339.67	-313.82	1,348.94	0.00	0.00	0.00
9,200.00	90.16	359.94	7,790.91	1,439.67	-313.92	1,448.89	0.00	0.00	0.00
9,300.00	90.16	359.94	7,790.64	1,539.67	-314.02	1,548.84	0.00	0.00	0.00
9,400.00	90.16	359.94	7,790.36	1,639.67	-314.12	1,648.80	0.00	0.00	0.00
9,500.00	90.16	359.94	7,790.09	1,739.67	-314.22	1,748.75	0.00	0.00	0.00
9,600.00	90.16	359.94	7,789.82	1,839.67	-314.32	1,848.70	0.00	0.00	0.00
9,700.00	90.16	359.94	7,789.54	1,939.67	-314.42	1,948.66	0.00	0.00	0.00
9,800.00	90.16	359.94	7,789.27	2,039.67	-314.51	2,048.61	0.00	0.00	0.00
9,900.00	90.16	359.94	7,788.99	2,139.67	-314.61	2,148.56	0.00	0.00	0.00
10,000.00	90.16	359.94	7,788.72	2,239.67	-314.71	2,248.51	0.00	0.00	0.00
10,100.00	90.16	359.94	7,788.45	2,339.67	-314.81	2,348.47	0.00	0.00	0.00
10,200.00	90.16	359.94	7,788.17	2,439.67	-314.91	2,448.42	0.00	0.00	0.00
10,300.00	90.16	359.94	7,787.90	2,539.67	-315.01	2,548.37	0.00	0.00	0.00
10,400.00	90.16	359.94	7,787.63	2,639.67	-315.11	2,648.32	0.00	0.00	0.00
10,500.00	90.16	359.94	7,787.35	2,739.67	-315.21	2,748.28	0.00	0.00	0.00
10,600.00	90.16	359.94	7,787.08	2,839.67	-315.31	2,848.23	0.00	0.00	0.00
10,700.00	90.16	359.94	7,786.81	2,939.67	-315.41	2,948.18	0.00	0.00	0.00
10,800.00	90.16	359.94	7,786.53	3,039.67	-315.51	3,048.13	0.00	0.00	0.00
10,900.00	90.16	359.94	7,786.26	3,139.67	-315.61	3,148.09	0.00	0.00	0.00
11,000.00	90.16	359.94	7,785.99	3,239.66	-315.71	3,248.04	0.00	0.00	0.00
11,100.00	90.16	359.94	7,785.71	3,339.66	-315.81	3,347.99	0.00	0.00	0.00
11,200.00	90.16	359.94	7,785.44	3,439.66	-315.91	3,447.94	0.00	0.00	0.00
11,300.00	90.16	359.94	7,785.17	3,539.66	-316.00	3,547.90	0.00	0.00	0.00
11,400.00	90.16	359.94	7,784.89	3,639.66	-316.10	3,647.85	0.00	0.00	0.00
11,500.00	90.16	359.94	7,784.62	3,739.66	-316.20	3,747.80	0.00	0.00	0.00
11,600.00	90.16	359.94	7,784.34	3,839.66	-316.30	3,847.75	0.00	0.00	0.00
11,700.00	90.16	359.94	7,784.07	3,939.66	-316.40	3,947.71	0.00	0.00	0.00
11,800.00	90.16	359.94	7,783.80	4,039.66	-316.50	4,047.66	0.00	0.00	0.00
11,900.00	90.16	359.94	7,783.52	4,139.66	-316.60	4,147.61	0.00	0.00	0.00
12,000.00	90.16	359.94	7,783.25	4,239.66	-316.70	4,247.56	0.00	0.00	0.00
12,100.00	90.16	359.94	7,782.98	4,339.66	-316.80	4,347.52	0.00	0.00	0.00
12,200.00	90.16	359.94	7,782.70	4,439.66	-316.90	4,447.47	0.00	0.00	0.00
12,300.00	90.16	359.94	7,782.43	4,539.66	-317.00	4,547.42	0.00	0.00	0.00
12,400.00	90.16	359.94	7,782.16	4,639.66	-317.10	4,647.37	0.00	0.00	0.00
12,500.00	90.16	359.94	7,781.88	4,739.66	-317.20	4,747.33	0.00	0.00	0.00
12,600.00	90.16	359.94	7,781.61	4,839.66	-317.30	4,847.28	0.00	0.00	0.00
12,700.00	90.16	359.94	7,781.34	4,939.66	-317.40	4,947.23	0.00	0.00	0.00
12,800.00	90.16	359.94	7,781.06	5,039.66	-317.49	5,047.18	0.00	0.00	0.00
12,900.00	90.16	359.94	7,780.79	5,139.66	-317.59	5,147.14	0.00	0.00	0.00
13,000.00	90.16	359.94	7,780.52	5,239.66	-317.69	5,247.09	0.00	0.00	0.00
13,100.00	90.16	359.94	7,780.24	5,339.66	-317.79	5,347.04	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 12H
Wellbore: Wellbore #1
Design: Plan #2

Local Co-ordinate Reference: Well Road Runner Federal Com 12H
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MD Reference: KB=25' @ 3272.70ft (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)
13,200.00	90.16	359.94	7,779.97	5,439.66	-317.89	5,446.99	0.00	0.00	0.00
13,300.00	90.16	359.94	7,779.69	5,539.66	-317.99	5,546.95	0.00	0.00	0.00
13,400.00	90.16	359.94	7,779.42	5,639.65	-318.09	5,646.90	0.00	0.00	0.00
13,500.00	90.16	359.94	7,779.15	5,739.65	-318.19	5,746.85	0.00	0.00	0.00
13,600.00	90.16	359.94	7,778.87	5,839.65	-318.29	5,846.80	0.00	0.00	0.00
13,700.00	90.16	359.94	7,778.60	5,939.65	-318.39	5,946.76	0.00	0.00	0.00
13,800.00	90.16	359.94	7,778.33	6,039.65	-318.49	6,046.71	0.00	0.00	0.00
13,900.00	90.16	359.94	7,778.05	6,139.65	-318.59	6,146.66	0.00	0.00	0.00
14,000.00	90.16	359.94	7,777.78	6,239.65	-318.69	6,246.62	0.00	0.00	0.00
14,100.00	90.16	359.94	7,777.51	6,339.65	-318.79	6,346.57	0.00	0.00	0.00
14,200.00	90.16	359.94	7,777.23	6,439.65	-318.89	6,446.52	0.00	0.00	0.00
14,300.00	90.16	359.94	7,776.96	6,539.65	-318.98	6,546.47	0.00	0.00	0.00
14,400.00	90.16	359.94	7,776.69	6,639.65	-319.08	6,646.43	0.00	0.00	0.00
14,500.00	90.16	359.94	7,776.41	6,739.65	-319.18	6,746.38	0.00	0.00	0.00
14,600.00	90.16	359.94	7,776.14	6,839.65	-319.28	6,846.33	0.00	0.00	0.00
14,700.00	90.16	359.94	7,775.86	6,939.65	-319.38	6,946.28	0.00	0.00	0.00
14,800.00	90.16	359.94	7,775.59	7,039.65	-319.48	7,046.24	0.00	0.00	0.00
14,900.00	90.16	359.94	7,775.32	7,139.65	-319.58	7,146.19	0.00	0.00	0.00
15,000.00	90.16	359.94	7,775.04	7,239.65	-319.68	7,246.14	0.00	0.00	0.00
15,100.00	90.16	359.94	7,774.77	7,339.65	-319.78	7,346.09	0.00	0.00	0.00
15,200.00	90.16	359.94	7,774.50	7,439.65	-319.88	7,446.05	0.00	0.00	0.00
15,300.00	90.16	359.94	7,774.22	7,539.65	-319.98	7,546.00	0.00	0.00	0.00
15,400.00	90.16	359.94	7,773.95	7,639.65	-320.08	7,645.95	0.00	0.00	0.00
15,500.00	90.16	359.94	7,773.68	7,739.65	-320.18	7,745.90	0.00	0.00	0.00
15,600.00	90.16	359.94	7,773.40	7,839.65	-320.28	7,845.86	0.00	0.00	0.00
15,700.00	90.16	359.94	7,773.13	7,939.65	-320.38	7,945.81	0.00	0.00	0.00
15,800.00	90.16	359.94	7,772.86	8,039.64	-320.47	8,045.76	0.00	0.00	0.00
15,900.00	90.16	359.94	7,772.58	8,139.64	-320.57	8,145.71	0.00	0.00	0.00
16,000.00	90.16	359.94	7,772.31	8,239.64	-320.67	8,245.67	0.00	0.00	0.00
16,100.00	90.16	359.94	7,772.04	8,339.64	-320.77	8,345.62	0.00	0.00	0.00
16,200.00	90.16	359.94	7,771.76	8,439.64	-320.87	8,445.57	0.00	0.00	0.00
16,300.00	90.16	359.94	7,771.49	8,539.64	-320.97	8,545.52	0.00	0.00	0.00
16,400.00	90.16	359.94	7,771.21	8,639.64	-321.07	8,645.48	0.00	0.00	0.00
16,500.00	90.16	359.94	7,770.94	8,739.64	-321.17	8,745.43	0.00	0.00	0.00
16,600.00	90.16	359.94	7,770.67	8,839.64	-321.27	8,845.38	0.00	0.00	0.00
16,700.00	90.16	359.94	7,770.39	8,939.64	-321.37	8,945.33	0.00	0.00	0.00
16,800.00	90.16	359.94	7,770.12	9,039.64	-321.47	9,045.29	0.00	0.00	0.00
16,900.00	90.16	359.94	7,769.85	9,139.64	-321.57	9,145.24	0.00	0.00	0.00
17,000.00	90.16	359.94	7,769.57	9,239.64	-321.67	9,245.19	0.00	0.00	0.00
17,100.00	90.16	359.94	7,769.30	9,339.64	-321.77	9,345.14	0.00	0.00	0.00
17,200.00	90.16	359.94	7,769.03	9,439.64	-321.86	9,445.10	0.00	0.00	0.00
17,300.00	90.16	359.94	7,768.75	9,539.64	-321.96	9,545.05	0.00	0.00	0.00
17,400.00	90.16	359.94	7,768.48	9,639.64	-322.06	9,645.00	0.00	0.00	0.00
17,500.00	90.16	359.94	7,768.21	9,739.64	-322.16	9,744.95	0.00	0.00	0.00



Integrity Directional Services, LLC

Survey Report



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Design: Plan #2

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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)
17,600.00	90.16	359.94	7,767.93	9,839.64	-322.26	9,844.91	0.00	0.00	0.00
17,700.00	90.16	359.94	7,767.66	9,939.64	-322.36	9,944.86	0.00	0.00	0.00
17,800.00	90.16	359.94	7,767.39	10,039.64	-322.46	10,044.81	0.00	0.00	0.00
17,900.00	90.16	359.94	7,767.11	10,139.64	-322.56	10,144.77	0.00	0.00	0.00
17,940.79	90.16	359.94	7,767.00	10,180.42	-322.60	10,185.53	0.00	0.00	0.00
TD at 17940.78									

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
12H Drilling Window E	0.00	359.95	0.00	316.43	-313.85	398,246.2293	527,377.6507	32.0948640	-104.2449257
- plan misses target center by 445.68ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Rectangle (sides W100.00 H9,864.03 D0.00)									
RR F C 12H FTP	0.00	0.00	7,752.72	120.72	-315.33	398,050.5225	527,376.1666	32.0943260	-104.2449310
- plan misses target center by 63.19ft at 7882.24ft MD (7756.37 TVD, 131.88 N, -253.25 E)									
- Point									
RR F C 12H BHL	0.00	0.00	7,767.00	10,180.42	-322.60	408,110.2000	527,368.9000	32.1219805	-104.2449278
- plan hits target center									
- Point									
RR F C 12H LTP	0.00	0.00	7,767.36	10,050.38	-318.21	407,980.1570	527,373.2865	32.1216230	-104.2449140
- plan misses target center by 4.26ft at 17810.74ft MD (7767.36 TVD, 10050.37 N, -322.47 E)									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2750	2750	0	0	Start Build 2.00
2900	2900	-3	-3	Start 4410.85 hold at 2900.00 MD
7311	7305	-151	-180	Start DLS 12.00 TFO 119.46
8074	7794	316	-289	Start DLS 4.00 TFO 90.00
8336	7793	575	-313	Start 9605.21 hold at 8335.57 MD
17,941	7767	10,180	-323	TD at 17940.78

Checked By: _____ Approved By: _____ Date: _____

**PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NM112907
WELL NAME & NO.:	Road Runner Federal Com – 12H
SURFACE HOLE FOOTAGE:	210'/FSL & 1995'/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