

OCD Artesia NM OIL CONSERVATION

ARTESIA DISTRICT

Form 3160-3
(March 2012)

APR 28 2017

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

RECEIVED

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM112907
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		6. If Indian, Allottee or Tribe Name
2. Name of Operator COG OPERATING LLC		7. If Unit or CA Agreement, Name and No.
3a. Address 600 West Illinois Ave Midland TX 79701		8. Lease Name and Well No. 316776 ROAD RUNNER FEDERAL COM 12H
3b. Phone No. (include area code) (432)683-7443		9. API Well No. 30-015-44148
4. Location of Well (Report location clearly and in accordance with any State requirements.) At surface SWSE / 210 FSL / 1995 FEL / LAT 32.094114 / LONG -104.244409 At proposed prod. zone NWNE / 200 FNL / 1980 FEL / LAT 32.122096 / LONG -104.244358		10. Field and Pool, or Exploratory 97794 COTTONWOOD DRAW / BONE SPRING
14. Distance in miles and direction from nearest town or post office* 10 miles		11. Sec., T. R. M. or Blk. and Survey or Area SEC 25 / T25S / R26E / NMP
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drg. unit line, if any) 200 feet	16. No. of acres in lease 440	17. Spacing Unit dedicated to this well 320
18. Distance from proposed location* to nearest well, drilling, completed, 419 feet applied for, on this lease, ft.	19. Proposed Depth 7788 feet / 17782 feet	20. BLM/BIA Bond No. on file FED: NMB000215
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 2148 feet	22. Approximate date work will start* 03/01/2017	23. Estimated duration 30 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, must be attached to this form:

- | | |
|--|---|
| 1. Well plat certified by a registered surveyor. | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan. | 5. Operator certification |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be required by the BLM. |

25. Signature (Electronic Submission)	Name (Printed/Typed) Mayte Reyes / Ph: (575)748-6945	Date 01/13/2017
Title Regulatory Analyst		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Ty Allen / Ph: (575)234-5978	Date 04/25/2017
Title Wildlife Biologist		

Application approval 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.
Conditions of approval, if any, are attached.

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.

(Continued on page 2)

*(Instructions on page 2)

APPROVED WITH CONDITIONS

Ref 5-1-17

APR 28 2017

DISTRICT I

1625 N. FRENCH DR., HOBBS, NM 88240
Phone: (505) 393-8101 Fax: (505) 393-0720

DISTRICT II

811 S. FIRST ST., ARTESIA, NM 88210
Phone: (505) 748-1203 Fax: (505) 748-9720

DISTRICT III

1000 RIO BRAZOS RD., AZTEC, NM 87410
Phone: (505) 334-8178 Fax: (505) 334-8170

DISTRICT IV

1220 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 478-3480 Fax: (505) 478-3482State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

RECEIVED

Form C-102

Revised August 1, 2011

Submit one copy to appropriate

District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015- 44148	Pool Code 97494	Pool Name Cottonwood Draw; Bone Spring
Property Code 316776	Property Name ROAD RUNNER FEDERAL COM	Well Number 12H
OGRID No. 229137	Operator Name COG OPERATING, LLC	Elevation 3247.7'

Surface Location

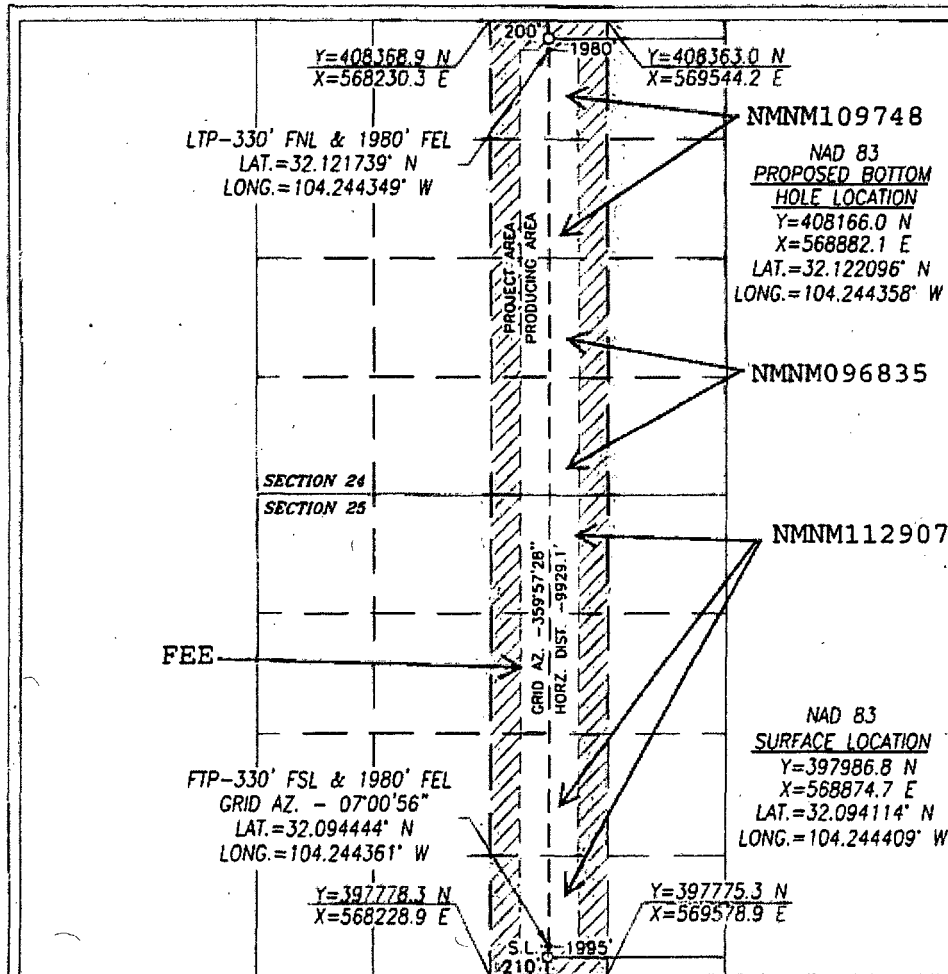
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	25	25-S	26-E		210	SOUTH	1995	EAST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	24	25-S	26-E		200	NORTH	1980	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
320			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Mayte Reyes Date 1-9-17

Printed Name
Mayte ReyesE-mail Address
mreyes1@concho.com

E-mail Address

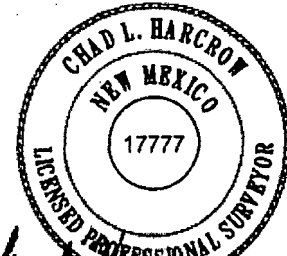
SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

NOVEMBER 11, 2016

Date of Survey

Signature & Seal of Professional Surveyor



Chad L. Harcrow 11/21/16
Certificate No. CHAD HARCROW 17777
W.O. # 16-935 DRAWN BY: VD

Surface Use Plan
COG Operating LLC
Road Runner Federal Com #12H
SHL: 210' FSL & 1995' FEL UL O
Section 25, T25S, R26E
BHL: 200' FNL & 1980' FEL UL B
Section 24, T25S, R26E
Eddy County, New Mexico

NM OIL CONSERVATION

ARTESIA DISTRICT

APR 28 2017

RECEIVED

OPERATOR CERTIFICATION

I hereby certify that I, or persons under my direct supervision, have inspected the drill site and access road proposed herein; that I am familiar with the conditions that presently exist; that I have full knowledge of State and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or COG Operating LLC, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements. Executed this 12th day of JANUARY, 2017.

Signed: Mayte Reyes

Printed Name: Mayte Reyes

Position: Regulatory Analyst

Address: 2208 W. Main Street, Artesia, NM 88210

Telephone: (575) 748-6945

E-mail: mreyes1@concho.com

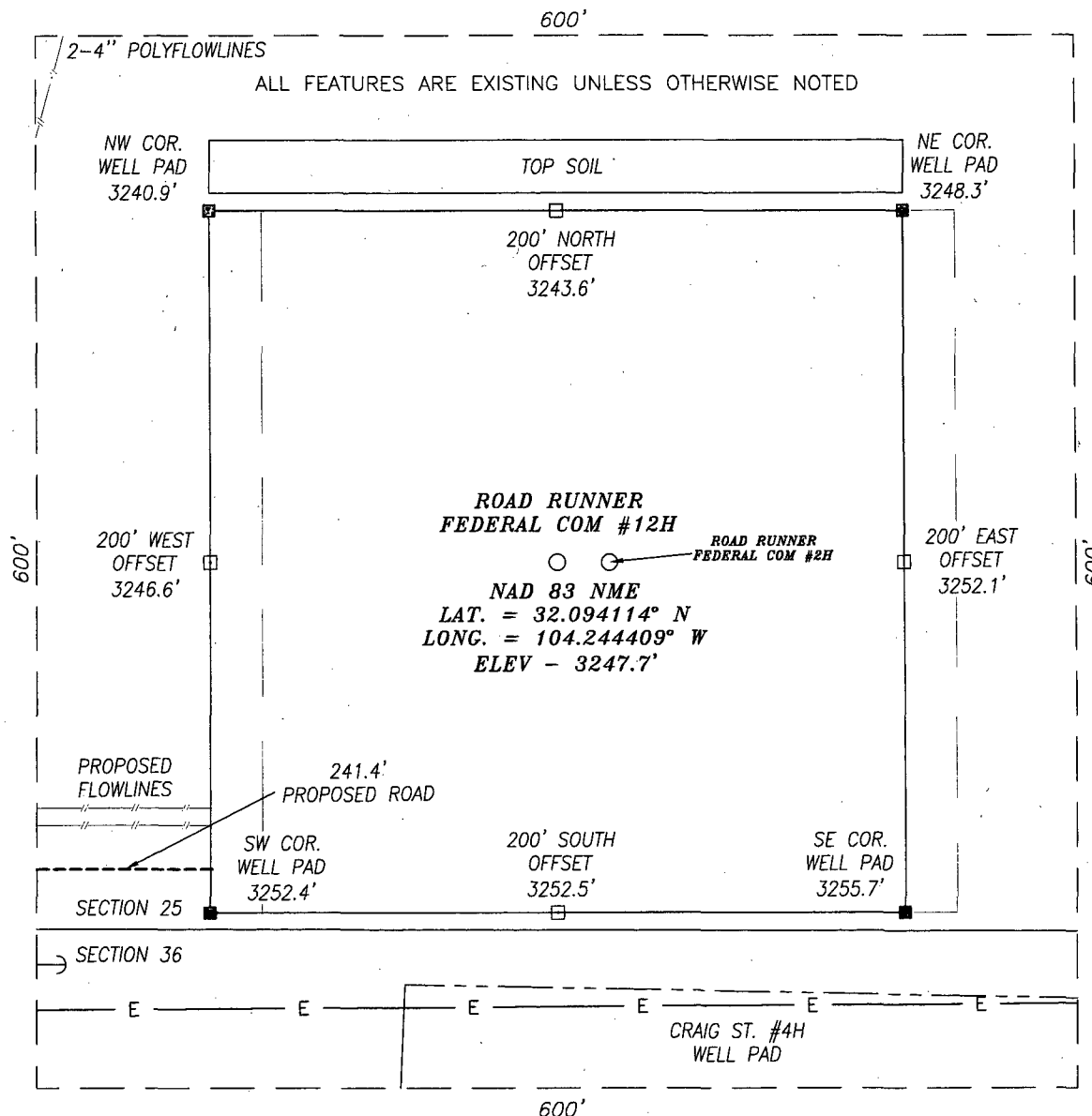
Field Representative (if not above signatory): Rand French

Telephone: (575) 748-6940. E-mail: rfrench@concho.com

SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,

EDDY COUNTY

NEW MEXICO

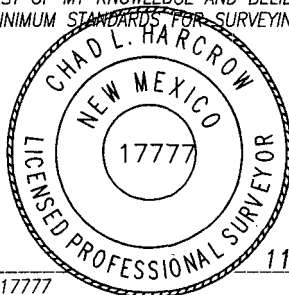


DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF JOHN D. FOREHAND RD (CR 742) AND WHITES CITY RD (CR 724) GO NORTH APPROXIMATELY 1.7 MILES TO A PROPOSED ROAD ON THE RIGHT (EAST). PROPOSED WELL IS APPROX. 470 FEET EASTNORTHEAST.

CERTIFICATION

I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

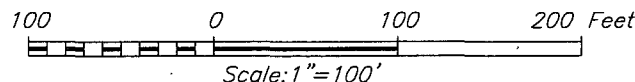


Chad Harcrow
CHAD HARCROW N.M.P.S. NO. 17777

11/21/16
DATE

HARCROW SURVEYING, LLC

2314 W. MAIN ST, ARTESIA, N.M. 88210
PH: (575) 746-2158 FAX: (575) 746-2158
c.harcrow@harcrowsurveying.com



COG OPERATING, LLC

ROAD RUNNER FEDERAL COM #12H WELL
LOCATED 210 FEET FROM THE SOUTH LINE
AND 1995 FEET FROM THE EAST LINE OF SECTION 25,
TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO

SURVEY DATE: NOVEMBER 11, 2016

PAGE 1 OF 1

DRAFTING DATE: NOVEMBER 17, 2016

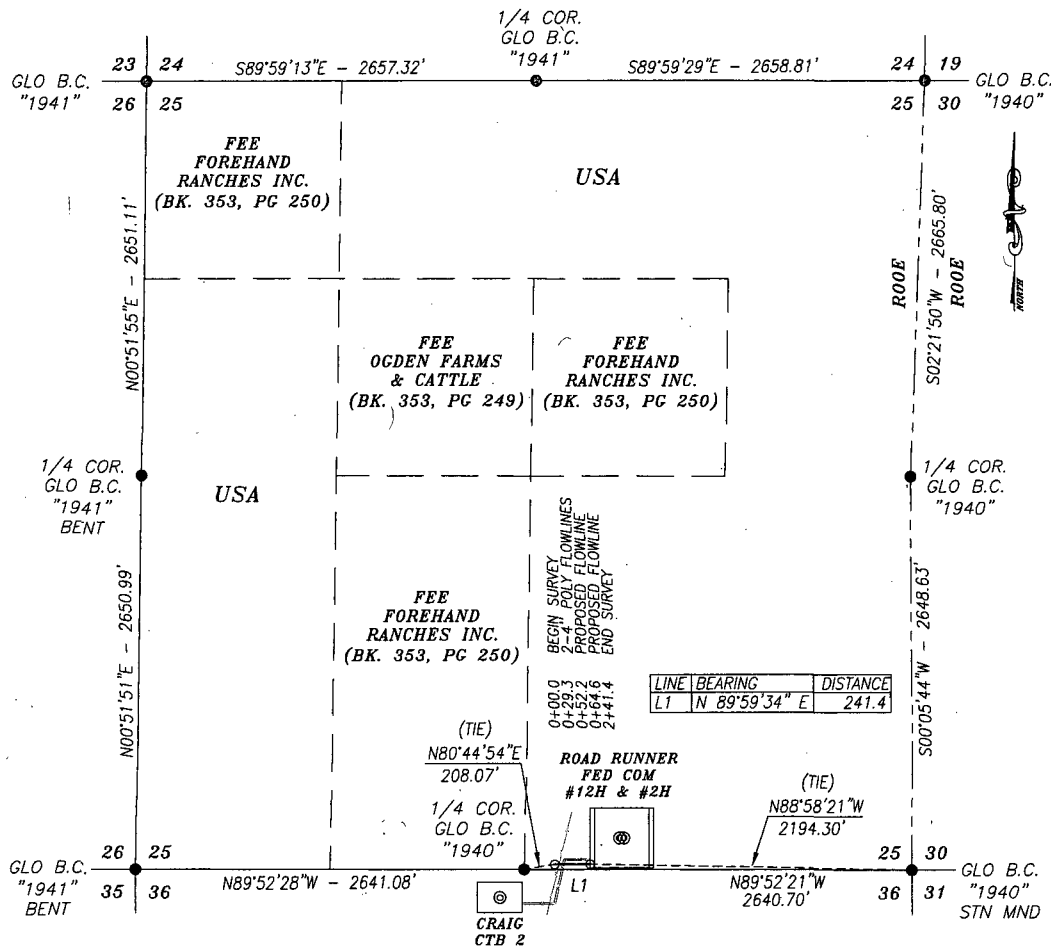
APPROVED BY: CH

DRAWN BY: VD

FILE: 16-935

ACCESS ROAD PLAT COG OPERATING, LLC

ACCESS ROAD FROM JOHN D. FOREHAND ROAD CR 742 TO THE
ROAD RUNNER FEDERAL COM #2H AND #12H IN
SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 241.4 FEET OR 14.63 RODS OR 0.046 MILES IN LENGTH CROSSING USA LAND IN SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:

BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.

CERTIFICATION

I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.



Chad Harcrow

CHAD HARCROW N.M.P.S. NO. 17777

11/21/16

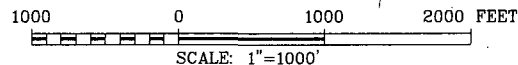
DATE

HARCROW SURVEYING, LLC

2314 W. MAIN ST, ARTESIA, N.M. 88210

PH: (575) 746-2158 FAX: (575) 746-2158

c.harcrow@harcrowsurveying.com



COG OPERATING LLC

SURVEY OF A PROPOSED ROAD LOCATED IN
SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26
EAST, NMPM, EDDY COUNTY, NEW MEXICO

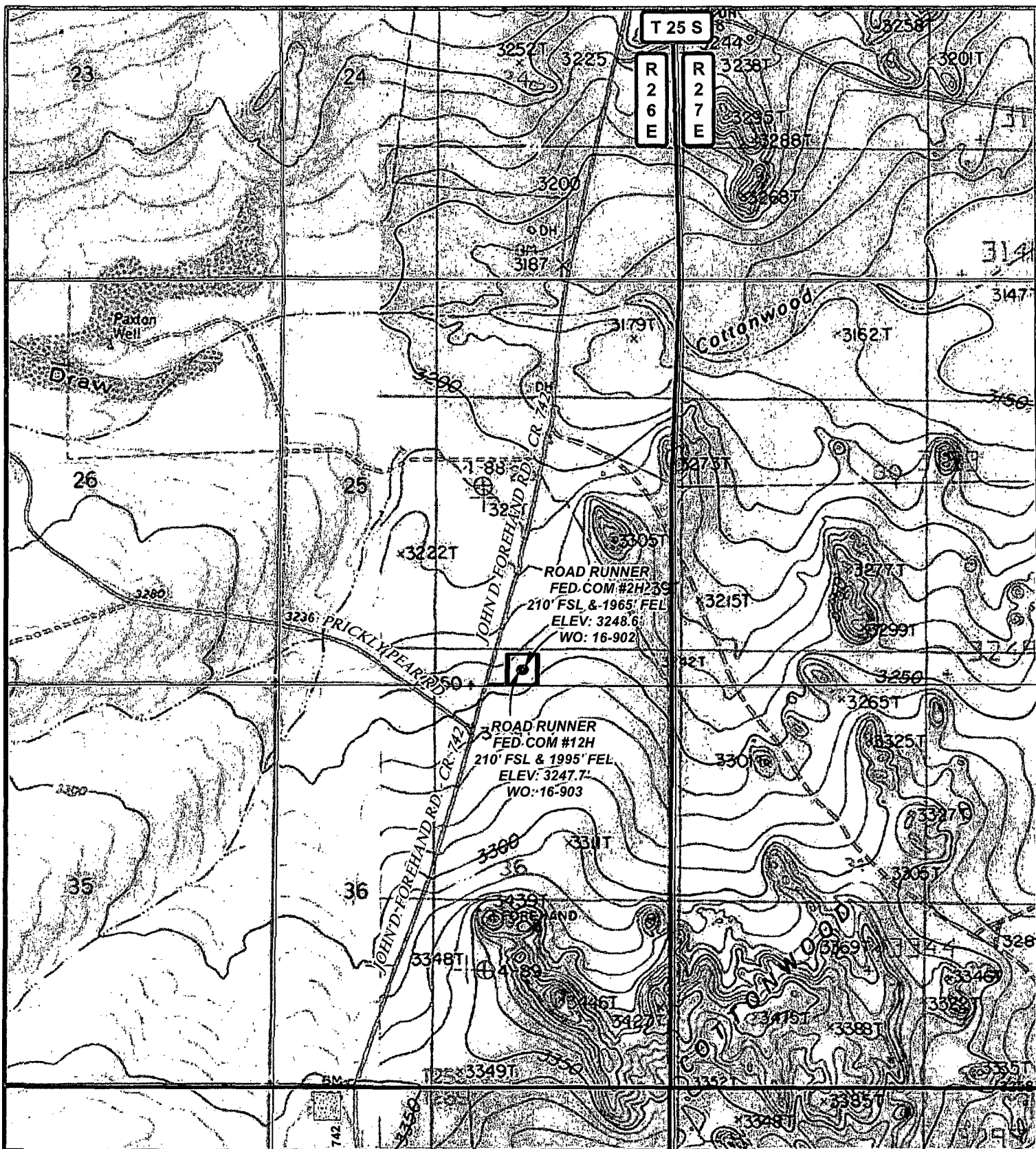
SURVEY DATE: NOVEMBER 11, 2016

DRAFTING DATE: NOVEMBER 18, 2016

APPROVED BY: CH DRAWN BY: VD

PAGE 1 OF 1

FILE: 16-936

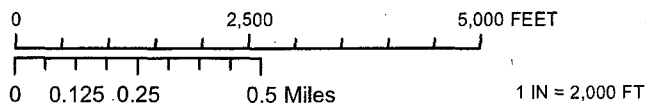


LEGEND

- WELL
- WELLPAD
- PROPOSED ROAD

ROAD RUNNER FED COM #2H & #12H

SECTION: 25	TOWNSHIP: 25 S.	RANGE: 26 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 16-934 & 935		LEASE: ROAD RUNNER FED COM



LOCATION MAP

TOPO

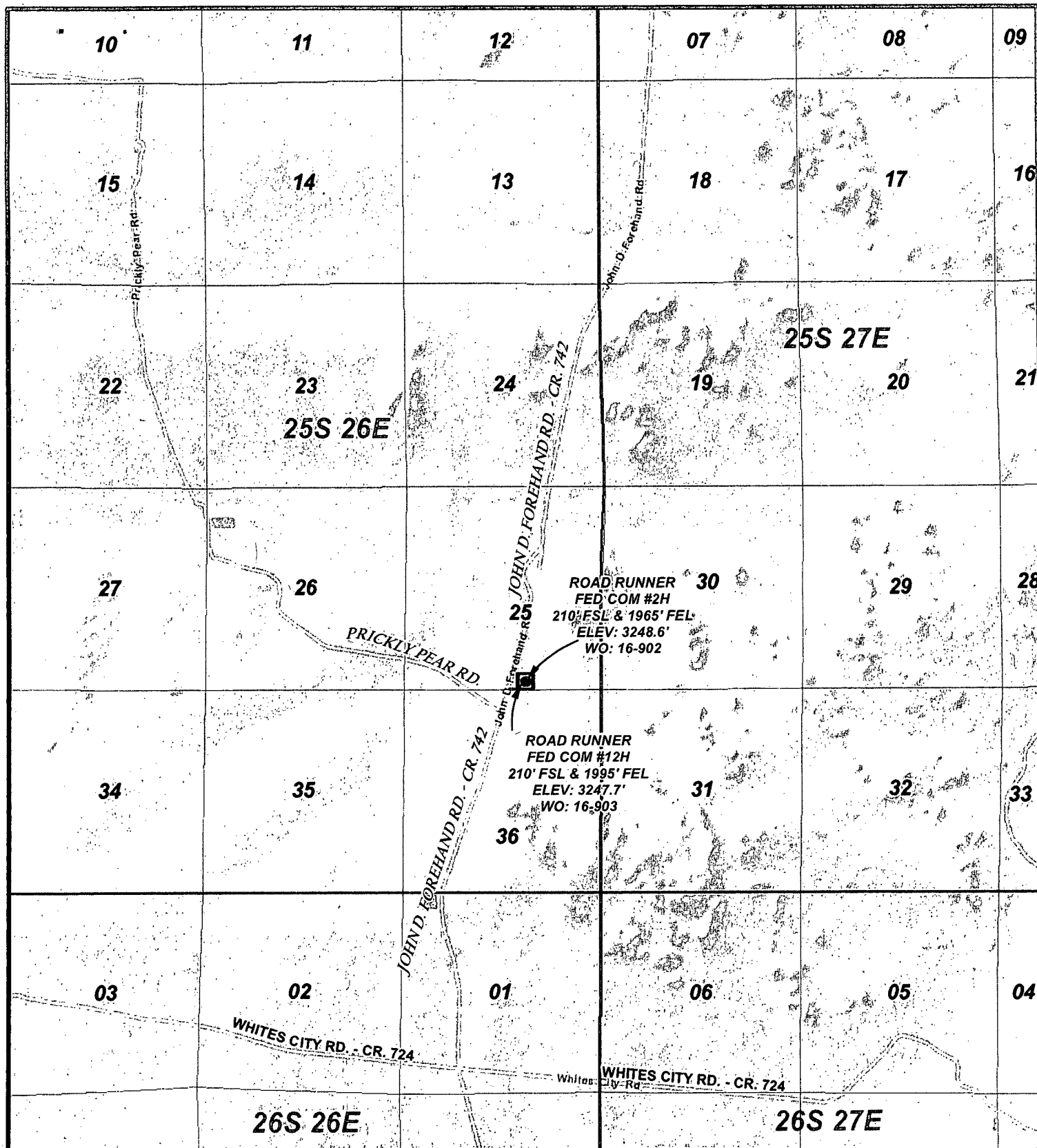
11/21/2016

C.H.

CONCHO
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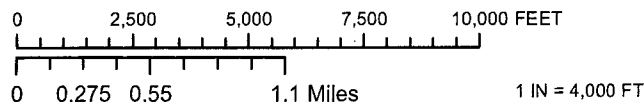


LEGEND

- WELL
- WELLPAD
- PROPOSED ROAD

ROAD RUNNER FED COM #2H & #12H

SECTION: 25 TOWNSHIP: 25 S. RANGE: 26 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M.
 W.O. # 16-934 & 935 LEASE: ROAD RUNNER FED COM



VICINITY MAP

11/21/2016

C.H.

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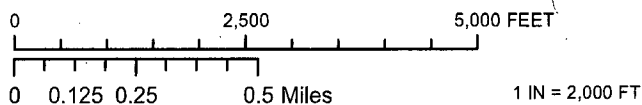


LEGEND

- WELL
- WELLPAD
- PROPOSED ROAD

ROAD RUNNER FED COM #2H & #12H

SECTION: 25 TOWNSHIP: 25 S. RANGE: 26 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M.
 W.O. # 16-934 & 935 LEASE: ROAD RUNNER FED COM



LOCATION MAP

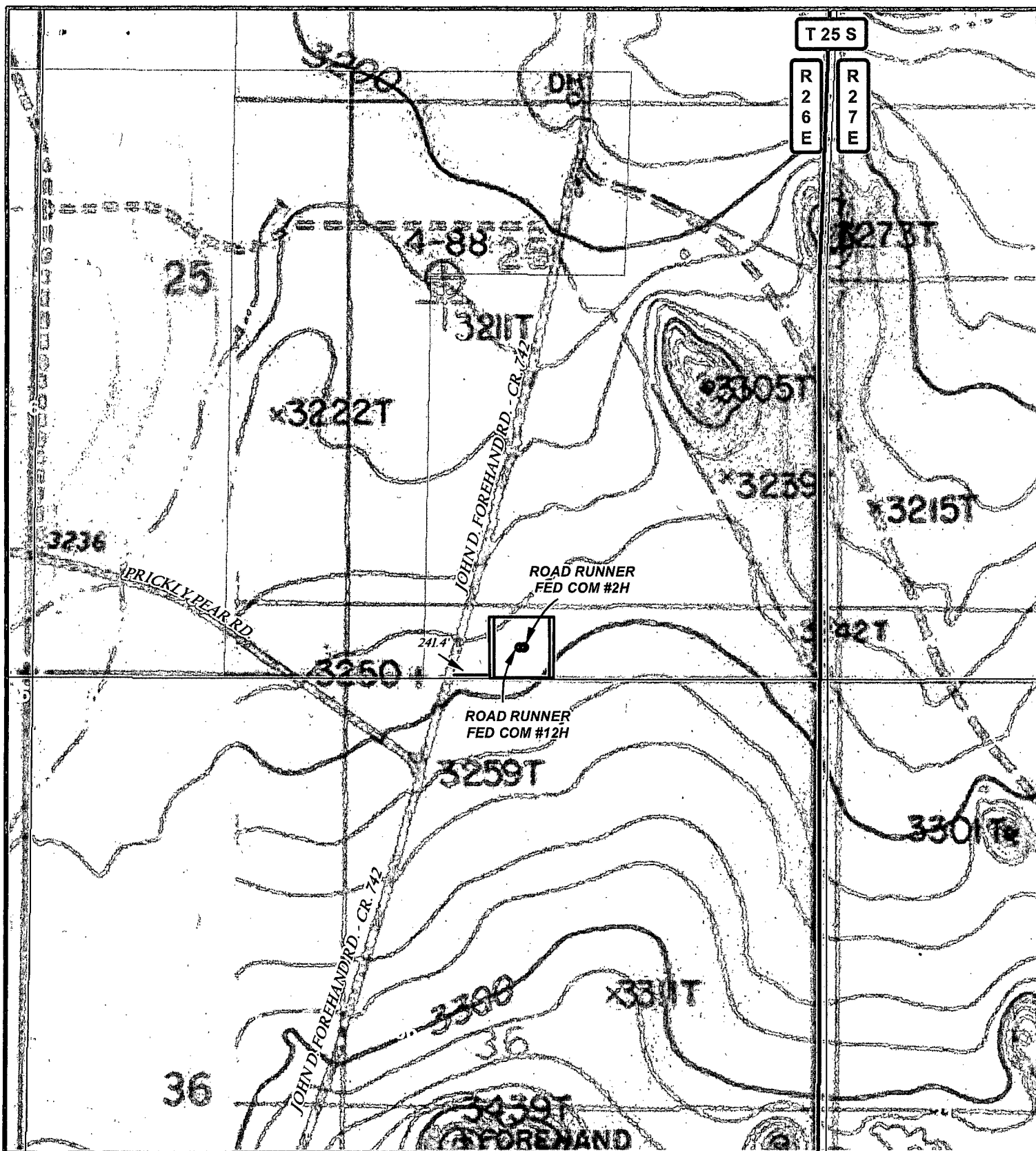
IMAGERY

11/21/2016

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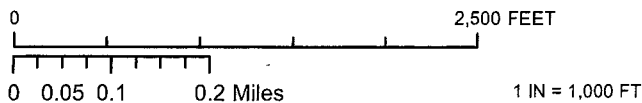


LEGEND

- WELL
- WELLPAD
- PROPOSED ROAD
- PRIVATE
- ▨ STATE OF NM
- ░ US BLM

ROAD RUNNER FED COM #2H & #12H ROAD

SECTION: 25 TOWNSHIP: 25 S. RANGE: 26 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M.
 W.O. # 16-936 LEASE: ROAD RUNNER FED COM



LOCATION MAP LAND STATUS 11/21/2016 C.H.

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 c.harcrow@harcrowsurveying.com



LEGEND

● WELL

□ WELLPAD

— PROPOSED ROAD

ROAD RUNNER FED COM #2H & #12H ROAD

SECTION: 25

TOWNSHIP: 25 S.

RANGE: 26 E.

STATE: NEW MEXICO

COUNTY: EDDY

SURVEY: N.M.P.M

W.O. # 16-936

LEASE: ROAD RUNNER FED COM

0 2,500 FEET

0 0.05 0.1 0.2 Miles

1 IN = 1,000 FT

LOCATION MAP

IMAGERY

11/21/2016

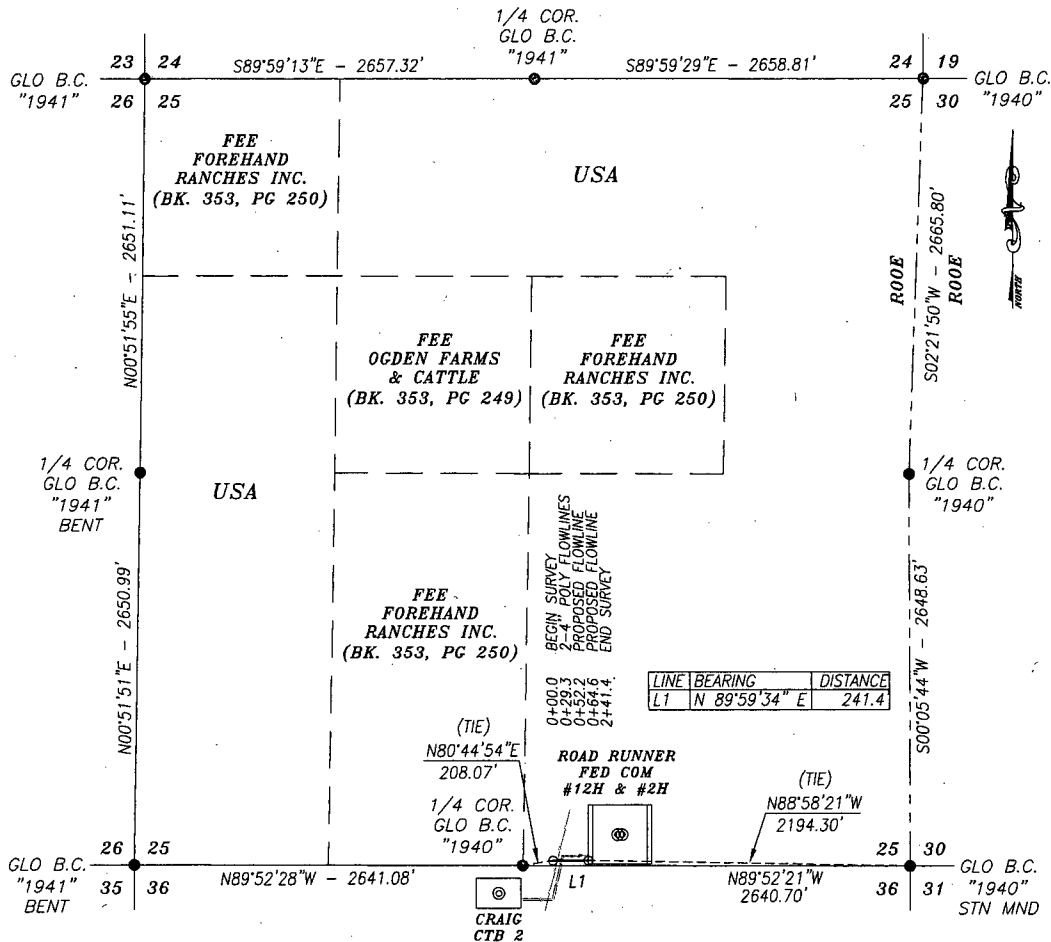
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ACCESS ROAD PLAT
COG OPERATING, LLC
 ACCESS ROAD FROM JOHN D. FOREHAND ROAD CR 742 TO THE
 ROAD RUNNER FEDERAL COM #2H AND #12H IN
SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26 EAST, N.M.P.M.,
 EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 241.4 FEET OR 14.63 RODS OR 0.046 MILES IN LENGTH CROSSING USA LAND IN SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:
 BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.

CERTIFICATION
 I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

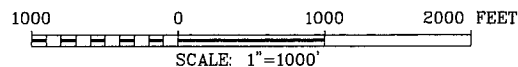


Chad Harcrow

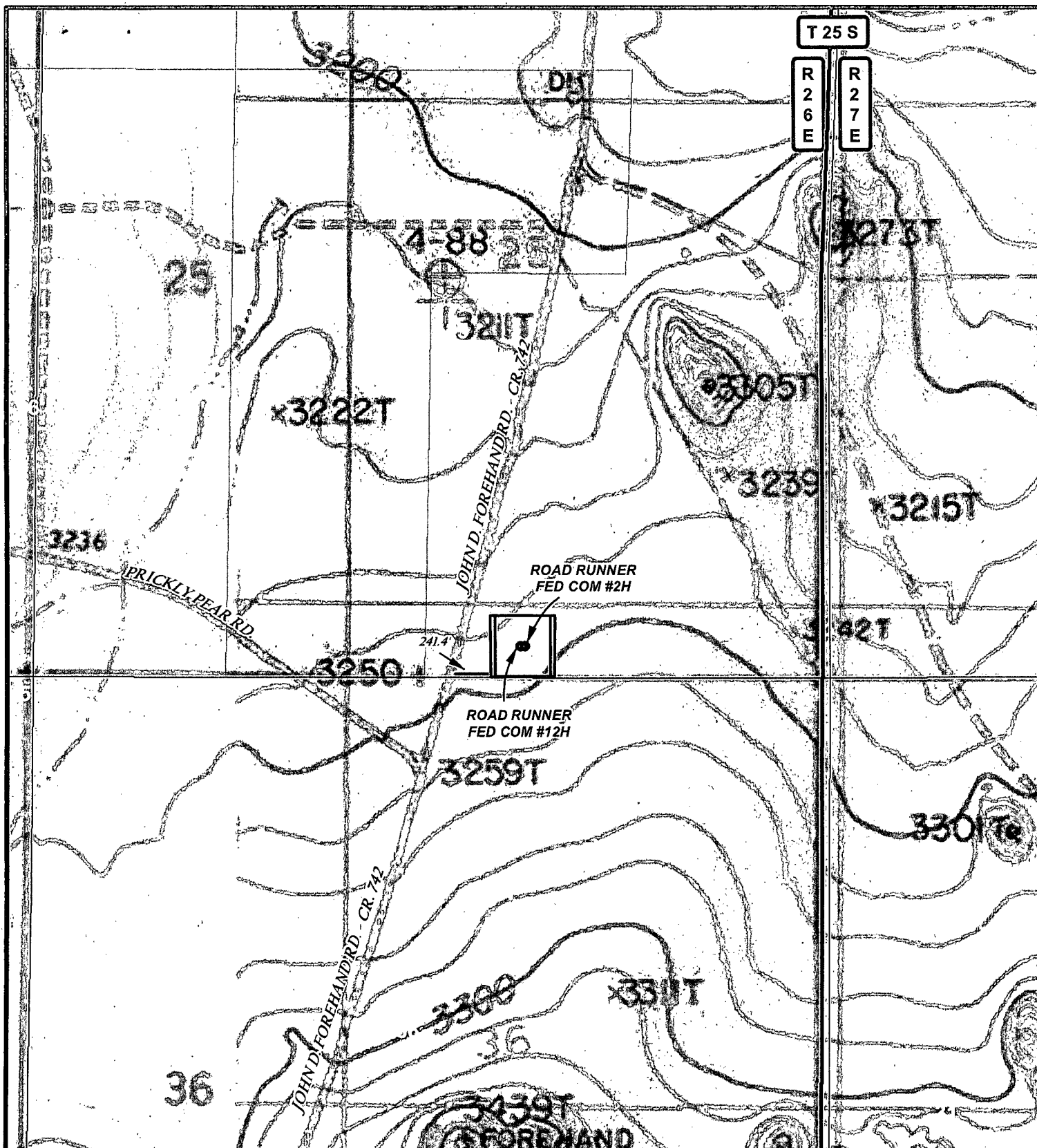
CHAD HARCROW N.M.P.S. NO. 17777

11/21/16
DATE

HARCROW SURVEYING, LLC
 2314 W. MAIN ST, ARTESIA, N.M. 88210
 PH: (575) 746-2158 FAX: (575) 746-2158
 c.harcrow@harcrowsurveying.com



COG OPERATING LLC		
SURVEY OF A PROPOSED ROAD LOCATED IN SECTION 25, TOWNSHIP 25 SOUTH, RANGE 26 EAST, NMPM, EDDY COUNTY, NEW MEXICO		
SURVEY DATE: NOVEMBER 11, 2016		
DRAFTING DATE: NOVEMBER 18, 2016	PAGE 1 OF 1	
APPROVED BY: CH	DRAWN BY: VD	FILE: 16-936

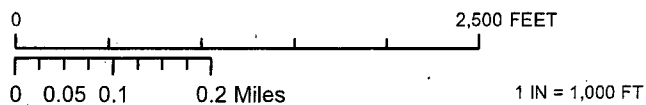


LEGEND

- WELL
- WELLPAD
- PROPOSED ROAD
- PRIVATE
- ▨ STATE OF NM
- US BLM

ROAD RUNNER FED COM #2H & #12H ROAD

SECTION: 25 TOWNSHIP: 25 S. RANGE: 26 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M.
 W.O. # 16-936 LEASE: ROAD RUNNER FED COM



LOCATION MAP

LAND STATUS

11/21/2016

C.H.

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 COG OPERATING, LLC



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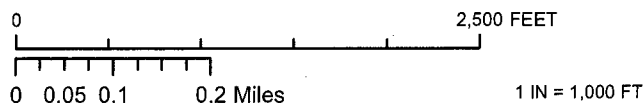


LEGEND

- WELL
- WELLPAD
- PROPOSED ROAD

ROAD RUNNER FED COM #2H & #12H ROAD

SECTION: 25	TOWNSHIP: 25 S.	RANGE: 26 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M.
W.O. # 16-936	LEASE: ROAD RUNNER FED COM	



LOCATION MAP

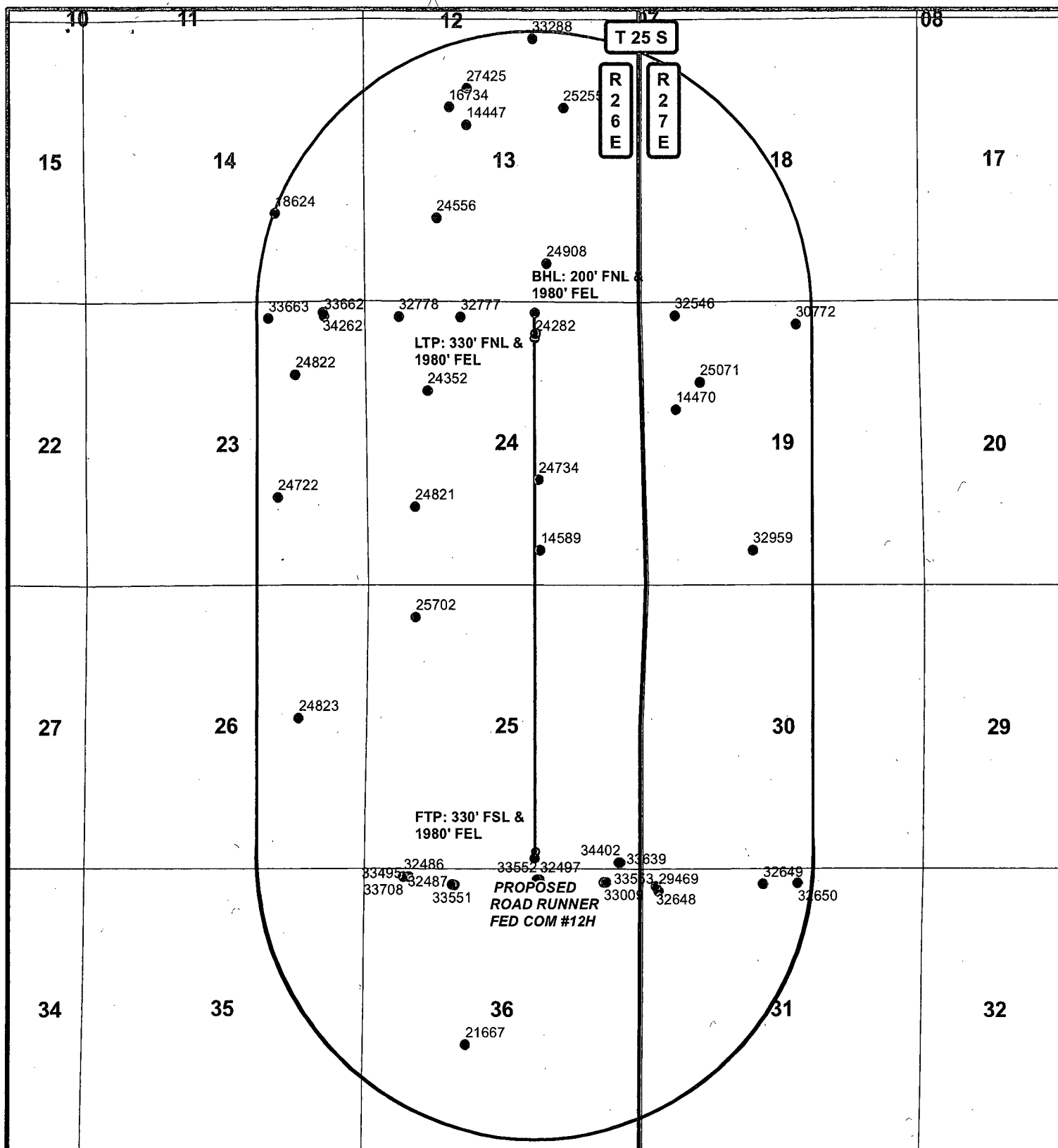
IMAGERY

11/21/2016

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DATA FOR "WELLS WITHIN 1 MI." IS TAKEN FROM THE NEW MEXICO EMNRD WEBSITE. THE DATA HAS BEEN UPDATED THROUGH OCTOBER 29, 2016.

LEGEND

- WELL
- BOTTOMHOLE
- WELLS WITHIN 1 MI.
- 1 MI. BUFFER

ROAD RUNNER FED COM #12H

SECTION: 25 TOWNSHIP: 25 S. RANGE: 26 E.
 STATE: NEW MEXICO COUNTY: EDDY 210' FSL & 1995' FEL
 W.O. # 16-935 LEASE: ROAD RUNNER FED COM SURVEY: N.M.P.M.

0 2,500 5,000 7,500 FEET

0 0.2 0.4 0.8 Miles 1 IN = 2,917 FT

1 MILE MAP

11/21/2016

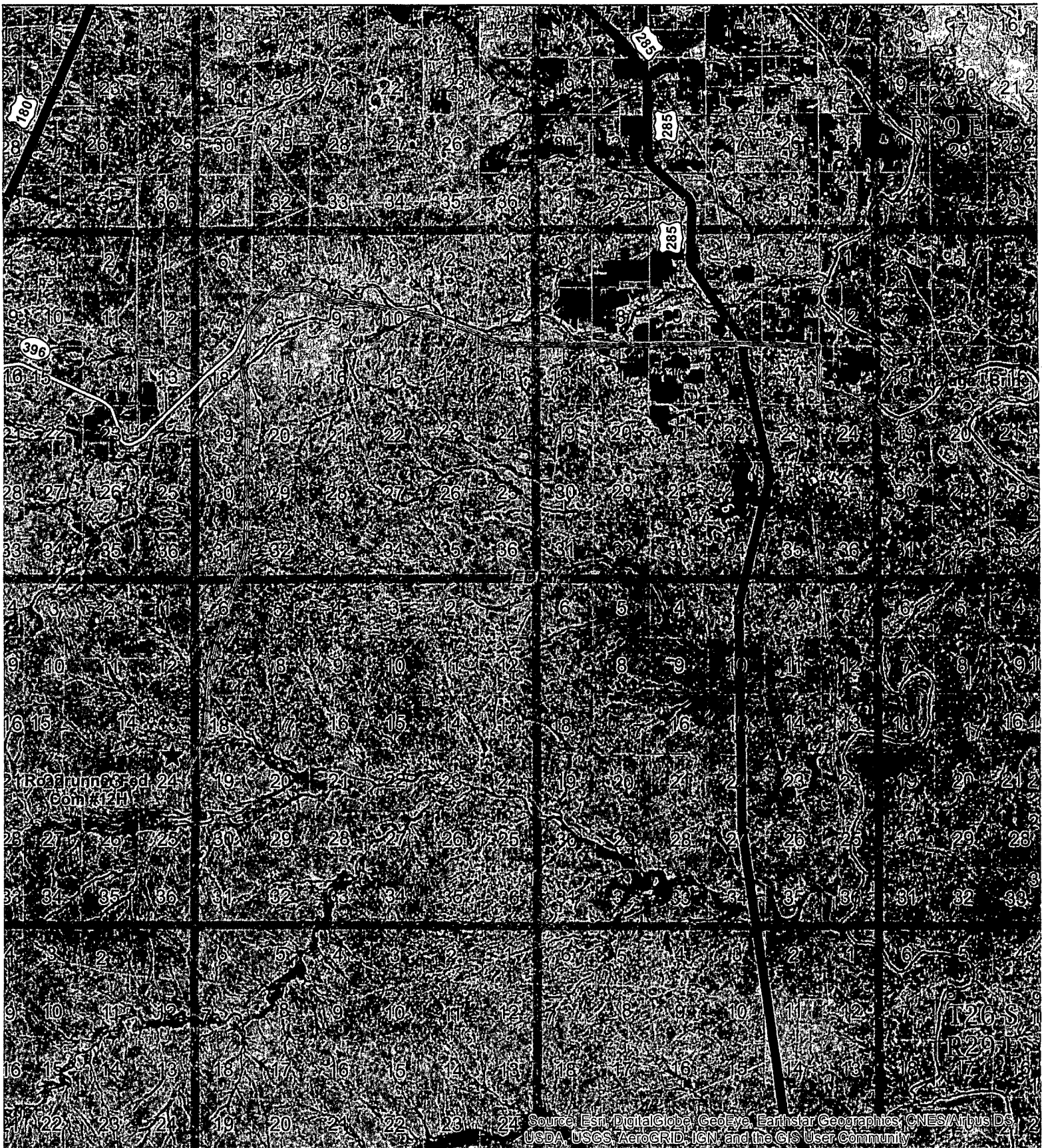
C.H.

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 COG OPERATING, LLC



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 PH: (575) 746-2158 FAX: (575) 746-2158
 c.harcrow@harcrowsurveying.com

ROAD RUNNER FED.COM #12H.WELLS																		
FD	Shape	OPERATOR	WELL NAME	LATITUDE	LONGITUDE	API	SECTION	TOWNSHIP	RANGE	FTG	NS	CD	FTG	EW	EW	CD	COMPL	STAT
14447	Point	BILL & PATSY RICH	SULPHATE SISTER 001	32.131768	-104.248557	3001521029		13 25 05	26E	1980	N		1980	W			Plugged	
14470	Point	ROBERT N ENFIELD	BOLTON FEDERAL 001	32.117171	-104.235674	3001521053		19 25 05	27E	1980	N		1980	W			Plugged	
14589	Point	BEARD OIL CO	GRIFFITH FED 001	32.109931	-104.244051	3001521186		24 25 05	26E	660	S		1980	E			Plugged	
16734	Point	CHEVRON U S A INC	FEDERAL 13 COM 001	32.132681	-104.249634	3001523492		13 25 05	26E	1650	N		1650	W			Plugged	
18624	Point	BILL & PATSY RICH	WHITE CITY 14 FEDERAL 002	32.127179	-104.260312	3001525661		14 25 05	26E	1650	S		1650	E			Plugged	
21667	Point	COG OPERATING LLC	COTTONWOOD 36 STATE SWD 001	32.084475	-104.248667	3001529560		36 25 05	26E	1980	S		1980	W			Plugged	
24282	Point	COG OPERATING LLC	LIGHTNING 24 FEDERAL COM 001	32.120816	-104.244344	3001533001		24 25 05	26E	660	N		1980	E			Active	
24352	Point	CIMAREX ENERGY CO. OF COLORADO	LIBERTY 24 FEDERAL COM 001	32.118131	-104.250968	3001533094		24 25 05	26E	1650	N		1650	W			Active	
24556	Point	CIMAREX ENERGY CO. OF COLORADO	FEDERAL 13 COM 002	32.126965	-104.25041	3001533344		13 25 05	26E	1565	S		1400	W			Active	
24722	Point	CIMAREX ENERGY CO. OF COLORADO	WIGEON 23 FEDERAL COM 001	32.112644	-104.260142	3001533563		23 25 05	26E	1650	S		1650	E			Active	
24734	Point	COG OPERATING LLC	LIGHTNING 24 FEDERAL COM 002	32.11356	-104.244149	3001533578		24 25 05	26E	1980	S		1980	E			Active	
24821	Point	CIMAREX ENERGY CO. OF COLORADO	LIBERTY 24 FEDERAL COM 002	32.112183	-104.251728	3001533683		24 25 05	26E	1475	S		940	W			Active	
24823	Point	CIMAREX ENERGY CO. OF COLORADO	WIGEON 23 FEDERAL COM 002	32.118942	-104.250904	3001533684		23 25 05	26E	1350	N		1300	E			TA	
24823	Point	CIMAREX ENERGY CO. OF COLORADO	BUFFLEHEAD 26 FEDERAL COM 001	32.10131	-104.258903	3001533685		26 25 05	26E	2475	N		1250	E			New (Not drilled or compl)	
24908	Point	CIMAREX ENERGY CO. OF COLORADO	FEDERAL 13 COM 003	32.124619	-104.243643	3001533785		13 25 05	26E	725	S		1750	E			Active	
25071	Point	OXY USA INC	MARINE 19 FEDERAL 001	32.118558	-104.234186	3001533981		19 25 05	27E	1480	N		1130	W			Plugged	
25255	Point	CIMAREX ENERGY CO. OF COLORADO	FEDERAL 13 COM 004	32.132629	-104.242588	3001534199		13 25 05	26E	1620	N		1400	E			Active	
25702	Point	CIMAREX ENERGY CO. OF COLORADO	FREEDOM 25 FEE 001C	32.106491	-104.251699	3001534716		25 25 05	26E	660	N		990	W			New (Not drilled or compl)	
27425	Point	CIMAREX ENERGY CO. OF COLORADO	FEDERAL 13 COM 006	32.133662	-104.248543	3001536571		13 25 05	26E	1310	N		1980	W			New (Not drilled or compl)	
29469	Point	COG OPERATING LLC	JACK FEDERAL 001H	32.092415	-104.236801	3001538643		31 25 05	27E	330	N		380	W			New (Not drilled or compl)	
30772	Point	OXY USA INC	PEACHES 19 FEDERAL 001H	32.121537	-104.228275	3001540250		19 25 05	27E	330	N		2310	E			New (Not drilled or compl)	
32486	Point	COG OPERATING LLC	CRAIG STATE 002	32.093161	-104.252462	3001541970		36 25 05	26E	210	N		800	W			New (Not drilled or compl)	
32487	Point	COG OPERATING LLC	CRAIG STATE 003H	32.092743	-104.249319	3001541971		36 25 05	26E	350	N		1770	W			New (Not drilled or compl)	
32497	Point	COG OPERATING LLC	CRAIG STATE 004H	32.093004	-104.244105	3001541981		36 25 05	26E	190	N		1870	E			New (Not drilled or compl)	
32546	Point	OXY USA INC	PEACHES 19 FEDERAL 004H	32.121966	-104.235735	3001542030		19 25 05	27E	150	N		660	W			New (Not drilled or compl)	
32649	Point	COG OPERATING LLC	JACK FEDERAL 002H	32.092662	-104.236965	3001542132		31 25 05	27E	240	N		330	W			New (Not drilled or compl)	
32650	Point	COG OPERATING LLC	JACK FEDERAL 004H	32.092796	-104.230379	3001542133		31 25 05	27E	206	N		2360	W			New (Not drilled or compl)	
32777	Point	CIMAREX ENERGY CO. OF COLORADO	LIBERTY 24 FEDERAL COM 003H	32.092853	-104.228261	3001542134		31 25 05	27E	190	N		2310	E			New (Not drilled or compl)	
32778	Point	CIMAREX ENERGY CO. OF COLORADO	LIBERTY 24 FEDERAL COM 004H	32.121889	-104.248925	3001542261		24 25 05	26E	330	N		1830	W			New (Not drilled or compl)	
32959	Point	OXY USA INC	PEACHES 19 FEDERAL 003H	32.121919	-104.252723	3001542262		24 25 05	26E	330	N		660	W			New (Not drilled or compl)	
33009	Point	COG OPERATING LLC	CRAIG STATE 005H	32.10994	-104.230969	3001542446		19 25 05	27E	730	S		1980	W			New (Not drilled or compl)	
33288	Point	CIMAREX ENERGY CO. OF COLORADO	FEDERAL 13 COM 008H	32.09287	-104.240178	3001542497		36 25 05	26E	190	N		660	E			New (Not drilled or compl)	
33495	Point	COG OPERATING LLC	CRAIG STATE 012H	32.136235	-104.244487	3001542777		13 25 05	26E	330	N		1980	E			New (Not drilled or compl)	
33551	Point	COG OPERATING LLC	CRAIG STATE 013H	32.093162	-104.252138	3001542989		36 25 05	26E	210	N		900	W			New (Not drilled or compl)	
33552	Point	COG OPERATING LLC	CRAIG STATE 014H	32.092748	-104.249481	3001543045		36 25 05	26E	350	N		1720	W			New (Not drilled or compl)	
33553	Point	COG OPERATING LLC	CRAIG STATE 015H	32.09301	-104.244267	3001543046		36 25 05	26E	190	N		1920	E			New (Not drilled or compl)	
33639	Point	COG OPERATING LLC	ROAD RUNNER FEDERAL 001H	32.092864	-104.240016	3001543047		36 25 05	26E	190	N		610	E			New (Not drilled or compl)	
33662	Point	CIMAREX ENERGY CO. OF COLORADO	WIGEON 23 FEDERAL COM 001H	32.093883	-104.239749	3001543133		23 25 05	26E	190	S		380	E			New (Not drilled or compl)	
33663	Point	CIMAREX ENERGY CO. OF COLORADO	WIGEON 23 FEDERAL COM 004H	32.121921	-104.257322	3001543156		23 25 05	26E	305	N		757	E			New (Not drilled or compl)	
33708	Point	COG OPERATING LLC	CRAIG STATE 002H	32.121792	-104.260714	3001543157		23 25 05	26E	334	N		1802	E			New (Not drilled or compl)	
34262	Point	CIMAREX ENERGY CO.	WHITE CITY 14 FEDERAL 015H	32.093161	-104.252462	3001543202		36 25 05	26E	210	N		800	W			New (Not drilled or compl)	
34402	Point	COG OPERATING LLC	ROAD RUNNER FEDERAL COM 011H	32.122106	-104.257399	3001543760		23 25 05	26E	237	N		781	E			New (Not drilled or compl)	
				32.09388	-104.239152	3001543900		25 25 05	26E	190	S		350	E			New (Not drilled or compl)	



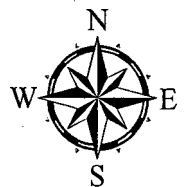
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Map Legend

**Roadrunner Fed Com #12H
To Malaga I Brine**

Route

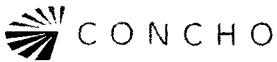
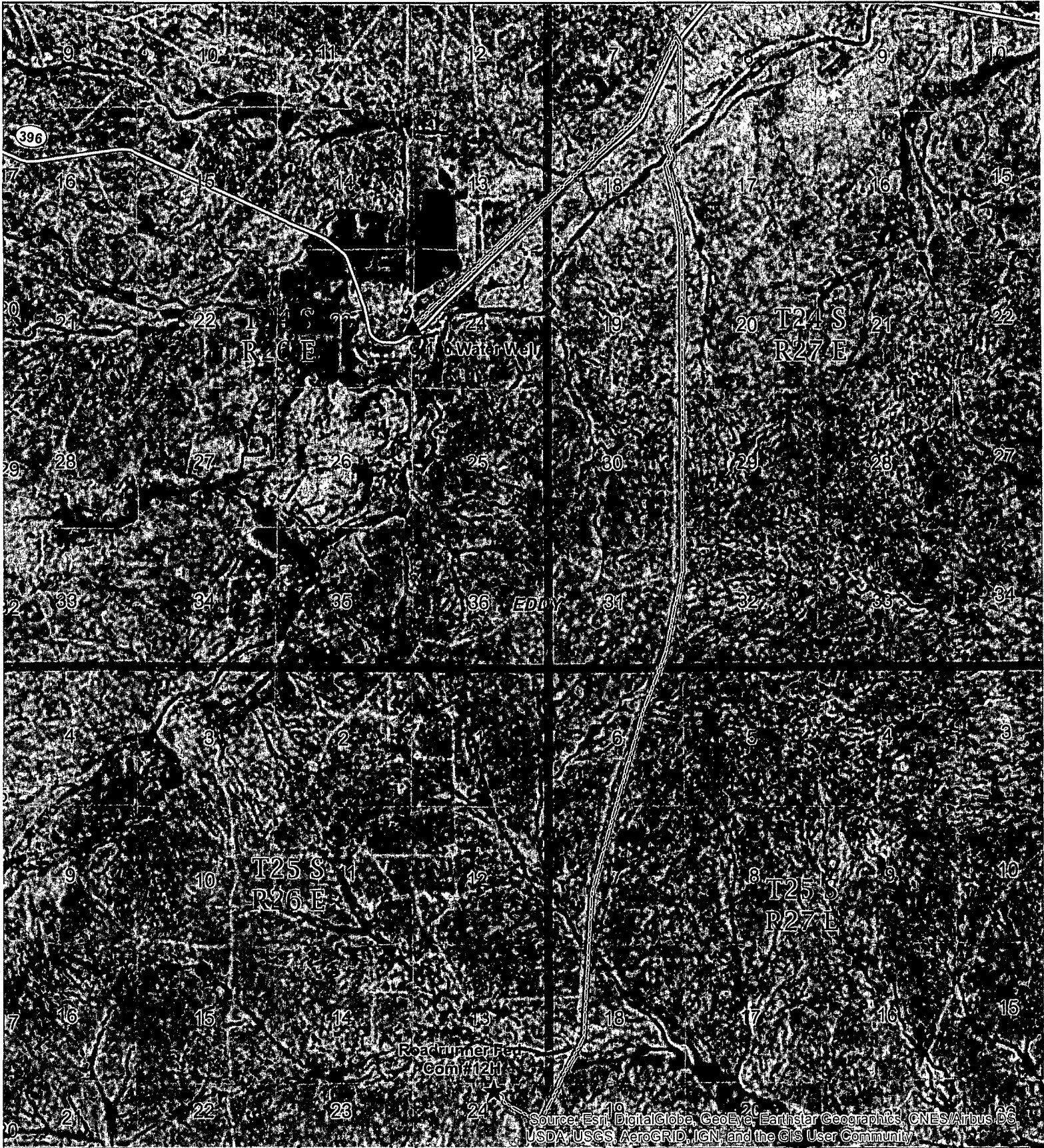


Date: 1/12/2017
Author: Whitney McDonald
State: New Mexico
County: Eddy

1000 Feet Above Seals and Seals
Section: 1000 Feet Above Seals and Seals
Date: 1/12/2017
Author: Whitney McDonald
State: New Mexico
County: Eddy

Disclaimer: This is not a legal survey document

0 0.75 1.5 3 4.5 6 Miles



Map Legend

Roadrunner Fed Com #12H Water Transfer Route

 Route

Date: 1/12/2017
 Author: Whytne McDonald
 State: New Mexico
 County: Eddy
 Disclaimer: This is not a legal survey document

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0 0.4 0.8 1.6 2.4 3.2 Miles



Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	210	13.375"	54.5	J55	STC	11.76	3.24	44.91
12.25"	0	1965	9.625"	40	J55	LTC	2.47	1.30	6.62
8.75"	0	17,782	5.5"	17	P110	LTC	1.96	3.51	3.36
BLM Minimum Safety Factor							1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Operating, LLC - ROAD RUNNER FEDERAL COM 12H

1. Geologic Formations

TVD of target	7,788' EOL	Pilot hole depth	NA
MD at TD:	17,782'	Deepest expected fresh water:	100'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	183	Water	
Top of Salt	320	Salt	
Base of Salt	1753	Salt	
Lamar	1938	Salt Water	
Bell Canyon	1990	Salt Water	
Cherry Canyon	2846	Oil/Gas	
Brushy Canyon	3930	Oil/Gas	
Bone Spring Lime	5508	Oil/Gas	
U. Avalon Shale	5790	Oil/Gas	
L. Avalon Shale	6035	Oil/Gas	
1st Bone Spring Sand	6465	Oil/Gas	
2nd Bone Spring Sand	7158	Oil/Gas	
3rd Bone Spring Sand	8298	Oil/Gas	
Wolfcamp	8649	Oil/Gas	

2. Casing Program

Hole Size	Casing		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	210	13.375"	54.5	J55	STC	11.76	3.24	44.91
12.25"	0	1965	9.625"	40	J55	LTC	2.47	1.30	6.62
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All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Operating, LLC - ROAD RUNNER FEDERAL COM 12H

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions; casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary?	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

COG Operating, LLC - ROAD RUNNER FEDERAL COM 12H

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft ³ / sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	-70	13.5	1.75	9	12	Lead: Class C + 4% Gel + 1% CaCl ₂
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl ₂
Inter.	290	12.7	2.0	9.6	16	Lead: 35:65:6 C Blend
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
5.5 Prod	810	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	2670	14.4	1.24	5.7	19	Tail: 50:50:2 Class H Blend

Volumes Subject to Observed Hole Conditions and/or Fluid Caliper Results

Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	50%
1 st Intermediate	0'	50%
Production	1,465'	25% OH in Lateral (KOP to EOL) – 40% OH in Vertical

4. Pressure Control Equipment

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.
---	---

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	x	Tested to:
12-1/4"	13-5/8"	2M	Annular	x	2000 psi
			Blind Ram		2M
			Pipe Ram		
			Double Ram		
			Other*		
8-3/4"	13-5/8"	3M	Annular	x	50% testing pressure
			Blind Ram	x	3M
			Pipe Ram	x	
			Double Ram		
			Other*		

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

X	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
N	Are anchors required by manufacturer?
N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.6 - 8.8	28-34	N/C
Surf csg	9-5/8" Int shoe	Saturated Brine	10 - 10.2	28-34	N/C
9-5/8" Int shoe	Lateral TD	Cut Brine	8.6 - 9.4	28-34	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

What will be used to monitor the loss or gain of fluid?

PVT/Pason/Visual Monitoring

6. Logging and Testing Procedures

Logging, Coring and Testing:	
Y	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
Y	No Logs are planned based on well control or offset log information.
N	Drill stem test? If yes, explain.
N	Coring? If yes, explain.

Additional logs planned		Interval
N	Resistivity	Pilot Hole TD to ICP
N	Density	Pilot Hole TD to ICP
Y	CBL	Production casing (If cement not circulated to surface)
Y	Mud log	Intermediate shoe to TD
N	PEX	

COG Operating, LLC - ROAD RUNNER FEDERAL COM 12H

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	3810 psi at 7788' TVD
Abnormal Temperature	NO 140 Deg. F.

No abnormal pressure or temperature conditions are anticipated. Sufficient mud materials to maintain mud properties and weight increase requirements will be kept on location at all times.

Sufficient supplies of Paper/LCM for periodic sweeps to control seepage and losses will be maintained on location.

Hydrogen Sulfide (H₂S) monitors will be installed prior to drilling out the surface shoe. If H₂S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.

N H₂S is present

Y H₂S Plan attached

8. Other Facets of Operation

Y	Is it a walking operation?
N	Is casing pre-set?

x	H ₂ S Plan.
x	BOP & Choke Schematics.
x	Directional Plan



NM OIL CONSERVATION
ARTESIA DISTRICT

APR 28 2017

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COG Operating LLC

Eddy County, NM (NAD-27 2015)

Road Runner Federal Com #12H

Road Runner Federal Com #12H

Lateral #1

Plan: Design #1

Standard Planning Report

16 December, 2016



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Company:	COG Operating LLC	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site:	Road Runner Federal Com #12H	North Reference:	Grid
Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Design:	Design #1		

Project:	Eddy County, NM (NAD-27 2015)		
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:	Road Runner Federal Com #12H		
Site Position:		Northing:	397,929.80 usft
From:	Map	Easting:	527,691.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	32° 5' 38.376 N
		Longitude:	104° 14' 38.087 W
		Grid Convergence:	0.05°

Well:	Road Runner Federal Com #12H					
Well Position	+N/-S	0.00 usft	Northing:	397,929.80 usft	Latitude:	32° 5' 38.376 N
	+E/-W	0.00 usft	Easting:	527,691.50 usft	Longitude:	104° 14' 38.087 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	3,247.70 usft

Wellbore	Lateral #1				
Magnetics	ModelName	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/16/2016	7.31	59.84	47,841

Design:	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	359.87

Plan Sections										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Dogleg Rate	Build Rate	Turn Rate	TFO	Target
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)	(°)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,330.54	0.00	0.00	7,330.54	0.00	0.00	0.00	0.00	0.00	0.00	
8,081.52	90.12	359.87	7,808.00	478.45	-1.06	12.00	12.00	-0.02	359.87	
17,782.02	90.12	359.87	7,788.00	10,178.90	-22.50	0.00	0.00	0.00	0.00	PBHL (RRFC#12H/L1



TDS
Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Company:	COG Operating LLC	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site:	Road Runner Federal Com #12H	North Reference:	Grid
Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Design:	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
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
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00



TDS
Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Road Runner Federal Com #12H
Well: Road Runner Federal Com #12H
Wellbore: Lateral #1
Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well Road Runner Federal Com #12H
KB @ 3272.70usft (Latshaw 44)
KB @ 3272.70usft (Latshaw 44)
Grid
Minimum Curvature

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,330.54	0.00	0.00	7,330.54	0.00	0.00	0.00	0.00	0.00	0.00	
Start DLS 12.00 TFO 359.87										
7,350.00	2.34	359.87	7,349.99	0.40	0.00	0.40	12.00	12.00	0.00	
7,375.00	5.34	359.87	7,374.94	2.07	0.00	2.07	12.00	12.00	0.00	
7,400.00	8.34	359.87	7,399.76	5.04	-0.01	5.04	12.00	12.00	0.00	
7,425.00	11.34	359.87	7,424.39	9.31	-0.02	9.31	12.00	12.00	0.00	
7,450.00	14.34	359.87	7,448.76	14.87	-0.03	14.87	12.00	12.00	0.00	
7,475.00	17.34	359.87	7,472.81	21.69	-0.05	21.69	12.00	12.00	0.00	
7,500.00	20.34	359.87	7,496.46	29.76	-0.07	29.76	12.00	12.00	0.00	
7,525.00	23.34	359.87	7,519.67	39.06	-0.09	39.06	12.00	12.00	0.00	
7,550.00	26.34	359.87	7,542.35	49.55	-0.11	49.55	12.00	12.00	0.00	
7,575.00	29.34	359.87	7,564.46	61.23	-0.14	61.23	12.00	12.00	0.00	
7,600.00	32.34	359.87	7,585.92	74.04	-0.16	74.04	12.00	12.00	0.00	
7,625.00	35.34	359.87	7,606.69	87.96	-0.19	87.96	12.00	12.00	0.00	
7,650.00	38.34	359.87	7,626.69	102.94	-0.23	102.94	12.00	12.00	0.00	
7,675.00	41.34	359.87	7,645.89	118.96	-0.26	118.96	12.00	12.00	0.00	
7,700.00	44.34	359.87	7,664.22	135.95	-0.30	135.95	12.00	12.00	0.00	
7,725.00	47.34	359.87	7,681.63	153.88	-0.34	153.88	12.00	12.00	0.00	
7,750.00	50.34	359.87	7,698.09	172.70	-0.38	172.70	12.00	12.00	0.00	
7,775.00	53.34	359.87	7,713.54	192.35	-0.43	192.36	12.00	12.00	0.00	
7,800.00	56.34	359.87	7,727.93	212.79	-0.47	212.79	12.00	12.00	0.00	
7,825.00	59.34	359.87	7,741.24	233.95	-0.52	233.95	12.00	12.00	0.00	
7,850.00	62.34	359.87	7,753.42	255.78	-0.57	255.78	12.00	12.00	0.00	
7,875.00	65.34	359.87	7,764.44	278.21	-0.61	278.21	12.00	12.00	0.00	
7,900.00	68.34	359.87	7,774.28	301.20	-0.67	301.20	12.00	12.00	0.00	
7,925.00	71.34	359.87	7,782.89	324.66	-0.72	324.66	12.00	12.00	0.00	
7,950.00	74.34	359.87	7,790.27	348.54	-0.77	348.55	12.00	12.00	0.00	
7,975.00	77.34	359.87	7,796.39	372.78	-0.82	372.78	12.00	12.00	0.00	
8,000.00	80.34	359.87	7,801.23	397.31	-0.88	397.31	12.00	12.00	0.00	
8,025.00	83.34	359.87	7,804.78	422.05	-0.93	422.05	12.00	12.00	0.00	
8,050.00	86.34	359.87	7,807.03	446.94	-0.99	446.95	12.00	12.00	0.00	
8,075.00	89.34	359.87	7,807.97	471.92	-1.04	471.92	12.00	12.00	0.00	
8,081.52	90.12	359.87	7,808.00	478.45	-1.06	478.45	12.00	12.00	0.00	

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Company:	COG Operating LLC	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site:	Road Runner Federal Com #12H	North Reference:	Grid
Well:	Road Runner Federal Com #12H	Survey/Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Design:	Design #1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	N/S (usft)	E/W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
Start 9700.50 hold at 8081.52 MD										
8,100.00	90.12	359.87	7,807.97	496.92	-1.10	496.92	0.00	0.00	0.00	
8,200.00	90.12	359.87	7,807.76	596.92	-1.32	596.92	0.00	0.00	0.00	
8,300.00	90.12	359.87	7,807.55	696.92	-1.54	696.92	0.00	0.00	0.00	
8,400.00	90.12	359.87	7,807.35	796.92	-1.76	796.92	0.00	0.00	0.00	
8,500.00	90.12	359.87	7,807.14	896.92	-1.98	896.92	0.00	0.00	0.00	
8,600.00	90.12	359.87	7,806.93	996.92	-2.20	996.92	0.00	0.00	0.00	
8,700.00	90.12	359.87	7,806.73	1,096.92	-2.42	1,096.92	0.00	0.00	0.00	
8,800.00	90.12	359.87	7,806.52	1,196.92	-2.65	1,196.92	0.00	0.00	0.00	
8,900.00	90.12	359.87	7,806.32	1,296.92	-2.87	1,296.92	0.00	0.00	0.00	
9,000.00	90.12	359.87	7,806.11	1,396.92	-3.09	1,396.92	0.00	0.00	0.00	
9,100.00	90.12	359.87	7,805.90	1,496.92	-3.31	1,496.92	0.00	0.00	0.00	
9,200.00	90.12	359.87	7,805.70	1,596.92	-3.53	1,596.92	0.00	0.00	0.00	
9,300.00	90.12	359.87	7,805.49	1,696.92	-3.75	1,696.92	0.00	0.00	0.00	
9,400.00	90.12	359.87	7,805.29	1,796.92	-3.97	1,796.92	0.00	0.00	0.00	
9,500.00	90.12	359.87	7,805.08	1,896.92	-4.19	1,896.92	0.00	0.00	0.00	
9,600.00	90.12	359.87	7,804.87	1,996.92	-4.41	1,996.92	0.00	0.00	0.00	
9,700.00	90.12	359.87	7,804.67	2,096.92	-4.64	2,096.92	0.00	0.00	0.00	
9,800.00	90.12	359.87	7,804.46	2,196.92	-4.86	2,196.92	0.00	0.00	0.00	
9,900.00	90.12	359.87	7,804.25	2,296.92	-5.08	2,296.92	0.00	0.00	0.00	
10,000.00	90.12	359.87	7,804.05	2,396.91	-5.30	2,396.92	0.00	0.00	0.00	
10,100.00	90.12	359.87	7,803.84	2,496.91	-5.52	2,496.92	0.00	0.00	0.00	
10,200.00	90.12	359.87	7,803.64	2,596.91	-5.74	2,596.92	0.00	0.00	0.00	
10,300.00	90.12	359.87	7,803.43	2,696.91	-5.96	2,696.92	0.00	0.00	0.00	
10,400.00	90.12	359.87	7,803.22	2,796.91	-6.18	2,796.92	0.00	0.00	0.00	
10,500.00	90.12	359.87	7,803.02	2,896.91	-6.40	2,896.92	0.00	0.00	0.00	
10,600.00	90.12	359.87	7,802.81	2,996.91	-6.62	2,996.92	0.00	0.00	0.00	
10,700.00	90.12	359.87	7,802.60	3,096.91	-6.85	3,096.92	0.00	0.00	0.00	
10,800.00	90.12	359.87	7,802.40	3,196.91	-7.07	3,196.92	0.00	0.00	0.00	
10,900.00	90.12	359.87	7,802.19	3,296.91	-7.29	3,296.92	0.00	0.00	0.00	
11,000.00	90.12	359.87	7,801.99	3,396.91	-7.51	3,396.92	0.00	0.00	0.00	
11,100.00	90.12	359.87	7,801.78	3,496.91	-7.73	3,496.92	0.00	0.00	0.00	
11,200.00	90.12	359.87	7,801.57	3,596.91	-7.95	3,596.92	0.00	0.00	0.00	
11,300.00	90.12	359.87	7,801.37	3,696.91	-8.17	3,696.92	0.00	0.00	0.00	
11,400.00	90.12	359.87	7,801.16	3,796.91	-8.39	3,796.92	0.00	0.00	0.00	
11,500.00	90.12	359.87	7,800.95	3,896.91	-8.61	3,896.92	0.00	0.00	0.00	
11,600.00	90.12	359.87	7,800.75	3,996.91	-8.83	3,996.92	0.00	0.00	0.00	
11,700.00	90.12	359.87	7,800.54	4,096.91	-9.06	4,096.92	0.00	0.00	0.00	
11,800.00	90.12	359.87	7,800.34	4,196.91	-9.28	4,196.92	0.00	0.00	0.00	
11,900.00	90.12	359.87	7,800.13	4,296.91	-9.50	4,296.92	0.00	0.00	0.00	
12,000.00	90.12	359.87	7,799.92	4,396.91	-9.72	4,396.92	0.00	0.00	0.00	
12,100.00	90.12	359.87	7,799.72	4,496.91	-9.94	4,496.92	0.00	0.00	0.00	
12,200.00	90.12	359.87	7,799.51	4,596.90	-10.16	4,596.92	0.00	0.00	0.00	
12,300.00	90.12	359.87	7,799.30	4,696.90	-10.38	4,696.92	0.00	0.00	0.00	
12,400.00	90.12	359.87	7,799.10	4,796.90	-10.60	4,796.92	0.00	0.00	0.00	
12,500.00	90.12	359.87	7,798.89	4,896.90	-10.82	4,896.92	0.00	0.00	0.00	
12,600.00	90.12	359.87	7,798.69	4,996.90	-11.05	4,996.92	0.00	0.00	0.00	
12,700.00	90.12	359.87	7,798.48	5,096.90	-11.27	5,096.92	0.00	0.00	0.00	
12,800.00	90.12	359.87	7,798.27	5,196.90	-11.49	5,196.91	0.00	0.00	0.00	
12,900.00	90.12	359.87	7,798.07	5,296.90	-11.71	5,296.91	0.00	0.00	0.00	
13,000.00	90.12	359.87	7,797.86	5,396.90	-11.93	5,396.91	0.00	0.00	0.00	
13,100.00	90.12	359.87	7,797.66	5,496.90	-12.15	5,496.91	0.00	0.00	0.00	
13,200.00	90.12	359.87	7,797.45	5,596.90	-12.37	5,596.91	0.00	0.00	0.00	
13,300.00	90.12	359.87	7,797.24	5,696.90	-12.59	5,696.91	0.00	0.00	0.00	



TDS
Planning Report



Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Road Runner Federal Com #12H
Well: Road Runner Federal Com #12H
Wellbore: Lateral #1
Design: Design #1

Local Co-ordinate Reference: Well Road Runner Federal Com #12H
TVD Reference: KB @ 3272.70usft (Latshaw 44)
MD Reference: KB @ 3272.70usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
13,400.00	90.12	359.87	7,797.04	5,796.90	-12.81	5,796.91	0.00	0.00	0.00	
13,500.00	90.12	359.87	7,796.83	5,896.90	-13.03	5,896.91	0.00	0.00	0.00	
13,600.00	90.12	359.87	7,796.62	5,996.90	-13.26	5,996.91	0.00	0.00	0.00	
13,700.00	90.12	359.87	7,796.42	6,096.90	-13.48	6,096.91	0.00	0.00	0.00	
13,800.00	90.12	359.87	7,796.21	6,196.90	-13.70	6,196.91	0.00	0.00	0.00	
13,900.00	90.12	359.87	7,796.01	6,296.90	-13.92	6,296.91	0.00	0.00	0.00	
14,000.00	90.12	359.87	7,795.80	6,396.90	-14.14	6,396.91	0.00	0.00	0.00	
14,100.00	90.12	359.87	7,795.59	6,496.90	-14.36	6,496.91	0.00	0.00	0.00	
14,200.00	90.12	359.87	7,795.39	6,596.90	-14.58	6,596.91	0.00	0.00	0.00	
14,300.00	90.12	359.87	7,795.18	6,696.90	-14.80	6,696.91	0.00	0.00	0.00	
14,400.00	90.12	359.87	7,794.97	6,796.89	-15.02	6,796.91	0.00	0.00	0.00	
14,500.00	90.12	359.87	7,794.77	6,896.89	-15.25	6,896.91	0.00	0.00	0.00	
14,600.00	90.12	359.87	7,794.56	6,996.89	-15.47	6,996.91	0.00	0.00	0.00	
14,700.00	90.12	359.87	7,794.36	7,096.89	-15.69	7,096.91	0.00	0.00	0.00	
14,800.00	90.12	359.87	7,794.15	7,196.89	-15.91	7,196.91	0.00	0.00	0.00	
14,900.00	90.12	359.87	7,793.94	7,296.89	-16.13	7,296.91	0.00	0.00	0.00	
15,000.00	90.12	359.87	7,793.74	7,396.89	-16.35	7,396.91	0.00	0.00	0.00	
15,100.00	90.12	359.87	7,793.53	7,496.89	-16.57	7,496.91	0.00	0.00	0.00	
15,200.00	90.12	359.87	7,793.32	7,596.89	-16.79	7,596.91	0.00	0.00	0.00	
15,300.00	90.12	359.87	7,793.12	7,696.89	-17.01	7,696.91	0.00	0.00	0.00	
15,400.00	90.12	359.87	7,792.91	7,796.89	-17.23	7,796.91	0.00	0.00	0.00	
15,500.00	90.12	359.87	7,792.71	7,896.89	-17.46	7,896.91	0.00	0.00	0.00	
15,600.00	90.12	359.87	7,792.50	7,996.89	-17.68	7,996.91	0.00	0.00	0.00	
15,700.00	90.12	359.87	7,792.29	8,096.89	-17.90	8,096.91	0.00	0.00	0.00	
15,800.00	90.12	359.87	7,792.09	8,196.89	-18.12	8,196.91	0.00	0.00	0.00	
15,900.00	90.12	359.87	7,791.88	8,296.89	-18.34	8,296.91	0.00	0.00	0.00	
16,000.00	90.12	359.87	7,791.67	8,396.89	-18.56	8,396.91	0.00	0.00	0.00	
16,100.00	90.12	359.87	7,791.47	8,496.89	-18.78	8,496.91	0.00	0.00	0.00	
16,200.00	90.12	359.87	7,791.26	8,596.89	-19.00	8,596.91	0.00	0.00	0.00	
16,300.00	90.12	359.87	7,791.06	8,696.89	-19.22	8,696.91	0.00	0.00	0.00	
16,400.00	90.12	359.87	7,790.85	8,796.89	-19.45	8,796.91	0.00	0.00	0.00	
16,500.00	90.12	359.87	7,790.64	8,896.89	-19.67	8,896.91	0.00	0.00	0.00	
16,600.00	90.12	359.87	7,790.44	8,996.88	-19.89	8,996.91	0.00	0.00	0.00	
16,700.00	90.12	359.87	7,790.23	9,096.88	-20.11	9,096.91	0.00	0.00	0.00	
16,800.00	90.12	359.87	7,790.03	9,196.88	-20.33	9,196.91	0.00	0.00	0.00	
16,900.00	90.12	359.87	7,789.82	9,296.88	-20.55	9,296.91	0.00	0.00	0.00	
17,000.00	90.12	359.87	7,789.61	9,396.88	-20.77	9,396.91	0.00	0.00	0.00	
17,100.00	90.12	359.87	7,789.41	9,496.88	-20.99	9,496.91	0.00	0.00	0.00	
17,200.00	90.12	359.87	7,789.20	9,596.88	-21.21	9,596.91	0.00	0.00	0.00	
17,300.00	90.12	359.87	7,788.99	9,696.88	-21.43	9,696.91	0.00	0.00	0.00	
17,400.00	90.12	359.87	7,788.79	9,796.88	-21.66	9,796.91	0.00	0.00	0.00	
17,500.00	90.12	359.87	7,788.58	9,896.88	-21.88	9,896.91	0.00	0.00	0.00	
17,600.00	90.12	359.87	7,788.38	9,996.88	-22.10	9,996.90	0.00	0.00	0.00	
17,700.00	90.12	359.87	7,788.17	10,096.88	-22.32	10,096.90	0.00	0.00	0.00	
17,782.02	90.12	359.87	7,788.00	10,178.90	-22.50	10,178.93	0.00	0.00	0.00	

TD at 17782.02

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Company:	COG Operating LLC	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Project:	Eddy County, NM (NAD-27 2015)	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site:	Road Runner Federal Com #12H	North Reference:	Grid
Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Lateral #1		
Design:	Design #1		

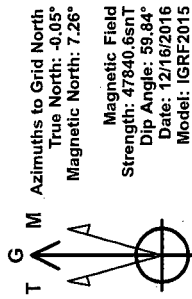
Design Targets										
Target Name	hit/miss target Shape	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
173.80' Radius @ 7794.		0.00	0.00	0.00	7,077.13	81.01	405,006.93	527,772.51	32° 6' 48.415 N	104° 14' 37.077 W
- plan misses target center by 7077.59usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)										
- Circle (radius 173.80)										
190.69' Radius @ 7788.		0.00	0.00	0.00	9,721.91	18.08	407,651.71	527,709.58	32° 7' 14.590 N	104° 14' 37.783 W
- plan misses target center by 7789.03usft at 17341.00usft MD (7788.91 TVD, 9737.88 N, -21.53 E)										
- Circle (radius 190.69)										
KOP (RRFC#12H/L1)		0.00	0.00	7,330.54	0.00	0.00	397,929.80	527,691.50	32° 5' 38.376 N	104° 14' 38.087 W
- plan hits target center										
- Point										
PBHL (RRFC#12H/L1)		-0.12	359.87	7,788.00	10,178.90	-22.50	408,108.70	527,669.00	32° 7' 19.113 N	104° 14' 38.250 W
- plan hits target center										
- Rectangle (sides W100.00 H9,929.00 D0.00)										
EOC (RRFC#12H/L1)		0.00	0.00	7,808.00	478.44	-1.06	398,408.24	527,690.44	32° 5' 43.111 N	104° 14' 38.095 W
- plan hits target center										
- Point										

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,330.54	7,330.54	0.00	0.00	Start DLS 12.00 TFO 359.87
8,081.52	7,808.00	478.45	-1.06	Start 9700.50 hold at 8081.52 MD
17,782.02	7,788.00	10,178.90	-22.50	TD at 17782.02



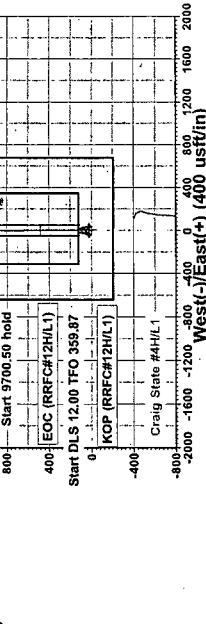
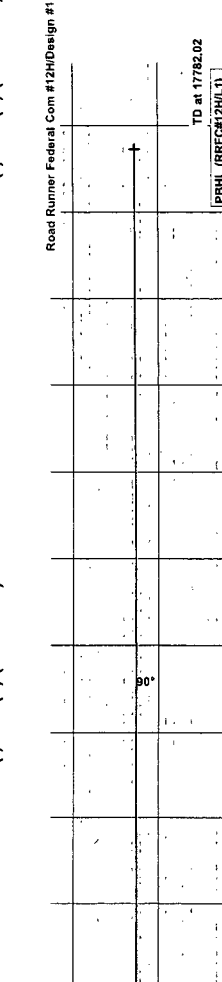
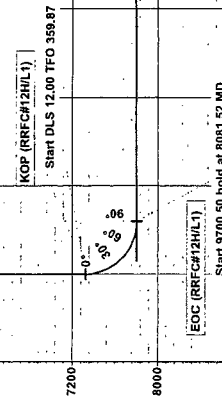
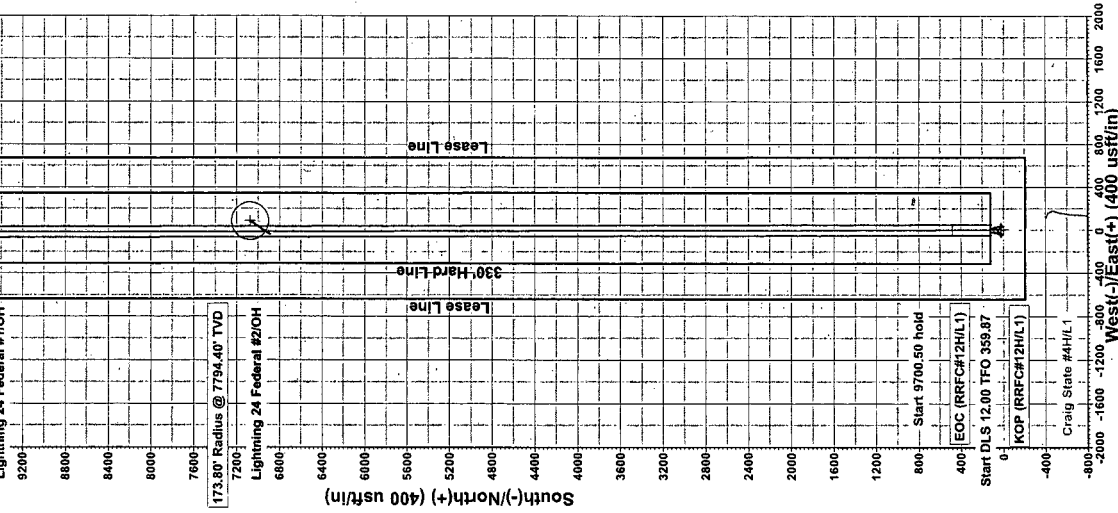
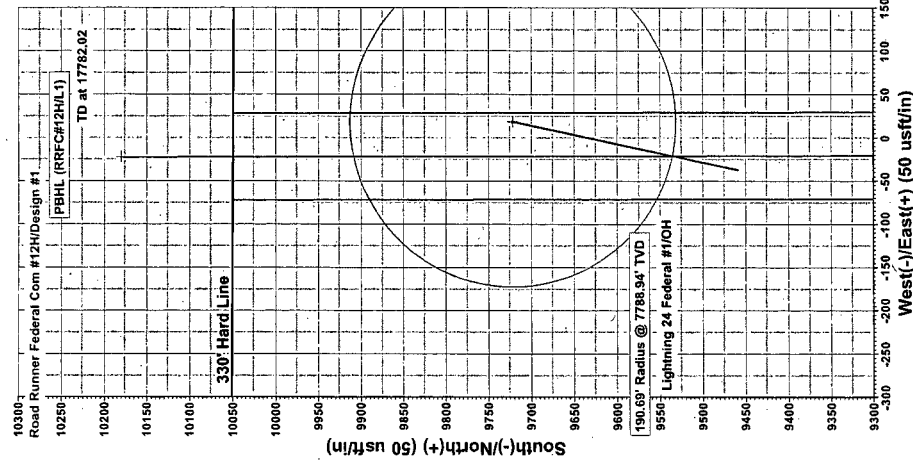
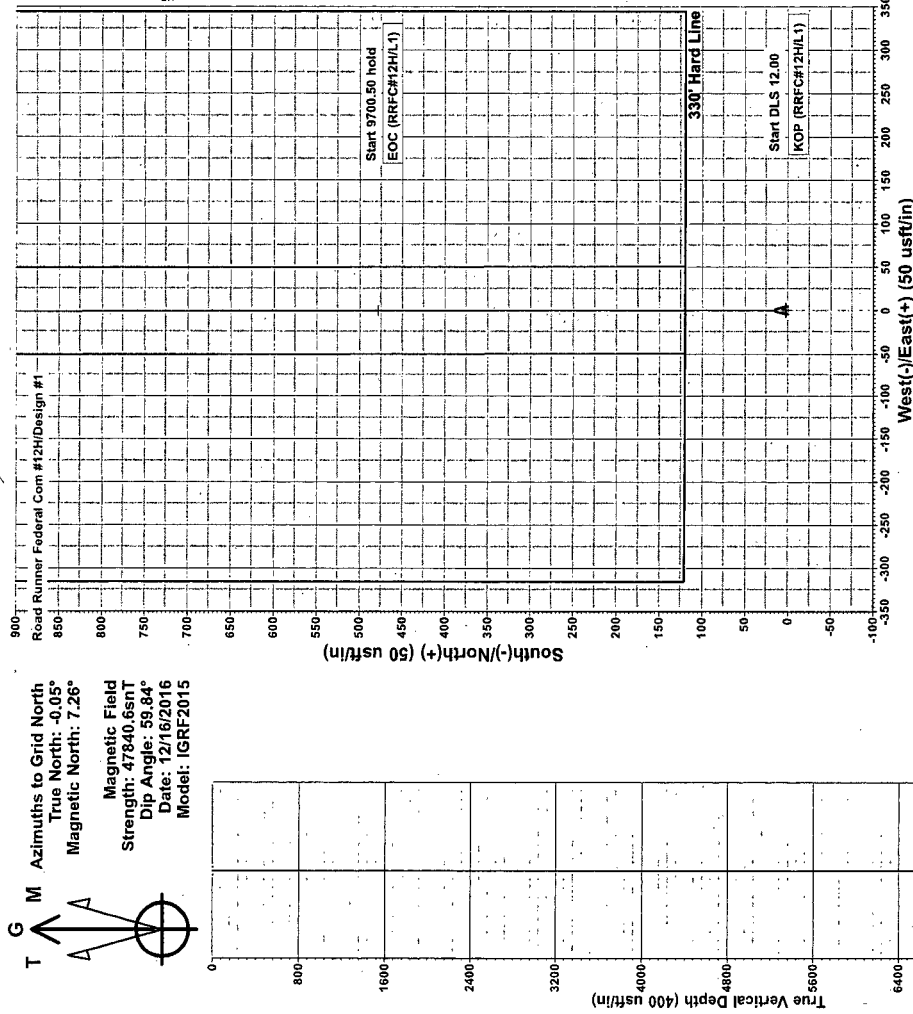
COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Road Runner Federal Com #12H
Well: Road Runner Federal Com #12H
Wellbore: Lateral #1

Plan: Design #1 (Road Runner Federal Com #12H/Lateral #1)



Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dieg	TFace	VSeet	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	7330.54	0.00	0.00	7330.54	0.00	0.00	0.00	0.00	0.00	0.00
3	8081.52	90.12	359.87	7808.00	478.45	-1.06	12.00	359.87	478.45	0.00
4	17782.02	90.12	359.87	7788.00	10178.90	-22.50	0.00	0.00	10178.92	PBHL (RRFC#12H/L1)



Terra Directional Services LLC
3705 South County Road 1210, Midland, TX 79706
Phone: 432-618-1210



Ground Elevation: 3247.70
RKB Elevation: KB @ 3272.70usft (Lalshaw 44)
Northing 397929.80
Easting 527691.50
Latitude 32° 5' 38.376 N
Longitude 104° 14' 38.087 W

PROJECT DETAILS: Eddy County, NM (NAD-27 2015)
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



NM OIL CONSERVATION
ARTESIA DISTRICT

APR 28 2017

RECEIVED

COG Operating LLC

Eddy County, NM (NAD-27 2015)

Road Runner Federal Com #12H

Road Runner Federal Com #12H

Lateral #1

Design #1

Anticollision Report

16 December, 2016





TDS
Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Road Runner Federal Com #12H
Site Error: 0.00 usft
Reference Well: Road Runner Federal Com #12H
Well Error: 0.00 usft
Reference Wellbore: Lateral #1
Reference Design: Design #1

Local Co-ordinate Reference
TVD Reference: KB @ 3272.70usft (Latshaw 44)
MD Reference: KB @ 3272.70usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Reference: Design #1
Filter type: NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method: Stations
Depth Range: Unlimited
Results Limited by: Maximum center-center distance of 9,999.98 usft
Warning Levels Evaluated at: 2.00 Sigma
Error Model: ISCWSA
Scan Method: Closest Approach 3D
Error Surface: Elliptical Conic
Casing Method: Not applied

Survey Tool Program: Date: 12/16/2016
From (usft): 0.00 To (usft): 17,782.02
Survey (Wellbore): Design #1 (Lateral #1)
Tool Name: MWD
Description: MWD - Standard

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Craig State #4H						
SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - B	368.03	370.74	417.91	416.57	310.021	CC
SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - B	1,400.00	1,401.73	420.75	414.92	72.248	ES
SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - B	6,800.00	6,784.00	507.08	478.05	17.467	SF
Eddy County Offset Wells						
Lightning 24 Federal #1 - OH - OH	17,138.36	7,770.29	0.11	-783.06	0.000	Level 1, CC, ES, SF
Lightning 24 Federal #2 - OH - OH	14,535.68	7,755.88	0.19	-606.96	0.000	Level 1, CC, ES, SF

Offset Design: Craig State #4H - SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - BHL: 330' FSL, 1980' FEL, S														Offset Site Error: 0.00 usft
Survey Program: 100-MWD-6721-MWD														Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	2.74	2.74	0.00	0.00	162.73	-400.40	124.50	419.31					
100.00	100.00	104.35	104.35	0.08	0.10	162.77	-400.30	124.12	419.11	418.92	0.19	2,226.408		
200.00	200.00	205.90	205.89	0.31	0.33	162.89	-399.97	123.11	418.50	417.86	0.64	653.380		
300.00	300.00	303.76	303.75	0.53	0.53	163.02	-399.77	122.10	418.00	416.94	1.06	393.315		
368.03	368.03	370.74	370.73	0.69	0.66	163.07	-399.81	121.66	417.91	416.57	1.35	310.021	CC	
400.00	400.00	402.26	402.24	0.76	0.72	163.09	-399.87	121.54	417.93	416.45	1.48	281.938		
500.00	500.00	502.22	502.21	0.98	0.93	163.13	-400.06	121.29	418.04	416.13	1.91	218.318		
600.00	600.00	601.67	601.65	1.21	1.14	163.19	-400.36	120.93	418.23	415.88	2.35	178.083		
700.00	700.00	700.69	700.67	1.43	1.35	163.30	-400.93	120.32	418.60	415.81	2.78	150.371		
800.00	800.00	800.53	800.51	1.66	1.57	163.43	-401.69	119.53	419.10	415.88	3.22	129.987		
900.00	900.00	900.84	900.80	1.88	1.78	163.61	-402.53	118.42	419.59	415.92	3.67	114.440		
1,000.00	1,000.00	1,001.16	1,001.12	2.11	1.99	163.78	-403.29	117.30	420.01	415.91	4.10	102.447		
1,100.00	1,100.00	1,103.71	1,103.66	2.33	2.20	163.90	-403.58	116.47	420.06	415.52	4.53	92.693		
1,135.13	1,135.13	1,137.88	1,137.83	2.41	2.27	163.93	-403.60	116.28	420.02	415.34	4.68	89.723		
1,200.00	1,200.00	1,201.01	1,200.96	2.56	2.40	163.96	-403.79	116.11	420.15	415.20	4.96	84.751		
1,300.00	1,300.00	1,301.60	1,301.55	2.78	2.61	163.95	-404.11	116.24	420.50	415.11	5.39	77.995		
1,400.00	1,400.00	1,401.73	1,401.68	3.01	2.82	163.92	-404.28	116.55	420.75	414.92	5.82	72.248	ES	
1,500.00	1,500.00	1,500.00	1,499.95	3.23	3.02	163.87	-404.76	117.05	421.35	415.10	6.25	67.377		
1,600.00	1,600.00	1,595.60	1,595.53	3.46	3.22	163.72	-405.67	118.49	422.68	416.00	6.68	63.288		
1,700.00	1,700.00	1,694.44	1,694.34	3.68	3.43	163.46	-406.87	120.86	424.52	417.41	7.11	59.693		
1,800.00	1,800.00	1,800.00	1,799.87	3.91	3.65	163.20	-407.69	123.09	425.87	418.32	7.56	56.352		

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:
Craig State #4H - SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - BHL: 330' FSL, 1980' FEL, S													0.00 usft
Survey Program: 100-MWD-6721-MWD													Offset Well Error:
Reference:													0.00 usft
Measured	Vertical	Measured	Vertical	Semi-Major Axis		Distance		Between		Minimum	Separation	Warning	
Depth	Depth	Depth	Depth	Reference	Offset	Highside	Offset Wellbore Centre	Between	Between	Separation	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	Tooface	N-S	Centres	Ellipses	(usft)			
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)			
1,900.00	1,900.00	1,899.59	1,899.45	4.13	3.86	163.04	-408.01	124.45	426.58	418.59	7.99	53.400	
2,000.00	2,000.00	1,998.78	1,998.63	4.35	4.07	162.93	-408.59	125.45	427.43	419.01	8.42	50.752	
2,100.00	2,100.00	2,098.46	2,098.30	4.58	4.28	162.81	-409.26	126.63	428.42	419.57	8.86	48.368	
2,200.00	2,200.00	2,200.00	2,199.83	4.80	4.49	162.67	-409.65	127.81	429.14	419.84	9.29	46.174	
2,300.00	2,300.00	2,298.26	2,298.09	5.03	4.70	162.56	-410.08	128.86	429.87	420.15	9.72	44.206	
2,400.00	2,400.00	2,400.00	2,399.82	5.25	4.91	162.44	-410.44	129.90	430.52	420.36	10.16	42.365	
2,500.00	2,500.00	2,497.46	2,497.27	5.48	5.12	162.28	-410.77	131.23	431.26	420.67	10.59	40.721	
2,600.00	2,600.00	2,599.42	2,599.21	5.70	5.33	162.05	-411.25	133.25	432.31	421.28	11.03	39.193	
2,700.00	2,700.00	2,695.35	2,695.10	5.93	5.53	161.76	-411.74	135.68	433.59	422.13	11.46	37.846	
2,800.00	2,800.00	2,795.97	2,795.67	6.15	5.75	161.39	-412.49	138.88	435.29	423.40	11.90	36.594	
2,900.00	2,900.00	2,892.27	2,891.92	6.38	5.95	161.07	-413.55	141.79	437.31	424.99	12.32	35.492	
3,000.00	3,000.00	2,993.89	2,993.49	6.60	6.17	160.80	-415.10	144.56	439.64	426.88	12.76	34.453	
3,100.00	3,100.00	3,094.92	3,094.48	6.83	6.38	160.54	-416.31	147.12	441.62	428.42	13.20	33.463	
3,200.00	3,200.00	3,193.93	3,193.46	7.05	6.59	160.32	-417.57	149.35	443.58	429.95	13.63	32.545	
3,300.00	3,300.00	3,292.90	3,292.40	7.28	6.80	160.15	-419.18	151.32	445.78	431.71	14.06	31.699	
3,400.00	3,400.00	3,392.93	3,392.39	7.50	7.01	160.05	-421.10	152.82	448.09	433.59	14.50	30.909	
3,500.00	3,500.00	3,493.85	3,493.28	7.73	7.23	159.93	-422.84	154.53	450.29	435.36	14.94	30.150	
3,600.00	3,600.00	3,595.13	3,594.54	7.95	7.44	159.74	-424.18	156.60	452.24	436.87	15.38	29.414	
3,700.00	3,700.00	3,694.81	3,694.19	8.18	7.66	159.54	-425.34	158.72	454.07	438.26	15.81	28.722	
3,800.00	3,800.00	3,794.90	3,794.26	8.40	7.87	159.41	-426.75	160.29	455.94	439.70	16.24	28.071	
3,900.00	3,900.00	3,895.95	3,895.28	8.63	8.08	159.38	-428.29	161.19	457.68	441.00	16.68	27.443	
4,000.00	4,000.00	3,997.59	3,996.92	8.85	8.29	159.32	-429.49	162.16	459.12	442.01	17.12	26.824	
4,100.00	4,100.00	4,097.31	4,096.62	9.07	8.50	159.29	-430.61	162.83	460.41	442.86	17.55	26.235	
4,200.00	4,200.00	4,194.53	4,193.83	9.30	8.70	159.32	-432.16	163.17	462.02	444.04	17.98	25.702	
4,300.00	4,300.00	4,296.04	4,295.33	9.52	8.92	159.30	-433.79	163.95	463.80	445.38	18.42	25.186	
4,400.00	4,400.00	4,394.29	4,393.56	9.75	9.13	159.26	-435.29	164.87	465.56	446.72	18.85	24.704	
4,500.00	4,500.00	4,496.52	4,495.78	9.97	9.34	159.19	-436.79	165.98	467.31	448.02	19.29	24.230	
4,600.00	4,600.00	4,596.37	4,595.61	10.20	9.55	159.14	-438.01	166.93	468.80	449.08	19.72	23.773	
4,700.00	4,700.00	4,697.05	4,696.28	10.42	9.76	159.15	-439.40	167.36	470.24	450.08	20.15	23.332	
4,800.00	4,800.00	4,796.45	4,795.67	10.65	9.97	159.15	-440.74	167.83	471.66	451.08	20.59	22.911	
4,900.00	4,900.00	4,896.27	4,895.48	10.87	10.18	159.18	-442.22	168.17	473.17	452.15	21.02	22.510	
5,000.00	5,000.00	4,995.64	4,994.84	11.10	10.39	159.24	-443.88	168.25	474.76	453.31	21.45	22.130	
5,100.00	5,100.00	5,096.36	5,095.54	11.32	10.61	159.26	-445.43	168.65	476.35	454.46	21.89	21.761	
5,200.00	5,200.00	5,196.93	5,196.10	11.55	10.82	159.28	-446.85	169.01	477.79	455.46	22.33	21.401	
5,300.00	5,300.00	5,296.82	5,295.99	11.77	11.03	159.31	-448.22	169.31	479.18	456.42	22.76	21.054	
5,400.00	5,400.00	5,397.33	5,396.48	12.00	11.24	159.32	-449.53	169.68	480.53	457.33	23.20	20.716	
5,500.00	5,500.00	5,498.37	5,497.51	12.22	11.45	159.31	-450.63	170.15	481.71	458.08	23.63	20.382	
5,600.00	5,600.00	5,598.51	5,597.65	12.45	11.67	159.31	-451.61	170.56	482.77	458.70	24.07	20.058	
5,700.00	5,700.00	5,697.85	5,696.98	12.67	11.87	159.33	-452.69	170.82	483.88	459.39	24.50	19.751	
5,800.00	5,800.00	5,801.02	5,800.15	12.90	12.09	159.36	-453.62	170.88	484.75	459.81	24.94	19.436	
5,900.00	5,900.00	5,903.03	5,902.16	13.12	12.30	159.39	-454.03	170.72	485.06	459.68	25.38	19.113	
5,996.43	5,996.43	6,000.00	5,999.13	13.34	12.50	159.42	-454.12	170.49	485.07	459.27	25.80	18.801	
6,000.00	6,000.00	6,000.00	5,999.13	13.35	12.50	159.42	-454.12	170.49	485.09	459.28	25.81	18.796	
6,100.00	6,100.00	6,086.44	6,085.55	13.57	12.69	159.40	-455.44	171.22	486.86	460.66	26.20	18.580	
6,200.00	6,200.00	6,177.15	6,176.16	13.80	12.88	159.31	-459.09	173.38	491.45	464.85	26.60	18.476	
6,300.00	6,300.00	6,282.63	6,281.50	14.02	13.11	159.24	-463.96	175.84	496.62	469.56	27.06	18.354	
6,400.00	6,400.00	6,385.54	6,384.33	14.24	13.33	159.24	-467.68	177.26	500.48	472.97	27.50	18.196	
6,500.00	6,500.00	6,490.29	6,489.03	14.47	13.56	159.28	-470.96	178.16	503.71	475.76	27.96	18.018	
6,600.00	6,600.00	6,596.76	6,595.47	14.69	13.78	159.28	-473.04	178.93	505.80	477.39	28.41	17.802	
6,700.00	6,700.00	6,703.62	6,702.33	14.92	13.95	159.34	-473.89	178.71	506.46	477.66	28.80	17.585	
6,753.79	6,753.79	6,757.53	6,756.23	15.04	13.97	159.43	-474.09	177.95	506.39	477.45	28.94	17.497	
6,800.00	6,800.00	6,784.00	6,782.69	15.14	13.97	159.52	-474.65	177.32	507.08	478.05	29.03	17.467 SF	

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



TDS
Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Road Runner Federal Com #12H
Site Error: 0.00 usft
Reference Well: Road Runner Federal Com #12H
Well Error: 0.00 usft
Reference Wellbore: Lateral #1
Reference Design: Design #1

Local Co-ordinate Reference: Well Road Runner Federal Com #12H
TVD Reference: KB @ 3272.70usft (Latshaw 44)
MDI Reference: KB @ 3272.70usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design: Craig State #4H - SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - BHL: 330' FSL, 1980' FEL, S													Offset Site Error: 0.00 usft
Survey Program: 100-MWD, 8721-MWD													Offset Well Error: 0.00 usft
Reference													
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	Offset Wellbore Centre E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
6,900.00	6,900.00	6,848.00	6,846.36	15.37	13.98	160.00	-480.20	174.79	514.12	484.99	29.13	17.649	
7,000.00	7,000.00	6,901.47	6,898.80	15.59	14.00	160.69	-490.12	171.69	529.61	500.60	29.01	18.257	
7,100.00	7,100.00	6,956.34	6,951.42	15.82	14.02	161.65	-505.00	167.47	553.14	524.40	28.74	19.246	
7,200.00	7,200.00	7,008.00	6,999.52	16.04	14.06	162.73	-523.17	162.65	584.34	556.02	28.32	20.635	
7,300.00	7,300.00	7,052.23	7,039.30	16.27	14.11	163.72	-542.00	158.31	623.07	595.37	27.70	22.494	
7,330.54	7,330.54	7,072.00	7,056.61	16.34	14.14	164.17	-551.35	156.36	636.36	608.75	27.62	23.043	
7,350.00	7,349.99	7,072.00	7,056.61	16.38	14.14	163.96	-551.35	156.36	645.40	618.06	27.33	23.611	
7,375.00	7,374.94	7,083.48	7,066.50	16.44	14.16	163.74	-557.04	155.21	658.40	631.20	27.20	24.205	
7,400.00	7,399.76	7,092.60	7,074.29	16.49	14.17	163.40	-561.71	154.29	672.84	645.80	27.04	24.886	
7,425.00	7,424.39	7,104.00	7,083.90	16.55	14.19	163.06	-567.72	153.13	688.63	661.69	26.93	25.568	
7,450.00	7,448.76	7,104.00	7,083.90	16.61	14.19	162.23	-567.72	153.13	705.67	679.04	26.63	26.503	
7,475.00	7,472.81	7,116.26	7,094.10	16.67	14.21	161.71	-574.41	151.89	723.80	697.22	26.58	27.230	
7,500.00	7,496.46	7,122.86	7,099.53	16.72	14.23	160.83	-578.10	151.23	743.03	716.58	26.45	28.096	
7,525.00	7,519.67	7,136.00	7,110.22	16.78	14.25	160.10	-585.63	149.94	763.29	736.83	26.46	28.846	
7,550.00	7,542.35	7,136.00	7,110.22	16.83	14.25	158.46	-585.63	149.94	784.25	758.01	26.24	29.882	
7,575.00	7,564.46	7,136.00	7,110.22	16.88	14.25	156.41	-585.63	149.94	806.06	780.01	26.05	30.937	
7,600.00	7,585.92	7,136.00	7,110.22	16.93	14.25	153.78	-585.63	149.94	828.59	802.70	25.89	32.003	
7,625.00	7,606.69	7,147.11	7,119.14	16.99	14.28	151.48	-592.17	148.90	851.56	825.60	25.96	32.803	
7,650.00	7,626.69	7,150.20	7,121.60	17.05	14.29	147.58	-594.02	148.63	875.08	849.18	25.90	33.785	
7,675.00	7,645.89	7,152.65	7,123.56	17.12	14.29	142.24	-595.49	148.42	899.00	873.14	25.85	34.772	
7,700.00	7,664.22	7,154.50	7,125.02	17.20	14.30	134.72	-596.60	148.27	923.23	897.41	25.82	35.759	
7,725.00	7,681.63	7,155.76	7,126.02	17.27	14.30	123.93	-597.36	148.17	947.70	921.91	25.79	36.742	
7,750.00	7,698.09	7,156.44	7,126.56	17.36	14.30	108.80	-597.77	148.11	972.33	946.55	25.78	37.717	
7,775.00	7,713.54	7,156.57	7,126.67	17.45	14.30	89.66	-597.86	148.10	997.04	971.26	25.78	38.681	
7,800.00	7,727.93	7,156.18	7,126.35	17.55	14.30	69.97	-597.62	148.13	1,021.76	995.98	25.78	39.629	
7,825.00	7,741.24	7,155.28	7,125.64	17.66	14.30	53.72	-597.07	148.21	1,046.43	1,020.63	25.80	40.559	
7,850.00	7,753.42	7,153.90	7,124.55	17.78	14.29	41.94	-596.24	148.32	1,070.98	1,045.15	25.83	41.468	
7,875.00	7,764.44	7,152.06	7,123.08	17.90	14.29	33.69	-595.13	148.47	1,095.34	1,069.48	25.86	42.352	
7,900.00	7,774.28	7,149.78	7,121.27	18.03	14.28	27.85	-593.76	148.67	1,119.47	1,093.56	25.91	43.210	
7,925.00	7,782.89	7,147.08	7,119.12	18.17	14.28	23.60	-592.16	148.90	1,143.30	1,117.34	25.96	44.039	
7,950.00	7,790.27	7,136.00	7,110.22	18.32	14.25	20.15	-585.63	149.94	1,166.85	1,140.94	25.91	45.035	
7,975.00	7,796.39	7,136.00	7,110.22	18.48	14.25	17.84	-585.63	149.94	1,189.88	1,163.85	26.03	45.710	
8,000.00	7,801.23	7,136.00	7,110.22	18.65	14.25	15.99	-585.63	149.94	1,212.49	1,186.33	26.16	46.344	
8,025.00	7,804.78	7,136.00	7,110.22	18.83	14.25	14.48	-585.63	149.94	1,234.65	1,208.34	26.30	46.938	
8,050.00	7,807.03	7,136.00	7,110.22	19.01	14.25	13.23	-585.63	149.94	1,256.30	1,229.85	26.45	47.491	
8,075.00	7,807.97	7,124.79	7,101.11	19.20	14.23	12.12	-579.19	151.04	1,277.28	1,250.81	26.47	48.249	
8,081.52	7,808.00	7,123.65	7,100.18	19.25	14.23	11.88	-578.55	151.15	1,282.67	1,256.17	26.50	48.405	
8,100.00	7,807.97	7,120.44	7,097.55	19.40	14.22	11.86	-576.74	151.47	1,297.91	1,271.32	26.59	48.818	
8,200.00	7,807.76	7,104.00	7,083.90	20.27	14.19	11.77	-567.72	153.13	1,381.36	1,354.32	27.04	51.086	
8,300.00	7,807.55	7,089.06	7,071.27	21.27	14.16	11.69	-559.88	154.65	1,466.30	1,438.85	27.45	53.415	
8,400.00	7,807.35	7,072.00	7,056.61	22.37	14.14	11.59	-551.35	156.36	1,552.58	1,524.79	27.79	55.864	
8,500.00	7,807.14	7,072.00	7,056.61	23.56	14.14	11.59	-551.35	156.36	1,640.10	1,611.87	28.23	58.099	
8,600.00	7,806.93	7,040.00	7,028.43	24.83	14.10	11.41	-536.51	159.52	1,728.54	1,700.15	28.38	60.899	
8,700.00	7,806.73	7,040.00	7,028.43	26.17	14.10	11.41	-536.51	159.52	1,817.77	1,789.03	28.74	63.256	
8,800.00	7,806.52	7,027.70	7,017.40	27.56	14.08	11.34	-531.21	160.72	1,907.90	1,878.93	28.98	65.841	
8,900.00	7,806.32	7,008.00	6,999.52	29.00	14.06	11.23	-523.17	162.65	1,998.86	1,969.70	29.16	68.556	
9,000.00	7,806.11	7,008.00	6,999.52	30.49	14.06	11.23	-523.17	162.65	2,090.26	2,060.84	29.42	71.060	
9,100.00	7,805.90	7,008.00	6,999.52	32.01	14.06	11.23	-523.17	162.65	2,182.42	2,152.77	29.65	73.615	
9,200.00	7,805.70	6,992.32	6,985.10	33.56	14.05	11.14	-517.21	164.16	2,274.97	2,245.17	29.80	76.352	
9,300.00	7,805.49	6,976.00	6,969.91	35.13	14.04	11.05	-511.42	165.70	2,368.16	2,338.23	29.93	79.111	
9,400.00	7,805.29	6,976.00	6,969.91	36.73	14.04	11.05	-511.42	165.70	2,461.62	2,431.51	30.12	81.741	
9,500.00	7,805.08	6,976.00	6,969.91	38.35	14.04	11.05	-511.42	165.70	2,555.58	2,525.30	30.28	84.400	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latslaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latslaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Craig State #4H - SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - BHL: 330' FSL, 1980' FEL, S												Offset Site Error:	0.00 usft
Survey Program: 100-MWD 6721-MWD												Offset Well Error:	0.00 usft
Reference													
Reference				Offset				Semi Major Axis		Distance			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,600.00	7,804.87	6,976.00	6,969.91	39.99	14.04	11.05	-511.42	165.70	2,649.98	2,619.55	30.43	87.085	
9,700.00	7,804.67	6,958.68	6,953.63	41.65	14.03	10.95	-505.74	167.27	2,744.49	2,713.96	30.53	89.890	
9,800.00	7,804.46	6,944.00	6,939.71	43.32	14.02	10.86	-501.26	168.52	2,839.49	2,808.85	30.64	92.684	
9,900.00	7,804.25	6,944.00	6,939.71	45.00	14.02	10.86	-501.26	168.52	2,934.63	2,903.87	30.76	95.399	
10,000.00	7,804.05	6,944.00	6,939.71	46.69	14.02	10.86	-501.26	168.52	3,030.08	2,999.20	30.88	98.129	
10,100.00	7,803.84	6,944.00	6,939.71	48.39	14.02	10.86	-501.26	168.52	3,125.82	3,094.83	30.99	100.873	
10,200.00	7,803.64	6,944.00	6,939.71	50.10	14.02	10.86	-501.26	168.52	3,221.81	3,190.72	31.09	103.628	
10,300.00	7,803.43	6,927.55	6,923.98	51.82	14.01	10.75	-496.62	169.83	3,317.80	3,286.63	31.17	106.437	
10,400.00	7,803.22	6,912.00	6,909.00	53.55	14.00	10.65	-492.62	170.97	3,414.22	3,382.96	31.25	109.245	
10,500.00	7,803.02	6,912.00	6,909.00	55.28	14.00	10.65	-492.62	170.97	3,510.63	3,479.28	31.34	112.004	
10,600.00	7,802.81	6,912.00	6,909.00	57.02	14.00	10.65	-492.62	170.97	3,607.23	3,575.80	31.43	114.769	
10,700.00	7,802.60	6,912.00	6,909.00	58.77	14.00	10.65	-492.62	170.97	3,704.01	3,672.50	31.51	117.540	
10,800.00	7,802.40	6,912.00	6,909.00	60.52	14.00	10.65	-492.62	170.97	3,800.96	3,769.37	31.59	120.315	
10,900.00	7,802.19	6,912.00	6,909.00	62.27	14.00	10.65	-492.62	170.97	3,898.07	3,866.40	31.67	123.093	
11,000.00	7,801.99	6,912.00	6,909.00	64.03	14.00	10.65	-492.62	170.97	3,995.32	3,963.58	31.74	125.874	
11,100.00	7,801.78	6,912.00	6,909.00	65.79	14.00	10.65	-492.62	170.97	4,092.70	4,060.88	31.81	128.656	
11,200.00	7,801.57	6,895.59	6,893.07	67.56	13.99	10.53	-488.80	172.07	4,189.95	4,158.07	31.88	131.424	
11,300.00	7,801.37	6,880.00	6,877.86	69.33	13.99	10.42	-485.56	173.05	4,287.63	4,255.68	31.95	134.191	
11,400.00	7,801.16	6,880.00	6,877.86	71.10	13.99	10.42	-485.56	173.05	4,385.20	4,353.18	32.02	136.957	
11,500.00	7,800.95	6,880.00	6,877.86	72.87	13.99	10.42	-485.56	173.05	4,482.87	4,450.79	32.08	139.724	
11,600.00	7,800.75	6,880.00	6,877.86	74.65	13.99	10.42	-485.56	173.05	4,580.65	4,548.50	32.15	142.489	
11,700.00	7,800.54	6,880.00	6,877.86	76.43	13.99	10.42	-485.56	173.05	4,678.52	4,646.31	32.21	145.252	
11,800.00	7,800.34	6,880.00	6,877.86	78.22	13.99	10.42	-485.56	173.05	4,776.47	4,744.20	32.27	148.013	
11,900.00	7,800.13	6,880.00	6,877.86	80.00	13.99	10.42	-485.56	173.05	4,874.51	4,842.18	32.33	150.771	
12,000.00	7,799.92	6,880.00	6,877.86	81.79	13.99	10.42	-485.56	173.05	4,972.63	4,940.24	32.39	153.526	
12,100.00	7,799.72	6,880.00	6,877.86	83.57	13.99	10.42	-485.56	173.05	5,070.82	5,038.38	32.45	156.278	
12,200.00	7,799.51	6,880.00	6,877.86	85.36	13.99	10.42	-485.56	173.05	5,169.09	5,136.58	32.50	159.025	
12,300.00	7,799.30	6,880.00	6,877.86	87.16	13.99	10.42	-485.56	173.05	5,267.41	5,234.85	32.56	161.768	
12,400.00	7,799.10	6,880.00	6,877.86	88.95	13.99	10.42	-485.56	173.05	5,365.80	5,333.18	32.62	164.507	
12,500.00	7,798.89	6,880.00	6,877.86	90.74	13.99	10.42	-485.56	173.05	5,464.25	5,431.58	32.67	167.240	
12,600.00	7,798.69	6,880.00	6,877.86	92.54	13.99	10.42	-485.56	173.05	5,562.75	5,530.02	32.73	169.968	
12,700.00	7,798.48	6,863.93	6,862.08	94.34	13.98	10.31	-482.64	173.98	5,661.06	5,628.26	32.80	172.602	
12,800.00	7,798.27	6,848.00	6,846.36	96.14	13.98	10.19	-480.20	174.79	5,759.81	5,726.94	32.87	175.234	
12,900.00	7,798.07	6,848.00	6,846.36	97.94	13.98	10.19	-480.20	174.79	5,858.37	5,825.45	32.92	177.934	
13,000.00	7,797.86	6,848.00	6,846.36	99.74	13.98	10.19	-480.20	174.79	5,956.98	5,924.00	32.98	180.627	
13,100.00	7,797.66	6,848.00	6,846.36	101.54	13.98	10.19	-480.20	174.79	6,055.64	6,022.60	33.03	183.314	
13,200.00	7,797.45	6,848.00	6,846.36	103.34	13.98	10.19	-480.20	174.79	6,154.34	6,121.25	33.09	185.995	
13,300.00	7,797.24	6,848.00	6,846.36	105.15	13.98	10.19	-480.20	174.79	6,253.08	6,219.93	33.14	188.669	
13,400.00	7,797.04	6,848.00	6,846.36	106.95	13.98	10.19	-480.20	174.79	6,351.85	6,318.66	33.20	191.335	
13,500.00	7,796.83	6,848.00	6,846.36	108.76	13.98	10.19	-480.20	174.79	6,450.67	6,417.42	33.25	193.995	
13,600.00	7,796.62	6,848.00	6,846.36	110.56	13.98	10.19	-480.20	174.79	6,549.52	6,516.22	33.31	196.646	
13,700.00	7,796.42	6,848.00	6,846.36	112.37	13.98	10.19	-480.20	174.79	6,648.41	6,615.05	33.36	199.291	
13,800.00	7,796.21	6,848.00	6,846.36	114.18	13.98	10.19	-480.20	174.79	6,747.33	6,713.92	33.41	201.927	
13,900.00	7,796.01	6,848.00	6,846.36	115.98	13.98	10.19	-480.20	174.79	6,846.28	6,812.81	33.47	204.555	
14,000.00	7,795.80	6,848.00	6,846.36	117.79	13.98	10.19	-480.20	174.79	6,945.26	6,911.74	33.52	207.176	
14,100.00	7,795.59	6,848.00	6,846.36	119.60	13.98	10.19	-480.20	174.79	7,044.27	7,010.70	33.58	209.788	
14,200.00	7,795.39	6,848.00	6,846.36	121.41	13.98	10.19	-480.20	174.79	7,143.31	7,109.68	33.63	212.391	
14,300.00	7,795.18	6,848.00	6,846.36	123.22	13.98	10.19	-480.20	174.79	7,242.37	7,208.69	33.69	214.986	
14,400.00	7,794.97	6,848.00	6,846.36	125.03	13.98	10.19	-480.20	174.79	7,341.46	7,307.72	33.74	217.572	
14,500.00	7,794.77	6,848.00	6,846.36	126.85	13.98	10.19	-480.20	174.79	7,440.58	7,406.78	33.80	220.150	
14,600.00	7,794.56	6,848.00	6,846.36	128.66	13.98	10.19	-480.20	174.79	7,539.71	7,505.86	33.85	222.718	
14,700.00	7,794.36	6,848.00	6,846.36	130.47	13.98	10.19	-480.20	174.79	7,638.87	7,604.97	33.91	225.278	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Craig State #4H - SL: 190' FNL, 1870' FEL, Sec 36, T25S, R26E, Unit B - BHL: 330' FSL, 1980' FEL, S													Offset Site Error:	0.00 usft
Survey Program: 100-MWD, 6721-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi-Major Axis		Distance		Minimum		Separation		Warning		
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore	Between	Between	Minimum	Separation	Factor		
Depth	Depth	Depth	Depth	(usft)	(usft)	(ft)	N-S	Centres	Ellipses	(usft)	(usft)			
(usft)	(usft)	(usft)	(usft)				(usft)	(usft)	(usft)	(usft)	(usft)			
14,800.00	7,794.15	6,848.00	6,846.36	132.29	13.98	10.19	-480.20	174.79	7,738.06	7,704.09	33.96	227.828		
14,900.00	7,793.94	6,848.00	6,846.36	134.10	13.98	10.19	-480.20	174.79	7,837.26	7,803.24	34.02	230.369		
15,000.00	7,793.74	6,848.00	6,846.36	135.91	13.98	10.19	-480.20	174.79	7,936.48	7,902.40	34.08	232.901		
15,100.00	7,793.53	6,848.00	6,846.36	137.73	13.98	10.19	-480.20	174.79	8,035.72	8,001.59	34.13	235.423		
15,200.00	7,793.32	6,848.00	6,846.36	139.54	13.98	10.19	-480.20	174.79	8,134.98	8,100.79	34.19	237.935		
15,300.00	7,793.12	6,848.00	6,846.36	141.36	13.98	10.19	-480.20	174.79	8,234.26	8,200.01	34.25	240.438		
15,400.00	7,792.91	6,848.00	6,846.36	143.17	13.98	10.19	-480.20	174.79	8,333.55	8,299.25	34.30	242.932		
15,500.00	7,792.71	6,848.00	6,846.36	144.99	13.98	10.19	-480.20	174.79	8,432.87	8,398.50	34.36	245.415		
15,600.00	7,792.50	6,832.43	6,830.94	146.81	13.97	10.08	-478.22	175.51	8,531.98	8,497.53	34.44	247.712		
15,700.00	7,792.29	6,831.68	6,830.19	148.62	13.97	10.07	-478.14	175.55	8,631.30	8,596.80	34.50	250.164		
15,800.00	7,792.09	6,816.00	6,814.60	150.44	13.97	9.95	-476.57	176.22	8,730.84	8,696.25	34.59	252.442		
15,900.00	7,791.88	6,816.00	6,814.60	152.26	13.97	9.95	-476.57	176.22	8,830.17	8,795.52	34.64	254.880		
16,000.00	7,791.67	6,816.00	6,814.60	154.07	13.97	9.95	-476.57	176.22	8,929.51	8,894.81	34.70	257.308		
16,100.00	7,791.47	6,816.00	6,814.60	155.89	13.97	9.95	-476.57	176.22	9,028.88	8,994.11	34.76	259.726		
16,200.00	7,791.26	6,816.00	6,814.60	157.71	13.97	9.95	-476.57	176.22	9,128.25	9,093.43	34.82	262.134		
16,300.00	7,791.06	6,816.00	6,814.60	159.53	13.97	9.95	-476.57	176.22	9,227.64	9,192.76	34.88	264.532		
16,400.00	7,790.85	6,816.00	6,814.60	161.35	13.97	9.95	-476.57	176.22	9,327.04	9,292.10	34.94	266.919		
16,500.00	7,790.64	6,816.00	6,814.60	163.17	13.97	9.95	-476.57	176.22	9,426.46	9,391.45	35.00	269.297		
16,600.00	7,790.44	6,816.00	6,814.60	164.98	13.97	9.95	-476.57	176.22	9,525.88	9,490.82	35.06	271.664		
16,700.00	7,790.23	6,816.00	6,814.60	166.80	13.97	9.95	-476.57	176.22	9,625.32	9,590.19	35.13	274.021		
16,800.00	7,790.03	6,816.00	6,814.60	168.62	13.97	9.95	-476.57	176.22	9,724.77	9,689.58	35.19	276.367		
16,900.00	7,789.82	6,816.00	6,814.60	170.44	13.97	9.95	-476.57	176.22	9,824.23	9,788.98	35.25	278.703		
17,000.00	7,789.61	6,816.00	6,814.60	172.26	13.97	9.95	-476.57	176.22	9,923.70	9,888.39	35.31	281.029		

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



TDS
Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Road Runner Federal Com #12H
Site Error: 0.00 usft
Reference Well: Road Runner Federal Com #12H
Well Error: 0.00 usft
Reference Wellbore: Lateral #1
Reference Design: Design #1

Local Co-ordinate Reference: Well Road Runner Federal Com #12H
TVD Reference: KB @ 3272.70usft (Latshaw 44)
MD Reference: KB @ 3272.70usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design Eddy County Offset Wells - Lightning 24 Federal #1 - OH - OH												Offset Site Error: 0.00 usft	
Survey Program 203-INC												Offset Well Error: 0.00 usft	
Reference	Offset	Semi-Major Axis	Distance										
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	0.11	9,721.91	18.08	9,721.95				
100.00	100.00	78.30	78.30	0.08	1.04	0.11	9,721.91	18.08	9,721.92	9,720.80	1.13	8,627.426	
200.00	200.00	178.30	178.30	0.31	2.37	0.11	9,721.91	18.08	9,721.92	9,719.24	2.68	3,623.680	
300.00	300.00	369.89	369.89	0.53	7.46	0.11	9,721.12	17.91	9,721.57	9,714.46	7.10	1,368.650	
400.00	400.00	539.26	539.24	0.76	15.85	0.10	9,718.85	17.43	9,720.20	9,708.80	11.40	852.935	
500.00	500.00	689.16	689.11	0.98	25.04	0.10	9,715.98	16.83	9,718.28	9,702.99	15.29	635.594	
600.00	600.00	825.56	825.47	1.21	33.74	0.10	9,712.72	16.14	9,715.87	9,697.05	18.83	516.115	
700.00	700.00	917.83	917.71	1.43	40.77	0.09	9,710.41	15.66	9,713.37	9,692.18	21.19	458.397	
800.00	800.00	1,010.10	1,009.95	1.66	47.79	0.09	9,708.17	15.19	9,710.94	9,687.39	23.56	412.266	
900.00	900.00	1,102.37	1,102.19	1.88	54.82	0.09	9,706.00	14.73	9,708.60	9,682.68	25.92	374.552	
1,000.00	1,000.00	1,194.64	1,194.44	2.11	61.86	0.08	9,703.91	14.29	9,706.33	9,678.04	28.29	343.144	
1,100.00	1,100.00	1,301.00	1,300.78	2.33	69.96	0.08	9,701.59	13.81	9,704.16	9,673.18	30.98	313.253	
1,200.00	1,200.00	1,505.05	1,504.74	2.56	93.77	0.07	9,695.98	12.63	9,701.49	9,664.35	37.13	261.255	
1,300.00	1,300.00	1,745.61	1,745.09	2.78	121.85	0.06	9,686.15	10.56	9,697.40	9,653.05	44.34	218.684	
1,400.00	1,400.00	1,797.00	1,796.41	3.01	127.85	0.06	9,683.60	10.02	9,692.63	9,646.55	46.08	210.356	
1,500.00	1,500.00	1,890.42	1,889.73	3.23	140.69	0.05	9,679.22	9.10	9,687.97	9,638.62	49.35	196.304	
1,600.00	1,600.00	1,979.00	1,978.24	3.46	152.86	0.05	9,675.83	8.39	9,684.10	9,631.63	52.47	184.566	
1,700.00	1,700.00	2,006.08	2,005.30	3.68	155.69	0.05	9,674.91	8.19	9,680.44	9,626.93	53.51	180.922	
1,800.00	1,800.00	2,094.10	2,093.27	3.91	164.91	0.04	9,671.99	7.58	9,677.12	9,620.80	56.33	171.807	
1,900.00	1,900.00	2,182.12	2,181.24	4.13	174.13	0.04	9,669.18	6.99	9,673.93	9,614.78	59.15	163.560	
2,000.00	2,000.00	2,284.00	2,283.08	4.35	184.80	0.04	9,666.06	6.33	9,670.87	9,608.50	62.37	155.049	
2,100.00	2,100.00	2,368.22	2,367.26	4.58	193.05	0.03	9,663.55	5.80	9,667.87	9,602.92	64.95	148.862	
2,200.00	2,200.00	2,468.18	2,467.17	4.80	202.83	0.03	9,660.56	5.17	9,664.88	9,596.93	67.95	142.230	
2,300.00	2,300.00	2,568.13	2,567.07	5.03	212.61	0.03	9,657.57	4.54	9,661.89	9,590.93	70.96	136.157	
2,400.00	2,400.00	2,668.08	2,666.98	5.25	222.40	0.02	9,654.59	3.92	9,658.90	9,584.93	73.97	130.578	
2,500.00	2,500.00	2,768.04	2,766.89	5.48	232.18	0.02	9,651.60	3.29	9,655.91	9,578.93	76.98	125.433	
2,600.00	2,600.00	2,849.08	2,847.90	5.70	238.61	0.02	9,649.25	2.79	9,653.02	9,573.74	79.27	121.772	
2,700.00	2,700.00	2,928.94	2,927.72	5.93	244.84	0.01	9,647.10	2.34	9,650.33	9,568.81	81.52	118.385	
2,800.00	2,800.00	3,008.80	3,007.56	6.15	251.06	0.01	9,645.12	1.93	9,647.85	9,564.09	83.76	115.183	
2,900.00	2,900.00	3,088.67	3,087.41	6.38	257.29	0.01	9,643.31	1.54	9,645.57	9,559.57	86.01	112.151	
3,000.00	3,000.00	3,168.55	3,167.27	6.60	263.51	0.01	9,641.66	1.20	9,643.51	9,555.26	88.25	109.275	
3,100.00	3,100.00	3,265.00	3,263.70	6.83	271.03	0.00	9,639.89	0.83	9,641.67	9,550.76	90.91	106.058	
3,200.00	3,200.00	3,360.02	3,358.71	7.05	277.81	0.00	9,638.19	0.47	9,639.88	9,546.43	93.45	103.153	
3,300.00	3,300.00	3,479.89	3,478.56	7.28	286.35	0.00	9,635.82	-0.03	9,637.90	9,541.31	96.60	99.773	
3,400.00	3,400.00	3,599.76	3,598.39	7.50	294.90	0.00	9,633.21	-0.58	9,635.72	9,535.98	99.75	96.603	
3,500.00	3,500.00	3,719.61	3,718.20	7.73	303.45	-0.01	9,630.35	-1.18	9,633.34	9,530.44	102.89	93.625	
3,600.00	3,600.00	3,817.38	3,815.95	7.95	310.42	-0.01	9,627.88	-1.70	9,630.82	9,525.31	105.51	91.279	
3,700.00	3,700.00	3,903.52	3,902.06	8.18	316.57	-0.01	9,625.82	-2.13	9,628.42	9,520.57	107.85	89.278	
3,800.00	3,800.00	3,989.66	3,988.18	8.40	322.71	-0.02	9,623.88	-2.54	9,626.17	9,515.98	110.18	87.364	
3,900.00	3,900.00	4,075.81	4,074.30	8.63	328.86	-0.02	9,622.06	-2.92	9,624.06	9,511.54	112.52	85.531	
4,000.00	4,000.00	4,161.96	4,160.44	8.85	335.00	-0.02	9,620.37	-3.28	9,622.10	9,507.24	114.86	83.773	
4,100.00	4,100.00	4,273.00	4,271.46	9.07	342.92	-0.02	9,618.37	-3.70	9,620.31	9,502.51	117.80	81.667	
4,200.00	4,200.00	4,380.42	4,378.86	9.30	352.01	-0.02	9,616.34	-4.13	9,618.43	9,497.58	120.85	79.592	
4,300.00	4,300.00	4,531.42	4,529.81	9.52	364.79	-0.03	9,612.79	-4.88	9,616.08	9,491.05	125.03	76.910	
4,400.00	4,400.00	4,682.38	4,680.71	9.75	377.57	-0.03	9,608.44	-5.79	9,613.20	9,483.98	129.21	74.397	
4,500.00	4,500.00	4,808.20	4,806.46	9.97	389.53	-0.04	9,604.24	-6.67	9,609.85	9,476.90	132.95	72.280	
4,600.00	4,600.00	4,908.14	4,906.33	10.20	400.67	-0.04	9,600.83	-7.39	9,606.44	9,470.20	136.24	70.513	
4,700.00	4,700.00	5,008.08	5,006.21	10.42	411.80	-0.05	9,597.42	-8.11	9,603.02	9,463.50	139.52	68.828	
4,800.00	4,800.00	5,108.02	5,106.09	10.65	422.94	-0.05	9,594.00	-8.83	9,599.61	9,456.80	142.81	67.221	
4,900.00	4,900.00	5,207.96	5,205.97	10.87	434.07	-0.06	9,590.59	-9.55	9,596.19	9,450.10	146.09	65.685	
5,000.00	5,000.00	5,268.00	5,265.98	11.10	440.76	-0.06	9,588.54	-9.98	9,592.86	9,444.68	148.18	64.739	
5,100.00	5,100.00	5,387.88	5,385.79	11.32	452.50	-0.06	9,584.57	-10.81	9,589.51	9,437.73	151.78	63.180	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Eddy County Offset Wells - Lightning 24 Federal #1 - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 203-INC													Offset Well Error:	0.00 usft
Reference		Offset		Semi-Major Axis			Distance			Minimum		Separation	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor		
5,200.00	5,200.00	5,473.58	5,471.44	11.55	460.89	-0.07	9,581.89	-11.38	9,586.38	9,431.94	154.44	62.074		
5,300.00	5,300.00	5,559.27	5,557.10	11.77	469.29	-0.07	9,579.33	-11.92	9,583.39	9,426.30	157.09	61.006		
5,400.00	5,400.00	5,644.98	5,642.77	12.00	477.68	-0.07	9,576.90	-12.43	9,580.56	9,420.81	159.74	59.975		
5,500.00	5,500.00	5,760.00	5,757.75	12.22	488.95	-0.08	9,573.84	-13.07	9,577.92	9,414.71	163.21	58.685		
5,600.00	5,600.00	5,760.00	5,757.75	12.45	488.95	-0.08	9,573.84	-13.07	9,575.53	9,412.05	163.47	58.575		
5,700.00	5,700.00	5,878.51	5,876.22	12.67	495.83	-0.08	9,571.09	-13.65	9,573.15	9,406.71	166.43	57.519		
5,800.00	5,800.00	5,950.00	5,947.69	12.90	499.99	-0.08	9,569.72	-13.94	9,571.23	9,402.91	168.32	56.863		
5,900.00	5,900.00	6,021.49	6,019.18	13.12	504.14	-0.08	9,568.56	-14.18	9,569.61	9,399.41	170.20	56.224		
6,000.00	6,000.00	6,092.99	6,090.67	13.35	508.30	-0.09	9,567.62	-14.38	9,568.29	9,396.20	172.08	55.602		
6,100.00	6,100.00	6,170.00	6,167.68	13.57	512.78	-0.09	9,566.83	-14.54	9,567.26	9,393.17	174.09	54.956		
6,200.00	6,200.00	6,308.72	6,306.39	13.80	520.83	-0.09	9,565.31	-14.86	9,566.18	9,388.73	177.46	53.908		
6,300.00	6,300.00	6,459.00	6,456.65	14.02	529.55	-0.09	9,562.91	-15.37	9,564.58	9,383.50	181.08	52.819		
6,400.00	6,400.00	6,609.26	6,606.87	14.24	538.27	-0.10	9,559.71	-16.04	9,562.45	9,377.74	184.71	51.770		
6,500.00	6,500.00	6,720.19	6,717.76	14.47	545.95	-0.10	9,556.92	-16.63	9,559.94	9,372.31	187.63	50.951		
6,600.00	6,600.00	6,812.25	6,809.79	14.69	553.13	-0.10	9,554.66	-17.11	9,557.48	9,367.26	190.21	50.247		
6,700.00	6,700.00	6,904.31	6,901.83	14.92	560.31	-0.11	9,552.46	-17.57	9,555.09	9,362.30	192.79	49.561		
6,800.00	6,800.00	6,996.38	6,993.88	15.14	567.49	-0.11	9,550.35	-18.01	9,552.80	9,357.42	195.37	48.895		
6,900.00	6,900.00	7,088.45	7,085.92	15.37	574.67	-0.11	9,548.31	-18.44	9,550.58	9,352.63	197.95	48.246		
7,000.00	7,000.00	7,180.75	7,178.20	15.59	581.24	-0.11	9,546.34	-18.86	9,548.45	9,347.97	200.47	47.629		
7,100.00	7,100.00	7,273.27	7,270.69	15.82	587.23	-0.12	9,544.44	-19.26	9,546.39	9,343.46	202.94	47.041		
7,200.00	7,200.00	7,365.78	7,363.19	16.04	593.23	-0.12	9,542.61	-19.64	9,544.42	9,339.02	205.40	46.467		
7,300.00	7,300.00	7,458.30	7,455.69	16.27	599.23	-0.12	9,540.85	-20.01	9,542.52	9,334.66	207.86	45.908		
7,330.54	7,330.54	7,486.56	7,483.94	16.34	601.06	-0.12	9,540.33	-20.12	9,541.96	9,333.34	208.61	45.740		
7,350.00	7,349.99	7,504.55	7,501.93	16.38	602.23	0.01	9,540.00	-20.19	9,541.20	9,332.11	209.09	45.631		
7,375.00	7,374.94	7,527.60	7,524.98	16.44	603.73	0.00	9,539.58	-20.28	9,539.08	9,329.37	209.71	45.487		
7,400.00	7,399.76	7,550.51	7,547.89	16.49	605.21	0.00	9,539.17	-20.36	9,535.66	9,325.34	210.32	45.339		
7,425.00	7,424.39	7,573.23	7,570.60	16.55	606.68	0.00	9,538.77	-20.45	9,530.96	9,320.03	210.93	45.186		
7,450.00	7,448.76	7,595.69	7,593.06	16.61	608.14	0.00	9,538.37	-20.53	9,524.98	9,313.45	211.53	45.030		
7,475.00	7,472.81	7,617.84	7,615.20	16.67	609.58	0.00	9,537.99	-20.61	9,517.74	9,305.62	212.12	44.870		
7,500.00	7,496.46	7,640.06	7,637.43	16.72	611.03	0.00	9,537.61	-20.69	9,509.26	9,296.55	212.71	44.705		
7,525.00	7,519.67	7,667.47	7,664.83	16.78	612.99	0.00	9,537.13	-20.79	9,499.57	9,286.12	213.44	44.507		
7,550.00	7,542.35	7,694.23	7,691.58	16.83	614.90	0.00	9,536.66	-20.89	9,488.67	9,274.51	214.15	44.308		
7,575.00	7,564.46	7,720.25	7,717.60	16.88	616.75	0.00	9,536.18	-20.99	9,476.59	9,261.75	214.85	44.109		
7,600.00	7,585.92	7,745.48	7,742.82	16.93	618.55	0.00	9,535.71	-21.09	9,463.38	9,247.86	215.52	43.910		
7,625.00	7,606.69	7,769.84	7,767.18	16.99	620.29	0.00	9,535.25	-21.19	9,449.07	9,232.90	216.17	43.712		
7,650.00	7,626.69	7,793.25	7,790.59	17.05	621.96	0.00	9,534.79	-21.28	9,433.70	9,216.91	216.79	43.516		
7,675.00	7,645.89	7,815.67	7,813.00	17.12	623.56	0.00	9,534.34	-21.38	9,417.31	9,199.92	217.38	43.321		
7,700.00	7,664.22	7,837.02	7,834.35	17.20	625.09	0.00	9,533.91	-21.47	9,399.94	9,181.99	217.95	43.128		
7,725.00	7,681.63	7,857.25	7,854.57	17.27	626.53	0.00	9,533.50	-21.56	9,381.66	9,163.17	218.49	42.939		
7,750.00	7,698.09	7,876.30	7,873.62	17.36	627.89	-0.01	9,533.10	-21.64	9,362.50	9,143.50	219.00	42.752		
7,775.00	7,713.54	7,894.12	7,891.44	17.45	629.16	-0.01	9,532.72	-21.72	9,342.52	9,123.05	219.47	42.569		
7,800.00	7,727.93	7,910.67	7,907.97	17.55	630.34	-0.01	9,532.36	-21.79	9,321.78	9,101.87	219.91	42.389		
7,825.00	7,741.24	7,925.89	7,923.19	17.66	631.43	-0.01	9,532.03	-21.86	9,300.34	9,080.02	220.31	42.214		
7,850.00	7,753.42	7,939.74	7,937.04	17.78	632.42	-0.01	9,531.73	-21.93	9,278.25	9,057.57	220.68	42.044		
7,875.00	7,764.44	7,952.20	7,949.50	17.90	633.30	-0.01	9,531.45	-21.99	9,255.57	9,034.56	221.01	41.878		
7,900.00	7,774.28	7,963.22	7,960.52	18.03	634.09	-0.02	9,531.20	-22.04	9,232.37	9,011.07	221.30	41.718		
7,925.00	7,782.89	7,972.79	7,970.08	18.17	634.77	-0.02	9,530.99	-22.08	9,208.72	8,987.16	221.55	41.564		
7,950.00	7,790.27	7,980.86	7,978.15	18.32	635.35	-0.03	9,530.80	-22.12	9,184.67	8,962.91	221.77	41.416		
7,975.00	7,796.39	7,987.44	7,984.72	18.48	635.82	-0.03	9,530.65	-22.15	9,160.30	8,938.36	221.94	41.273		
8,000.00	7,801.23	7,992.49	7,989.77	18.65	636.18	-0.05	9,530.54	-22.18	9,135.67	8,913.60	222.08	41.138		
8,025.00	7,804.78	7,996.00	7,993.29	18.83	636.43	-0.08	9,530.45	-22.20	9,110.86	8,888.69	222.17	41.009		
8,050.00	7,807.03	7,997.98	7,995.27	19.01	636.57	-0.18	9,530.41	-22.21	9,085.91	8,863.69	222.22	40.887		



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Eddy County Offset Wells - Lightning 24 Federal #1 - OH - OH													Offset Site Error:
Survey Program: 203-INC													0.00 usft
Reference													Offset Well Error:
Offset													0.00 usft
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre		Between	Between	Minimum	Separation	Warning
Depth	Depth	Depth	Depth	Depth	Depth	Toolface	N-S	E-W	Centres	Ellipses	Separation	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
8,075.00	7,807.97	7,998.41	7,995.70	19.20	636.60	-179.37	9,530.40	-22.21	9,060.92	8,838.69	222.23	40.772	
8,081.52	7,808.00	7,998.27	7,995.56	19.25	636.59	-179.71	9,530.40	-22.21	9,054.40	8,832.17	222.23	40.743	
8,100.00	7,807.97	7,997.72	7,995.01	19.40	636.55	-179.71	9,530.41	-22.20	9,035.93	8,813.71	222.22	40.662	
8,200.00	7,807.76	7,994.76	7,992.05	20.27	636.34	-179.71	9,530.48	-22.19	8,935.96	8,713.81	222.15	40.225	
8,300.00	7,807.55	7,991.81	7,989.10	21.27	636.13	-179.71	9,530.55	-22.18	8,835.99	8,613.91	222.08	39.787	
8,400.00	7,807.35	7,988.88	7,986.17	22.37	635.92	-179.71	9,530.62	-22.16	8,736.02	8,514.00	222.02	39.348	
8,500.00	7,807.14	7,985.95	7,983.24	23.56	635.71	-179.71	9,530.69	-22.15	8,636.05	8,414.10	221.95	38.910	
8,600.00	7,806.93	7,983.04	7,980.33	24.83	635.50	-179.71	9,530.75	-22.13	8,536.08	8,314.20	221.89	38.470	
8,700.00	7,806.73	7,980.14	7,977.43	26.17	635.30	-179.71	9,530.82	-22.12	8,436.12	8,214.29	221.82	38.031	
8,800.00	7,806.52	7,977.25	7,974.54	27.56	635.09	-179.71	9,530.88	-22.11	8,336.15	8,114.38	221.76	37.590	
8,900.00	7,806.32	7,974.37	7,971.66	29.00	634.89	-179.71	9,530.95	-22.09	8,236.18	8,014.48	221.70	37.150	
9,000.00	7,806.11	7,971.50	7,968.79	30.49	634.68	-179.71	9,531.02	-22.08	8,136.21	7,914.57	221.64	36.709	
9,100.00	7,805.90	7,968.64	7,965.93	32.01	634.48	-179.71	9,531.08	-22.06	8,036.24	7,814.66	221.58	36.267	
9,200.00	7,805.70	7,965.79	7,963.09	33.56	634.27	-179.71	9,531.14	-22.05	7,936.27	7,714.74	221.52	35.826	
9,300.00	7,805.49	7,962.96	7,960.25	35.13	634.07	-179.71	9,531.21	-22.04	7,836.30	7,614.83	221.47	35.383	
9,400.00	7,805.29	7,960.13	7,957.43	36.73	633.87	-179.71	9,531.27	-22.02	7,736.33	7,514.92	221.41	34.941	
9,500.00	7,805.08	7,957.32	7,954.62	38.35	633.67	-179.71	9,531.33	-22.01	7,636.36	7,415.00	221.36	34.498	
9,600.00	7,804.87	7,954.52	7,951.82	39.99	633.47	-179.71	9,531.40	-22.00	7,536.39	7,315.09	221.30	34.055	
9,700.00	7,804.67	7,951.73	7,949.02	41.65	633.27	-179.71	9,531.46	-21.98	7,436.42	7,215.17	221.25	33.611	
9,800.00	7,804.46	7,948.94	7,946.24	43.32	633.07	-179.71	9,531.52	-21.97	7,336.45	7,115.25	221.20	33.167	
9,900.00	7,804.25	7,946.17	7,943.47	45.00	632.87	-179.71	9,531.58	-21.96	7,236.48	7,015.33	221.15	32.722	
10,000.00	7,804.05	7,943.41	7,940.71	46.69	632.68	-179.71	9,531.65	-21.95	7,136.51	6,915.41	221.10	32.278	
10,100.00	7,803.84	7,940.66	7,937.96	48.39	632.48	-179.71	9,531.71	-21.93	7,036.54	6,815.49	221.05	31.832	
10,200.00	7,803.64	7,937.92	7,935.23	50.10	632.29	-179.71	9,531.77	-21.92	6,936.57	6,715.56	221.00	31.387	
10,300.00	7,803.43	7,935.19	7,932.50	51.82	632.09	-179.71	9,531.83	-21.91	6,836.59	6,615.64	220.95	30.941	
10,400.00	7,803.22	7,932.48	7,929.78	53.55	631.90	-179.71	9,531.89	-21.89	6,736.62	6,515.71	220.91	30.495	
10,500.00	7,803.02	7,929.77	7,927.07	55.28	631.70	-179.71	9,531.95	-21.88	6,636.65	6,415.79	220.86	30.049	
10,600.00	7,802.81	7,927.07	7,924.37	57.02	631.51	-179.71	9,532.01	-21.87	6,536.68	6,315.86	220.82	29.602	
10,700.00	7,802.60	7,924.38	7,921.69	58.77	631.32	-179.71	9,532.06	-21.86	6,436.71	6,215.93	220.78	29.155	
10,800.00	7,802.40	7,921.70	7,919.01	60.52	631.13	-179.71	9,532.12	-21.85	6,336.74	6,116.00	220.74	28.707	
10,900.00	7,802.19	7,919.04	7,916.34	62.27	630.94	-179.71	9,532.18	-21.83	6,236.77	6,016.07	220.70	28.260	
11,000.00	7,801.99	7,916.38	7,913.69	64.03	630.75	-179.71	9,532.24	-21.82	6,136.80	5,916.14	220.66	27.812	
11,100.00	7,801.78	7,913.73	7,911.04	65.79	630.56	-179.71	9,532.30	-21.81	6,036.82	5,816.21	220.62	27.363	
11,200.00	7,801.57	7,911.09	7,908.40	67.56	630.37	-179.70	9,532.35	-21.80	5,936.85	5,716.27	220.58	26.915	
11,300.00	7,801.37	7,908.46	7,905.77	69.33	630.18	-179.70	9,532.41	-21.78	5,836.88	5,616.34	220.54	26.468	
11,400.00	7,801.16	7,905.84	7,903.15	71.10	630.00	-179.70	9,532.47	-21.77	5,736.91	5,516.40	220.51	26.017	
11,500.00	7,800.95	7,903.24	7,900.55	72.87	629.81	-179.70	9,532.52	-21.76	5,636.94	5,416.47	220.47	25.568	
11,600.00	7,800.75	7,900.64	7,897.95	74.65	629.62	-179.70	9,532.58	-21.75	5,536.96	5,316.53	220.44	25.118	
11,700.00	7,800.54	7,898.05	7,895.36	76.43	629.44	-179.70	9,532.64	-21.74	5,436.99	5,216.59	220.40	24.668	
11,800.00	7,800.34	7,895.47	7,892.78	78.22	629.26	-179.70	9,532.69	-21.73	5,337.02	5,116.65	220.37	24.218	
11,900.00	7,800.13	7,892.90	7,890.21	80.00	629.07	-179.70	9,532.75	-21.71	5,237.05	5,016.71	220.34	23.768	
12,000.00	7,799.92	7,890.33	7,887.65	81.79	628.89	-179.70	9,532.80	-21.70	5,137.07	4,916.77	220.31	23.318	
12,100.00	7,799.72	7,887.78	7,885.10	83.57	628.71	-179.70	9,532.85	-21.69	5,037.10	4,816.82	220.28	22.867	
12,200.00	7,799.51	7,885.24	7,882.56	85.36	628.53	-179.70	9,532.91	-21.68	4,937.13	4,716.88	220.25	22.416	
12,300.00	7,799.30	7,882.71	7,880.02	87.16	628.35	-179.70	9,532.96	-21.67	4,837.16	4,616.93	220.22	21.965	
12,400.00	7,799.10	7,880.18	7,877.50	88.95	628.17	-179.69	9,533.02	-21.66	4,737.18	4,516.99	220.20	21.514	
12,500.00	7,798.89	7,877.67	7,874.98	90.74	627.99	-179.69	9,533.07	-21.65	4,637.21	4,417.04	220.17	21.062	
12,600.00	7,798.69	7,875.16	7,872.48	92.54	627.81	-179.69	9,533.12	-21.64	4,537.24	4,317.09	220.14	20.610	
12,700.00	7,798.48	7,872.67	7,869.98	94.34	627.63	-179.69	9,533.17	-21.62	4,437.26	4,217.14	220.12	20.158	
12,800.00	7,798.27	7,870.18	7,867.50	96.14	627.45	-179.69	9,533.23	-21.61	4,337.29	4,117.19	220.10	19.706	
12,900.00	7,798.07	7,867.70	7,865.02	97.94	627.27	-179.69	9,533.28	-21.60	4,237.32	4,017.24	220.07	19.254	
13,000.00	7,797.86	7,865.23	7,862.55	99.74	627.10	-179.69	9,533.33	-21.59	4,137.34	3,917.29	220.05	18.802	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Eddy County Offset Wells - Lightning 24 Federal #1 - OH - OH													Offset Site Error:
Survey Program: 203-INC													Offset Well Error:
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		Warning			
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre	Between	Between	Minimum	Separation	Factor	Warning
Depth	Depth	Depth	Depth	(usft)	(usft)	(ft)	N/S	Centres	Ellipses	Separation	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(ft)	(usft)	(usft)	(usft)	(usft)			
13,100.00	7,797.66	7,862.77	7,860.09	101.54	626.92	-179.69	9,533.38	-21.58	4,037.37	3,817.34	220.03	18.349	
13,200.00	7,797.45	7,860.32	7,857.64	103.34	626.75	-179.68	9,533.43	-21.57	3,937.39	3,717.38	220.01	17.896	
13,300.00	7,797.24	7,857.87	7,855.20	105.15	626.57	-179.68	9,533.48	-21.56	3,837.42	3,617.43	219.99	17.443	
13,400.00	7,797.04	7,855.44	7,852.76	106.95	626.40	-179.68	9,533.53	-21.55	3,737.45	3,517.47	219.98	16.990	
13,500.00	7,796.83	7,853.01	7,850.34	108.76	626.23	-179.68	9,533.58	-21.54	3,637.47	3,417.51	219.96	16.537	
13,600.00	7,796.62	7,850.60	7,847.92	110.56	626.05	-179.68	9,533.63	-21.53	3,537.50	3,317.56	219.94	16.084	
13,700.00	7,796.42	7,848.19	7,845.51	112.37	625.88	-179.67	9,533.68	-21.52	3,437.52	3,217.60	219.93	15.630	
13,800.00	7,796.21	7,845.79	7,843.11	114.18	625.71	-179.67	9,533.73	-21.51	3,337.55	3,117.64	219.91	15.177	
13,900.00	7,796.01	7,843.40	7,840.72	115.98	625.54	-179.67	9,533.78	-21.50	3,237.57	3,017.68	219.90	14.723	
14,000.00	7,795.80	7,841.01	7,838.34	117.79	625.37	-179.67	9,533.83	-21.49	3,137.60	2,917.72	219.88	14.269	
14,100.00	7,795.59	7,838.64	7,835.96	119.60	625.20	-179.66	9,533.88	-21.48	3,037.63	2,817.75	219.87	13.815	
14,200.00	7,795.39	7,836.27	7,833.60	121.41	625.03	-179.66	9,533.93	-21.47	2,937.65	2,717.79	219.86	13.361	
14,300.00	7,795.18	7,833.92	7,831.24	123.22	624.86	-179.66	9,533.98	-21.46	2,837.68	2,617.83	219.85	12.907	
14,400.00	7,794.97	7,831.57	7,828.89	125.03	624.70	-179.65	9,534.02	-21.45	2,737.70	2,517.86	219.84	12.453	
14,500.00	7,794.77	7,829.22	7,826.55	126.85	624.53	-179.65	9,534.07	-21.44	2,637.73	2,417.90	219.83	11.999	
14,600.00	7,794.56	7,826.89	7,824.22	128.66	624.36	-179.64	9,534.12	-21.43	2,537.75	2,317.93	219.82	11.545	
14,700.00	7,794.36	7,824.57	7,821.89	130.47	624.20	-179.64	9,534.17	-21.42	2,437.78	2,217.96	219.82	11.090	
14,800.00	7,794.15	7,822.25	7,819.58	132.29	624.03	-179.64	9,534.21	-21.41	2,337.80	2,117.99	219.81	10.636	
14,900.00	7,793.94	7,819.94	7,817.27	134.10	623.87	-179.63	9,534.26	-21.40	2,237.83	2,018.02	219.80	10.181	
15,000.00	7,793.74	7,817.64	7,814.97	135.91	623.70	-179.62	9,534.31	-21.39	2,137.85	1,918.05	219.80	9.726	
15,100.00	7,793.53	7,815.35	7,812.68	137.73	623.54	-179.62	9,534.35	-21.38	2,037.87	1,818.08	219.79	9.272	
15,200.00	7,793.32	7,813.06	7,810.39	139.54	623.38	-179.61	9,534.40	-21.37	1,937.90	1,718.11	219.79	8.817	
15,300.00	7,793.12	7,810.79	7,808.12	141.36	623.21	-179.60	9,534.44	-21.36	1,837.92	1,618.13	219.79	8.362	
15,400.00	7,792.91	7,808.52	7,805.85	143.17	623.05	-179.59	9,534.49	-21.35	1,737.95	1,518.16	219.79	7.907	
15,500.00	7,792.71	7,806.25	7,803.59	144.99	622.89	-179.58	9,534.53	-21.34	1,637.97	1,418.18	219.79	7.453	
15,600.00	7,792.50	7,804.00	7,801.33	146.81	622.73	-179.57	9,534.58	-21.33	1,538.00	1,318.21	219.79	6.998	
15,700.00	7,792.29	7,801.76	7,799.09	148.62	622.57	-179.56	9,534.62	-21.32	1,438.02	1,218.23	219.79	6.543	
15,800.00	7,792.09	7,799.52	7,796.85	150.44	622.41	-179.54	9,534.67	-21.31	1,338.04	1,118.25	219.79	6.088	
15,900.00	7,791.88	7,797.29	7,794.62	152.26	622.25	-179.52	9,534.71	-21.30	1,238.07	1,018.27	219.79	5.633	
16,000.00	7,791.67	7,795.06	7,792.40	154.07	622.09	-179.50	9,534.75	-21.29	1,138.09	918.29	219.80	5.178	
16,100.00	7,791.47	7,792.85	7,790.18	155.89	621.93	-179.48	9,534.80	-21.28	1,038.11	818.31	219.80	4.723	
16,200.00	7,791.26	7,790.64	7,787.98	157.71	621.78	-179.44	9,534.84	-21.27	938.14	718.33	219.81	4.268	
16,300.00	7,791.06	7,788.44	7,785.78	159.53	621.62	-179.41	9,534.88	-21.26	838.16	618.34	219.82	3.813	
16,400.00	7,790.85	7,786.25	7,783.59	161.35	621.46	-179.36	9,534.93	-21.26	738.19	518.35	219.83	3.358	
16,500.00	7,790.64	7,784.06	7,781.40	163.17	621.31	-179.29	9,534.97	-21.25	638.21	418.36	219.84	2.903	
16,600.00	7,790.44	7,781.89	7,779.22	164.98	621.15	-179.21	9,535.01	-21.24	538.23	318.37	219.86	2.448	
16,700.00	7,790.23	7,779.72	7,777.05	166.80	621.00	-179.08	9,535.05	-21.23	438.25	218.37	219.89	1.993	
16,800.00	7,790.03	7,777.55	7,774.89	168.62	620.84	-178.87	9,535.10	-21.22	338.28	118.36	219.92	1.538	
16,900.00	7,789.82	7,775.40	7,772.74	170.44	620.69	-178.50	9,535.14	-21.21	238.30	18.32	219.98	1.083 Level 2	
17,000.00	7,789.61	7,773.25	7,770.59	172.26	620.54	-177.58	9,535.18	-21.20	138.32	-81.79	220.11	0.628 Level 1	
17,100.00	7,789.41	7,771.11	7,768.45	174.08	620.38	-177.92	9,535.22	-21.19	38.35	-182.57	220.92	0.174 Level 1	
17,138.36	7,789.33	7,770.29	7,767.63	174.78	620.32	-89.77	9,535.24	-21.19	0.11	-783.06	783.17	0.000 Level 1, CC, ES, SF	
17,200.00	7,789.20	7,768.97	7,766.31	175.90	620.23	-4.67	9,535.26	-21.18	61.63	-157.53	219.16	0.281 Level 1	
17,300.00	7,788.99	7,766.85	7,764.19	177.72	620.08	-1.64	9,535.30	-21.18	161.61	-57.98	219.58	0.736 Level 1	
17,400.00	7,788.79	7,764.73	7,762.07	179.54	619.93	-0.93	9,535.34	-21.17	261.59	41.89	219.69	1.191 Level 2	
17,500.00	7,788.58	7,762.61	7,759.95	181.37	619.78	-0.61	9,535.39	-21.16	361.56	141.82	219.75	1.645	
17,600.00	7,788.38	7,760.51	7,757.85	183.19	619.63	-0.43	9,535.43	-21.15	461.54	241.76	219.78	2.100	
17,700.00	7,788.17	7,758.41	7,755.75	185.01	619.48	-0.31	9,535.47	-21.14	561.52	341.70	219.81	2.555	
17,782.02	7,788.00	7,756.69	7,754.03	186.50	619.35	-0.24	9,535.50	-21.14	643.52	423.69	219.83	2.927	
17,782.48	7,788.00	7,756.68	7,754.02	186.51	619.35	-0.24	9,535.50	-21.14	643.98	420.67	223.31	2.884	



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latslaw 44)
Reference Site:	Road Runner Federal Com #12H	MDI Reference:	KB @ 3272.70usft (Latslaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Eddy County Offset Wells - Lightning 24 Federal #2 - OH - OH												Offset Site Error:	0.00 usft		
Survey Program: 221-INC												Offset Well Error:	0.00 usft		
Reference	Offset	Semi Major Axis	Distance	Measured Depth	Vertical Depth	Reference	Offset	Highside	Offset Wellbore	Centre	Between	Between	Minimum	Separation	Warning
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	7,077.13	81.01	7,077.72				
100.00	100.00	89.87	89.87	0.08	2.20	0.65	7,076.93	80.87	7,077.47	7,075.82	1.65	4,289.162			
200.00	200.00	221.00	220.99	0.31	5.41	0.65	7,075.93	80.20	7,076.66	7,072.50	4.16	1,701.888			
300.00	300.00	307.30	307.29	0.53	7.77	0.65	7,075.16	79.69	7,075.78	7,069.57	6.22	1,138.314			
400.00	400.00	382.39	382.38	0.76	9.82	0.64	7,074.78	79.43	7,075.27	7,067.23	8.04	880.425			
500.00	500.00	460.70	460.69	0.98	11.99	0.64	7,074.66	79.35	7,075.10	7,065.16	9.94	711.460			
600.00	600.00	532.77	532.75	1.21	17.80	0.64	7,073.73	78.73	7,074.56	7,060.14	14.42	490.570			
700.00	700.00	761.75	761.71	1.43	23.64	0.63	7,072.00	77.58	7,073.18	7,054.60	18.58	380.651			
800.00	800.00	861.73	861.68	1.66	29.51	0.62	7,070.55	76.61	7,071.72	7,049.19	22.53	313.876			
900.00	900.00	961.72	961.65	1.88	35.40	0.61	7,069.09	75.64	7,070.25	7,043.78	26.48	267.011			
1,000.00	1,000.00	1,061.70	1,061.62	2.11	41.28	0.61	7,067.64	74.67	7,068.79	7,038.36	30.43	232.306			
1,100.00	1,100.00	1,161.69	1,161.59	2.33	47.17	0.60	7,066.19	73.70	7,067.33	7,032.95	34.38	205.570			
1,200.00	1,200.00	1,390.34	1,390.15	2.56	68.26	0.57	7,060.98	70.22	7,065.14	7,018.75	46.39	152.314			
1,300.00	1,300.00	1,483.24	1,482.97	2.78	77.79	0.55	7,057.81	68.10	7,061.71	7,009.83	51.88	136.123			
1,400.00	1,400.00	1,811.00	1,810.16	3.01	134.34	0.47	7,042.83	58.11	7,057.55	6,975.28	82.28	85.776			
1,500.00	1,500.00	1,864.42	1,863.43	3.23	145.93	0.46	7,039.57	55.92	7,051.44	6,962.63	88.81	79.401			
1,600.00	1,600.00	1,919.16	1,918.07	3.46	157.47	0.44	7,036.65	53.98	7,046.05	6,950.73	95.33	73.916			
1,700.00	1,700.00	2,014.94	2,013.66	3.68	175.67	0.41	7,031.80	50.74	7,040.95	6,935.42	105.54	66.715			
1,800.00	1,800.00	2,095.00	2,093.59	3.91	190.46	0.39	7,027.90	48.13	7,036.06	6,922.12	113.93	61.756			
1,900.00	1,900.00	2,172.15	2,170.62	4.13	203.70	0.37	7,024.38	45.78	7,031.46	6,909.93	121.54	57.854			
2,000.00	2,000.00	2,267.19	2,265.53	4.35	219.49	0.35	7,020.23	43.01	7,027.08	6,896.50	130.58	53.815			
2,100.00	2,100.00	2,316.00	2,314.28	4.58	227.54	0.34	7,018.11	41.60	7,022.90	6,887.56	135.34	51.890			
2,200.00	2,200.00	2,399.59	2,397.78	4.80	239.10	0.32	7,014.87	39.43	7,019.07	6,876.95	142.11	49.391			
2,300.00	2,300.00	2,464.57	2,462.71	5.03	247.50	0.31	7,012.87	38.10	7,015.96	6,868.82	147.13	47.685			
2,400.00	2,400.00	2,564.51	2,562.59	5.25	258.63	0.30	7,009.97	36.17	7,013.04	6,859.29	153.75	45.612			
2,500.00	2,500.00	2,650.95	2,648.98	5.48	267.59	0.28	7,007.51	34.52	7,010.19	6,851.02	159.17	44.043			
2,600.00	2,600.00	2,729.65	2,727.65	5.70	275.30	0.27	7,005.50	33.18	7,007.62	6,843.74	163.89	42.759			
2,700.00	2,700.00	2,813.33	2,811.29	5.93	283.18	0.26	7,003.61	31.91	7,005.35	6,836.63	168.72	41.521			
2,800.00	2,800.00	2,913.29	2,911.22	6.15	291.63	0.25	7,001.43	30.46	7,003.17	6,829.24	173.92	40.266			
2,900.00	2,900.00	3,013.26	3,011.15	6.38	300.08	0.24	6,999.25	29.01	7,000.98	6,821.85	179.13	39.082			
3,000.00	3,000.00	3,113.22	3,111.08	6.60	308.54	0.23	6,997.08	27.56	6,998.80	6,814.43	184.37	37.961			
3,100.00	3,100.00	3,213.19	3,211.01	6.83	317.00	0.21	6,994.90	26.10	6,996.62	6,807.02	189.60	36.902			
3,200.00	3,200.00	3,299.61	3,297.41	7.05	323.40	0.20	6,993.09	24.89	6,994.51	6,800.84	193.68	36.114			
3,300.00	3,300.00	3,382.90	3,380.68	7.28	329.33	0.20	6,991.53	23.85	6,992.64	6,795.17	197.48	35.410			
3,400.00	3,400.00	3,466.00	3,463.76	7.50	336.66	0.19	6,989.88	22.75	6,991.05	6,788.93	202.11	34.590			
3,500.00	3,500.00	3,549.47	3,547.22	7.73	339.48	0.18	6,989.02	22.18	6,989.62	6,785.43	204.19	34.231			
3,600.00	3,600.00	3,632.73	3,630.47	7.95	343.18	0.18	6,988.06	21.54	6,988.47	6,781.65	206.82	33.791			
3,700.00	3,700.00	3,716.00	3,713.73	8.18	346.89	0.17	6,987.30	21.03	6,987.56	6,778.11	209.44	33.363			
3,800.00	3,800.00	3,833.11	3,830.84	8.40	352.09	0.17	6,986.30	20.36	6,986.71	6,773.68	213.02	32.798			
3,900.00	3,900.00	3,962.17	3,959.88	8.63	357.87	0.16	6,984.69	19.28	6,985.45	6,768.48	216.98	32.194			
4,000.00	4,000.00	4,062.15	4,059.85	8.85	363.67	0.15	6,983.24	18.31	6,984.00	6,763.18	220.82	31.628			
4,100.00	4,100.00	4,162.14	4,159.82	9.07	369.46	0.14	6,981.79	17.35	6,982.55	6,757.89	224.66	31.081			
4,200.00	4,200.00	4,254.22	4,251.89	9.30	374.28	0.14	6,980.47	16.47	6,981.12	6,753.18	227.94	30.627			
4,300.00	4,300.00	4,337.45	4,335.11	9.52	377.99	0.13	6,979.46	15.79	6,979.90	6,749.31	230.59	30.270			
4,400.00	4,400.00	4,420.69	4,418.35	9.75	381.70	0.13	6,978.64	15.25	6,978.92	6,745.69	233.23	29.923			
4,500.00	4,500.00	4,521.01	4,518.66	9.97	386.17	0.12	6,977.85	14.72	6,978.12	6,741.76	236.36	29.523			
4,600.00	4,600.00	4,642.74	4,640.38	10.20	391.61	0.11	6,976.61	13.89	6,977.10	6,736.98	240.12	29.057			
4,700.00	4,700.00	4,751.00	4,748.63	10.42	396.44	0.11	6,975.18	12.94	6,975.78	6,732.28	243.50	28.648			
4,800.00	4,800.00	4,843.51	4,841.12	10.65	400.58	0.10	6,973.96	12.12	6,974.47	6,728.03	246.44	28.301			
4,900.00	4,900.00	4,926.81	4,924.42	10.87	404.30	0.09	6,973.08	11.53	6,973.40	6,724.29	249.11	27.994			
5,000.00	5,000.00	5,011.35	5,008.96	11.10	407.98	0.09	6,972.38	11.06	6,972.57	6,720.82	251.75	27.696			
5,100.00	5,100.00	5,111.35	5,108.95	11.32	411.13	0.09	6,971.65	10.58	6,971.84	6,717.64	254.21	27.426			

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Eddy County Offset Wells - Lightning 24 Federal #2 - OH - OH													Offset Site Error:
Survey Program 221-INC													0.00 usft
Reference													Offset Well Error:
Offset													0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,200.00	5,245.51	5,243.10	11.55	417.06	0.08	6,970.36	9.72	6,970.89	6,712.56	258.32	26.985	
5,300.00	5,300.00	5,361.97	5,359.55	11.77	423.01	0.07	6,968.75	8.64	6,969.49	6,707.12	262.37	26.564	
5,400.00	5,400.00	5,461.96	5,459.52	12.00	428.83	0.06	6,967.30	7.67	6,968.04	6,701.79	266.24	26.172	
5,500.00	5,500.00	5,561.94	5,559.49	12.22	434.64	0.06	6,965.84	6.70	6,966.58	6,696.46	270.12	25.791	
5,600.00	5,600.00	5,661.93	5,659.46	12.45	440.46	0.05	6,964.39	5.73	6,965.13	6,691.13	274.00	25.420	
5,700.00	5,700.00	5,760.16	5,757.68	12.67	446.09	0.04	6,962.97	4.78	6,963.68	6,685.90	277.78	25.069	
5,800.00	5,800.00	5,847.59	5,845.10	12.90	450.59	0.03	6,961.80	4.00	6,962.34	6,681.45	280.90	24.786	
5,900.00	5,900.00	5,941.95	5,939.44	13.12	455.69	0.03	6,960.71	3.27	6,961.18	6,676.82	284.36	24.480	
6,000.00	6,000.00	6,084.22	6,081.69	13.35	464.90	0.02	6,958.62	1.88	6,959.71	6,669.46	290.25	23.978	
6,100.00	6,100.00	6,272.52	6,269.92	13.57	481.43	-0.01	6,954.30	-1.00	6,957.52	6,657.31	300.22	23.175	
6,200.00	6,200.00	6,378.90	6,376.21	13.80	493.25	-0.03	6,950.74	-3.38	6,954.15	6,646.84	307.32	22.629	
6,300.00	6,300.00	6,462.00	6,459.27	14.02	502.48	-0.04	6,948.53	-4.86	6,951.44	6,638.52	312.92	22.215	
6,400.00	6,400.00	6,494.72	6,491.98	14.24	504.82	-0.04	6,947.86	-5.31	6,949.15	6,634.50	314.65	22.085	
6,500.00	6,500.00	6,568.44	6,565.68	14.47	510.08	-0.05	6,946.64	-6.12	6,947.47	6,629.36	318.11	21.840	
6,600.00	6,600.00	6,690.85	6,688.06	14.69	518.82	-0.06	6,944.30	-7.69	6,945.51	6,621.85	323.67	21.459	
6,700.00	6,700.00	6,745.00	6,742.20	14.92	522.68	-0.07	6,943.40	-8.29	6,943.91	6,617.62	326.29	21.282	
6,800.00	6,800.00	6,833.57	6,830.76	15.14	526.66	-0.07	6,942.29	-9.02	6,942.68	6,613.52	329.16	21.092	
6,900.00	6,900.00	6,911.45	6,908.64	15.37	530.05	-0.08	6,941.62	-9.48	6,941.80	6,610.16	331.64	20.931	
7,000.00	7,000.00	7,011.45	7,008.63	15.59	533.22	-0.08	6,940.89	-9.96	6,941.08	6,606.94	334.14	20.773	
7,100.00	7,100.00	7,117.15	7,114.32	15.82	536.89	-0.09	6,940.11	-10.48	6,940.35	6,603.41	336.94	20.598	
7,200.00	7,200.00	7,248.06	7,245.23	16.04	542.78	-0.09	6,938.76	-11.38	6,939.32	6,598.26	341.06	20.346	
7,300.00	7,300.00	7,361.73	7,358.88	16.27	548.64	-0.10	6,937.17	-12.44	6,937.91	6,592.84	345.07	20.106	
7,330.54	7,330.54	7,392.27	7,389.42	16.34	550.41	-0.11	6,936.73	-12.74	6,937.47	6,591.21	346.26	20.035	
7,350.00	7,349.99	7,411.71	7,408.86	16.38	551.55	0.02	6,936.44	-12.93	6,936.79	6,589.77	347.02	19.989	
7,375.00	7,374.94	7,436.63	7,433.77	16.44	553.00	0.02	6,936.08	-13.17	6,934.76	6,586.76	348.00	19.928	
7,400.00	7,399.76	7,461.40	7,458.54	16.49	554.44	0.02	6,935.72	-13.41	6,931.42	6,582.45	348.97	19.863	
7,425.00	7,424.39	7,485.96	7,483.10	16.55	555.87	0.01	6,935.37	-13.65	6,926.79	6,576.86	349.93	19.795	
7,450.00	7,448.76	7,496.00	7,493.13	16.61	556.46	0.01	6,935.22	-13.74	6,920.90	6,570.53	350.37	19.753	
7,475.00	7,472.81	7,526.23	7,523.35	16.67	557.82	0.01	6,934.80	-14.03	6,913.74	6,562.41	351.33	19.679	
7,500.00	7,496.46	7,544.86	7,541.99	16.72	558.65	0.01	6,934.56	-14.19	6,905.37	6,553.42	351.95	19.620	
7,525.00	7,519.67	7,563.14	7,560.26	16.78	559.48	0.01	6,934.33	-14.34	6,895.78	6,543.23	352.55	19.560	
7,550.00	7,542.35	7,581.01	7,578.13	16.83	560.28	0.01	6,934.13	-14.48	6,885.02	6,531.88	353.14	19.496	
7,575.00	7,564.46	7,598.41	7,595.53	16.88	561.06	0.01	6,933.94	-14.60	6,873.11	6,519.39	353.72	19.431	
7,600.00	7,585.92	7,615.32	7,612.44	16.93	561.82	0.01	6,933.76	-14.72	6,860.08	6,505.80	354.27	19.364	
7,625.00	7,606.69	7,631.67	7,628.79	16.99	562.56	0.01	6,933.60	-14.82	6,845.96	6,491.15	354.81	19.295	
7,650.00	7,626.69	7,647.43	7,644.55	17.05	563.27	0.00	6,933.46	-14.92	6,830.79	6,475.46	355.33	19.224	
7,675.00	7,645.89	7,662.55	7,659.67	17.12	563.95	0.00	6,933.33	-15.00	6,814.62	6,458.79	355.83	19.151	
7,700.00	7,664.22	7,686.00	7,683.11	17.20	565.00	0.00	6,933.15	-15.13	6,797.49	6,440.92	356.57	19.064	
7,725.00	7,681.63	7,693.38	7,690.49	17.27	565.34	0.00	6,933.10	-15.16	6,779.42	6,422.59	356.83	18.999	
7,750.00	7,698.09	7,713.59	7,710.70	17.36	566.25	0.00	6,932.94	-15.27	6,760.48	6,403.00	357.47	18.912	
7,775.00	7,713.54	7,732.52	7,729.63	17.45	567.10	0.00	6,932.78	-15.37	6,740.69	6,382.63	358.07	18.825	
7,800.00	7,727.93	7,750.11	7,747.22	17.55	567.89	0.00	6,932.63	-15.48	6,720.13	6,361.51	358.63	18.739	
7,825.00	7,741.24	7,766.33	7,763.44	17.66	568.62	0.00	6,932.48	-15.58	6,698.85	6,339.71	359.14	18.653	
7,850.00	7,753.42	7,781.12	7,778.22	17.78	569.29	-0.01	6,932.33	-15.67	6,676.90	6,317.30	359.60	18.567	
7,875.00	7,764.44	7,794.44	7,791.55	17.90	569.89	-0.01	6,932.20	-15.76	6,654.36	6,294.33	360.03	18.483	
7,900.00	7,774.28	7,806.28	7,803.39	18.03	570.42	-0.01	6,932.07	-15.85	6,631.27	6,270.87	360.40	18.400	
7,925.00	7,782.89	7,816.59	7,813.69	18.17	570.88	-0.02	6,931.96	-15.92	6,607.72	6,246.99	360.72	18.318	
7,950.00	7,790.27	7,825.35	7,822.45	18.32	571.28	-0.02	6,931.86	-15.99	6,583.75	6,222.75	361.00	18.237	
7,975.00	7,796.39	7,832.54	7,829.64	18.48	571.60	-0.03	6,931.78	-16.04	6,559.45	6,198.22	361.23	18.159	
8,000.00	7,801.23	7,838.14	7,835.25	18.65	571.85	-0.04	6,931.72	-16.08	6,534.87	6,173.46	361.40	18.082	
8,025.00	7,804.78	7,842.15	7,839.25	18.83	572.03	-0.07	6,931.67	-16.11	6,510.09	6,148.55	361.53	18.007	
8,050.00	7,807.03	7,844.55	7,841.66	19.01	572.14	-0.14	6,931.64	-16.13	6,485.17	6,123.56	361.61	17.934	

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



TDS
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Road Runner Federal Com #12H
Project:	Eddy County, NM (NAD-27 2015)	TVD Reference:	KB @ 3272.70usft (Latshaw 44)
Reference Site:	Road Runner Federal Com #12H	MD Reference:	KB @ 3272.70usft (Latshaw 44)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Road Runner Federal Com #12H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	Lateral #1	Database:	EDM 5000.1 Single User Db
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Eddy County Offset Wells - Lightning 24 Federal #2 - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 221-INC													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis	Distance											
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside (usft)	Offset Wellbore Centre (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
8,075.00	7,807.97	7,845.35	7,842.45	19.20	572.18	-146.29	6,931.63	-16.14	6,460.18	6,098.54	361.63	17.864		
8,081.52	7,808.00	7,845.29	7,842.40	19.25	572.18	-179.48	6,931.63	-16.14	6,453.65	6,092.02	361.63	17.846		
8,100.00	7,807.97	7,844.98	7,842.08	19.40	572.16	-179.48	6,931.64	-16.14	6,435.18	6,073.55	361.63	17.795		
8,200.00	7,807.76	7,843.29	7,840.39	20.27	572.09	-179.47	6,931.66	-16.12	6,335.19	5,973.61	361.58	17.521		
8,300.00	7,807.55	7,841.61	7,838.72	21.27	572.01	-179.47	6,931.68	-16.11	6,235.20	5,873.66	361.54	17.246		
8,400.00	7,807.35	7,839.95	7,837.05	22.37	571.93	-179.47	6,931.70	-16.10	6,135.21	5,773.71	361.49	16.972		
8,500.00	7,807.14	7,838.29	7,835.39	23.56	571.86	-179.47	6,931.72	-16.08	6,035.22	5,673.77	361.45	16.697		
8,600.00	7,806.93	7,836.65	7,833.75	24.83	571.79	-179.47	6,931.74	-16.07	5,935.23	5,573.82	361.41	16.422		
8,700.00	7,806.73	7,835.01	7,832.12	26.17	571.71	-179.47	6,931.75	-16.06	5,835.24	5,473.87	361.37	16.148		
8,800.00	7,806.52	7,833.39	7,830.50	27.56	571.64	-179.46	6,931.77	-16.05	5,735.24	5,373.91	361.33	15.873		
8,900.00	7,806.32	7,831.78	7,828.89	29.00	571.57	-179.46	6,931.79	-16.03	5,635.25	5,273.96	361.29	15.597		
9,000.00	7,806.11	7,830.18	7,827.29	30.49	571.50	-179.46	6,931.81	-16.02	5,535.26	5,174.01	361.26	15.322		
9,100.00	7,805.90	7,828.59	7,825.70	32.01	571.42	-179.46	6,931.83	-16.01	5,435.27	5,074.05	361.22	15.047		
9,200.00	7,805.70	7,827.02	7,824.12	33.56	571.35	-179.46	6,931.85	-16.00	5,335.28	4,974.09	361.19	14.772		
9,300.00	7,805.49	7,825.45	7,822.56	35.13	571.28	-179.45	6,931.86	-15.99	5,235.29	4,874.14	361.15	14.496		
9,400.00	7,805.29	7,823.89	7,821.00	36.73	571.21	-179.45	6,931.88	-15.97	5,135.30	4,774.18	361.12	14.220		
9,500.00	7,805.08	7,822.35	7,819.45	38.35	571.14	-179.45	6,931.90	-15.96	5,035.31	4,674.22	361.09	13.945		
9,600.00	7,804.87	7,820.81	7,817.92	39.99	571.07	-179.44	6,931.91	-15.95	4,935.32	4,574.25	361.06	13.669		
9,700.00	7,804.67	7,819.28	7,816.39	41.65	571.00	-179.44	6,931.93	-15.94	4,835.32	4,474.29	361.03	13.393		
9,800.00	7,804.46	7,817.77	7,814.87	43.32	570.94	-179.44	6,931.95	-15.93	4,735.33	4,374.33	361.00	13.117		
9,900.00	7,804.25	7,816.26	7,813.37	45.00	570.87	-179.43	6,931.97	-15.92	4,635.34	4,274.36	360.98	12.841		
10,000.00	7,804.05	7,814.77	7,811.87	46.69	570.80	-179.43	6,931.98	-15.91	4,535.35	4,174.40	360.95	12.565		
10,100.00	7,803.84	7,813.28	7,810.39	48.39	570.73	-179.43	6,932.00	-15.90	4,435.36	4,074.43	360.93	12.289		
10,200.00	7,803.64	7,811.80	7,808.91	50.10	570.67	-179.42	6,932.01	-15.89	4,335.37	3,974.46	360.90	12.013		
10,300.00	7,803.43	7,810.34	7,807.44	51.82	570.60	-179.42	6,932.03	-15.88	4,235.37	3,874.50	360.88	11.736		
10,400.00	7,803.22	7,808.88	7,805.99	53.55	570.54	-179.41	6,932.05	-15.86	4,135.38	3,774.53	360.86	11.460		
10,500.00	7,803.02	7,807.43	7,804.54	55.28	570.47	-179.41	6,932.06	-15.85	4,035.39	3,674.55	360.84	11.183		
10,600.00	7,802.81	7,805.99	7,803.10	57.02	570.41	-179.40	6,932.08	-15.84	3,935.40	3,574.58	360.82	10.907		
10,700.00	7,802.60	7,804.56	7,801.67	58.77	570.34	-179.40	6,932.09	-15.83	3,835.41	3,474.61	360.80	10.630		
10,800.00	7,802.40	7,803.14	7,800.25	60.52	570.28	-179.39	6,932.11	-15.82	3,735.42	3,374.63	360.78	10.354		
10,900.00	7,802.19	7,801.73	7,798.84	62.27	570.21	-179.39	6,932.12	-15.81	3,635.42	3,274.66	360.76	10.077		
11,000.00	7,801.99	7,800.33	7,797.44	64.03	570.15	-179.38	6,932.14	-15.80	3,535.43	3,174.68	360.75	9.800		
11,100.00	7,801.78	7,798.93	7,796.04	65.79	570.09	-179.37	6,932.15	-15.79	3,435.44	3,074.71	360.73	9.523		
11,200.00	7,801.57	7,797.55	7,794.66	67.56	570.03	-179.37	6,932.17	-15.78	3,335.45	2,974.73	360.72	9.247		
11,300.00	7,801.37	7,796.17	7,793.28	69.33	569.96	-179.36	6,932.18	-15.77	3,235.45	2,874.75	360.71	8.970		
11,400.00	7,801.16	7,794.81	7,791.91	71.10	569.90	-179.35	6,932.19	-15.77	3,135.46	2,774.77	360.70	8.693		
11,500.00	7,800.95	7,793.45	7,790.55	72.87	569.84	-179.34	6,932.21	-15.76	3,035.47	2,674.79	360.68	8.416		
11,600.00	7,800.75	7,792.10	7,789.20	74.65	569.78	-179.33	6,932.22	-15.75	2,935.48	2,574.80	360.67	8.139		
11,700.00	7,800.54	7,790.75	7,787.86	76.43	569.72	-179.32	6,932.24	-15.74	2,835.49	2,474.82	360.67	7.862		
11,800.00	7,800.34	7,789.42	7,786.53	78.22	569.66	-179.31	6,932.25	-15.73	2,735.49	2,374.83	360.66	7.585		
11,900.00	7,800.13	7,788.09	7,785.20	80.00	569.60	-179.30	6,932.26	-15.72	2,635.50	2,274.85	360.65	7.308		
12,000.00	7,799.92	7,786.78	7,783.89	81.79	569.54	-179.28	6,932.28	-15.71	2,535.51	2,174.86	360.65	7.030		
12,100.00	7,799.72	7,785.47	7,782.58	83.57	569.48	-179.27	6,932.29	-15.70	2,435.52	2,074.87	360.64	6.753		
12,200.00	7,799.51	7,784.17	7,781.28	85.36	569.42	-179.25	6,932.30	-15.69	2,335.52	1,974.89	360.64	6.476		
12,300.00	7,799.30	7,782.87	7,779.98	87.16	569.37	-179.23	6,932.32	-15.68	2,235.53	1,874.90	360.63	6.199		
12,400.00	7,799.10	7,781.59	7,778.70	88.95	569.31	-179.22	6,932.33	-15.68	2,135.54	1,774.90	360.63	5.922		
12,500.00	7,798.89	7,780.31	7,777.42	90.74	569.25	-179.19	6,932.34	-15.67	2,035.54	1,674.91	360.63	5.644		
12,600.00	7,798.69	7,779.04	7,776.15	92.54	569.19	-179.17	6,932.35	-15.66	1,935.55	1,574.92	360.63	5.367		
12,700.00	7,798.48	7,777.78	7,774.89	94.34	569.14	-179.15	6,932.37	-15.65	1,835.56	1,474.93	360.63	5.090		
12,800.00	7,798.27	7,776.52	7,773.63	96.14	569.08	-179.12	6,932.38	-15.64	1,735.57	1,374.93	360.64	4.813		
12,900.00	7,798.07	7,775.27	7,772.38	97.94	569.02	-179.08	6,932.39	-15.63	1,635.57	1,274.93	360.64	4.535		
13,000.00	7,797.86	7,774.03	7,771.14	99.74	568.97	-179.05	6,932.40	-15.63	1,535.58	1,174.94	360.64	4.258		

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



TDS
Anticollision Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Road Runner Federal Com #12H
Site Error: 0.00 usft
Reference Well: Road Runner Federal Com #12H
Well Error: 0.00 usft
Reference Wellbore: Lateral #1
Reference Design: Design #1

Local Co-ordinate Reference: Well Road Runner Federal Com #12H
TVD Reference: KB @ 3272.70usft (Latshaw 44)
MD Reference: KB @ 3272.70usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design: Eddy County Offset Wells - Lightning 24 Federal #2 - OH - OH													Offset Site Error: 0.00 usft
Survey Program: 221-INC													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		Warning			
Measured Vertical Depth (usft)	Measured Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N/S (usft)	Offset Wellbore Centre E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
13,100.00	7,797.66	7,772.80	7,769.91	101.54	568.91	-179.00	6,932.42	-15.62	1,435.59	1,074.94	360.65	3.981	
13,200.00	7,797.45	7,771.58	7,768.69	103.34	568.86	-178.96	6,932.43	-15.61	1,335.59	974.94	360.66	3.703	
13,300.00	7,797.24	7,770.36	7,767.47	105.15	568.80	-178.90	6,932.44	-15.60	1,235.60	874.93	360.67	3.426	
13,400.00	7,797.04	7,769.15	7,766.26	106.95	568.75	-178.83	6,932.45	-15.59	1,135.61	774.93	360.68	3.149	
13,500.00	7,796.83	7,767.94	7,765.05	108.76	568.69	-178.75	6,932.46	-15.59	1,035.61	674.92	360.69	2.871	
13,600.00	7,796.62	7,766.75	7,763.86	110.56	568.64	-178.66	6,932.47	-15.58	935.62	574.92	360.70	2.594	
13,700.00	7,796.42	7,765.56	7,762.67	112.37	568.59	-178.54	6,932.49	-15.57	835.63	474.91	360.72	2.317	
13,800.00	7,796.21	7,764.38	7,761.49	114.18	568.53	-178.38	6,932.50	-15.56	735.63	374.89	360.74	2.039	
13,900.00	7,796.01	7,763.20	7,760.31	115.98	568.48	-178.18	6,932.51	-15.56	635.64	274.87	360.77	1.762	
14,000.00	7,795.80	7,762.03	7,759.14	117.79	568.43	-177.91	6,932.52	-15.55	535.65	174.85	360.80	1.485 Level 3	
14,100.00	7,795.59	7,760.87	7,757.98	119.60	568.37	-177.50	6,932.53	-15.54	435.65	74.81	360.84	1.207 Level 2	
14,200.00	7,795.39	7,759.71	7,756.82	121.41	568.32	-176.86	6,932.54	-15.53	335.66	-25.25	360.91	0.930 Level 1	
14,300.00	7,795.18	7,758.56	7,755.68	123.22	568.27	-175.67	6,932.55	-15.53	235.67	-125.35	361.02	0.653 Level 1	
14,400.00	7,794.97	7,757.42	7,754.53	125.03	568.22	-172.75	6,932.56	-15.52	135.67	-225.59	361.26	0.376 Level 1	
14,500.00	7,794.77	7,756.29	7,753.40	126.85	568.17	-154.88	6,932.57	-15.51	35.68	-327.16	362.85	0.098 Level 1	
14,535.68	7,794.69	7,755.88	7,752.99	127.49	568.15	-89.64	6,932.58	-15.51	0.19	-606.96	607.14	0.000 Level 1, CC, ES, SF	
14,600.00	7,794.56	7,755.16	7,752.27	128.66	568.12	-14.04	6,932.58	-15.51	64.31	-295.25	359.57	0.179 Level 1	
14,700.00	7,794.36	7,754.03	7,751.15	130.47	568.07	-5.40	6,932.59	-15.50	164.31	-195.99	360.29	0.456 Level 1	
14,800.00	7,794.15	7,752.92	7,750.03	132.29	568.02	-3.24	6,932.60	-15.49	264.30	-96.18	360.48	0.733 Level 1	
14,900.00	7,793.94	7,751.81	7,748.92	134.10	567.97	-2.26	6,932.61	-15.49	364.29	3.72	360.58	1.010 Level 2	
15,000.00	7,793.74	7,750.70	7,747.81	135.91	567.92	-1.71	6,932.62	-15.48	464.29	103.65	360.64	1.287 Level 3	
15,100.00	7,793.53	7,749.61	7,746.72	137.73	567.87	-1.35	6,932.63	-15.47	564.28	203.59	360.69	1.564	
15,200.00	7,793.32	7,748.51	7,745.63	139.54	567.82	-1.10	6,932.64	-15.47	664.28	303.55	360.73	1.841	
15,300.00	7,793.12	7,747.43	7,744.54	141.36	567.77	-0.91	6,932.65	-15.46	764.27	403.51	360.76	2.118	
15,400.00	7,792.91	7,746.35	7,743.46	143.17	567.72	-0.77	6,932.66	-15.45	864.26	503.47	360.79	2.395	
15,500.00	7,792.71	7,745.27	7,742.39	144.99	567.67	-0.66	6,932.67	-15.45	964.26	603.43	360.82	2.672	
15,600.00	7,792.50	7,744.21	7,741.32	146.81	567.62	-0.57	6,932.68	-15.44	1,064.25	703.40	360.85	2.949	
15,700.00	7,792.29	7,743.15	7,740.26	148.62	567.58	-0.49	6,932.69	-15.43	1,164.25	803.36	360.88	3.226	
15,800.00	7,792.09	7,742.09	7,739.20	150.44	567.53	-0.43	6,932.70	-15.43	1,264.24	903.33	360.91	3.503	
15,900.00	7,791.88	7,741.04	7,738.15	152.26	567.48	-0.37	6,932.71	-15.42	1,364.23	1,003.30	360.94	3.780	
16,000.00	7,791.67	7,740.00	7,737.11	154.07	567.44	-0.33	6,932.72	-15.41	1,464.23	1,103.26	360.97	4.056	
16,100.00	7,791.47	7,738.96	7,736.07	155.89	567.39	-0.28	6,932.73	-15.41	1,564.22	1,203.23	361.00	4.333	
16,200.00	7,791.26	7,737.92	7,735.04	157.71	567.34	-0.25	6,932.74	-15.40	1,664.22	1,303.19	361.02	4.610	
16,300.00	7,791.06	7,736.90	7,734.01	159.53	567.30	-0.22	6,932.75	-15.40	1,764.21	1,403.16	361.05	4.886	
16,400.00	7,790.85	7,735.87	7,732.99	161.35	567.25	-0.19	6,932.76	-15.39	1,864.20	1,503.12	361.08	5.163	
16,500.00	7,790.64	7,734.86	7,731.97	163.17	567.20	-0.16	6,932.76	-15.38	1,964.20	1,603.09	361.11	5.439	
16,600.00	7,790.44	7,733.85	7,730.96	164.98	567.16	-0.14	6,932.77	-15.38	2,064.19	1,703.05	361.14	5.716	
16,700.00	7,790.23	7,732.84	7,729.96	166.80	567.11	-0.12	6,932.78	-15.37	2,164.19	1,803.01	361.17	5.992	
16,800.00	7,790.03	7,731.84	7,728.96	168.62	567.07	-0.10	6,932.79	-15.37	2,264.18	1,902.98	361.21	6.268	
16,900.00	7,789.82	7,730.85	7,727.96	170.44	567.02	-0.08	6,932.80	-15.36	2,364.18	2,002.94	361.24	6.545	
17,000.00	7,789.61	7,729.86	7,726.97	172.26	566.98	-0.07	6,932.81	-15.36	2,464.17	2,102.90	361.27	6.821	
17,100.00	7,789.41	7,728.87	7,725.99	174.08	566.93	-0.05	6,932.82	-15.35	2,564.17	2,202.86	361.30	7.097	
17,200.00	7,789.20	7,727.90	7,725.01	175.90	566.89	-0.04	6,932.82	-15.34	2,664.16	2,302.82	361.34	7.373	
17,300.00	7,788.99	7,726.92	7,724.04	177.72	566.85	-0.03	6,932.83	-15.34	2,764.15	2,402.78	361.37	7.649	
17,400.00	7,788.79	7,725.95	7,723.07	179.54	566.80	-0.02	6,932.84	-15.33	2,864.15	2,502.74	361.41	7.925	
17,500.00	7,788.58	7,724.99	7,722.10	181.37	566.76	-0.01	6,932.85	-15.33	2,964.14	2,602.70	361.44	8.201	
17,600.00	7,788.38	7,724.03	7,721.15	183.19	566.72	0.00	6,932.86	-15.32	3,064.14	2,702.66	361.48	8.477	
17,700.00	7,788.17	7,723.08	7,720.19	185.01	566.67	0.01	6,932.86	-15.32	3,164.13	2,802.62	361.51	8.752	
17,782.02	7,788.00	7,722.30	7,719.41	186.50	566.64	0.02	6,932.87	-15.31	3,246.15	2,884.61	361.54	8.979	
17,782.48	7,788.00	7,722.30	7,719.41	186.51	566.64	0.02	6,932.87	-15.31	3,246.61	2,881.55	365.06	8.893	

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

Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Road Runner Federal Com #12H
Site Error: 0.00 usft
Reference Well: Road Runner Federal Com #12H
Well Error: 0.00 usft
Reference Wellbore: Lateral #1
Reference Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Output errors are at:
Database:
Offset TVD Reference:

Well Road Runner Federal Com #12H
KB @ 3272.70usft (Latshaw 44)
KB @ 3272.70usft (Latshaw 44)
Grid
Minimum Curvature
2.00 sigma
EDM 5000.1 Single User Db
Offset Datum

Reference Depths are relative to KB @ 3272.70usft (Latshaw 44)

Offset Depths are relative to Offset Datum

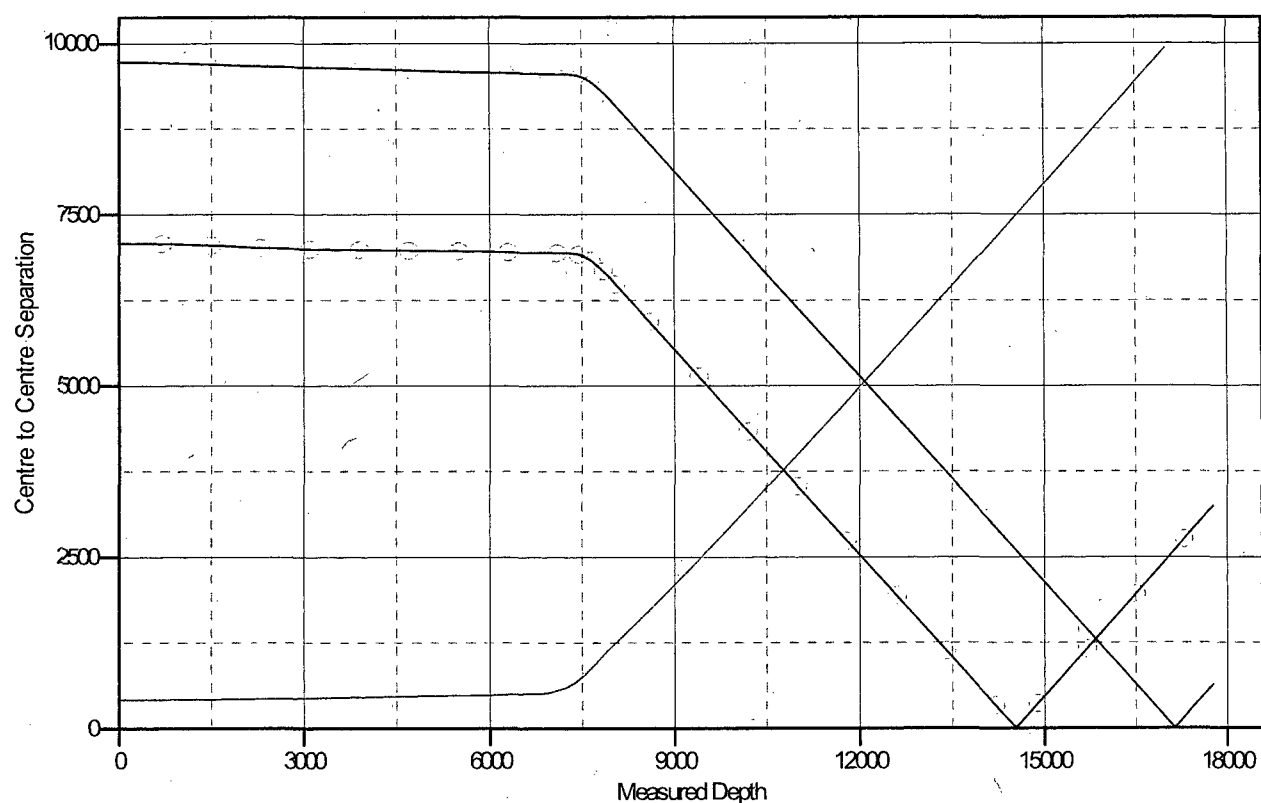
Central Meridian is 104° 20' 0.000 W

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

- Lightning 24 Federal #2, OH, OHV0

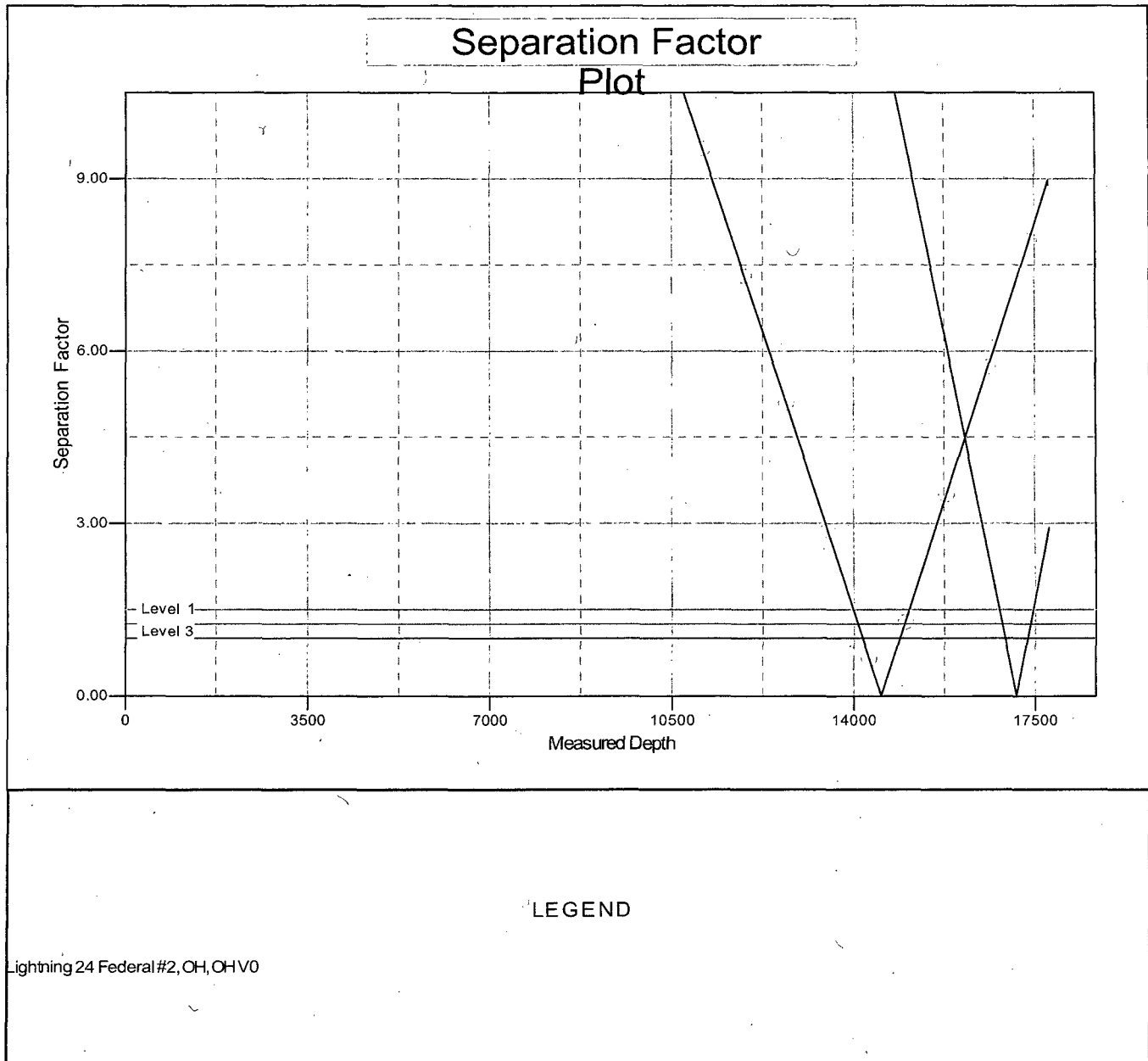


Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Reference Site: Road Runner Federal Com #12H
Site Error: 0.00 usft
Reference Well: Road Runner Federal Com #12H
Well Error: 0.00 usft
Reference Wellbore: Lateral #1
Reference Design: Design #1

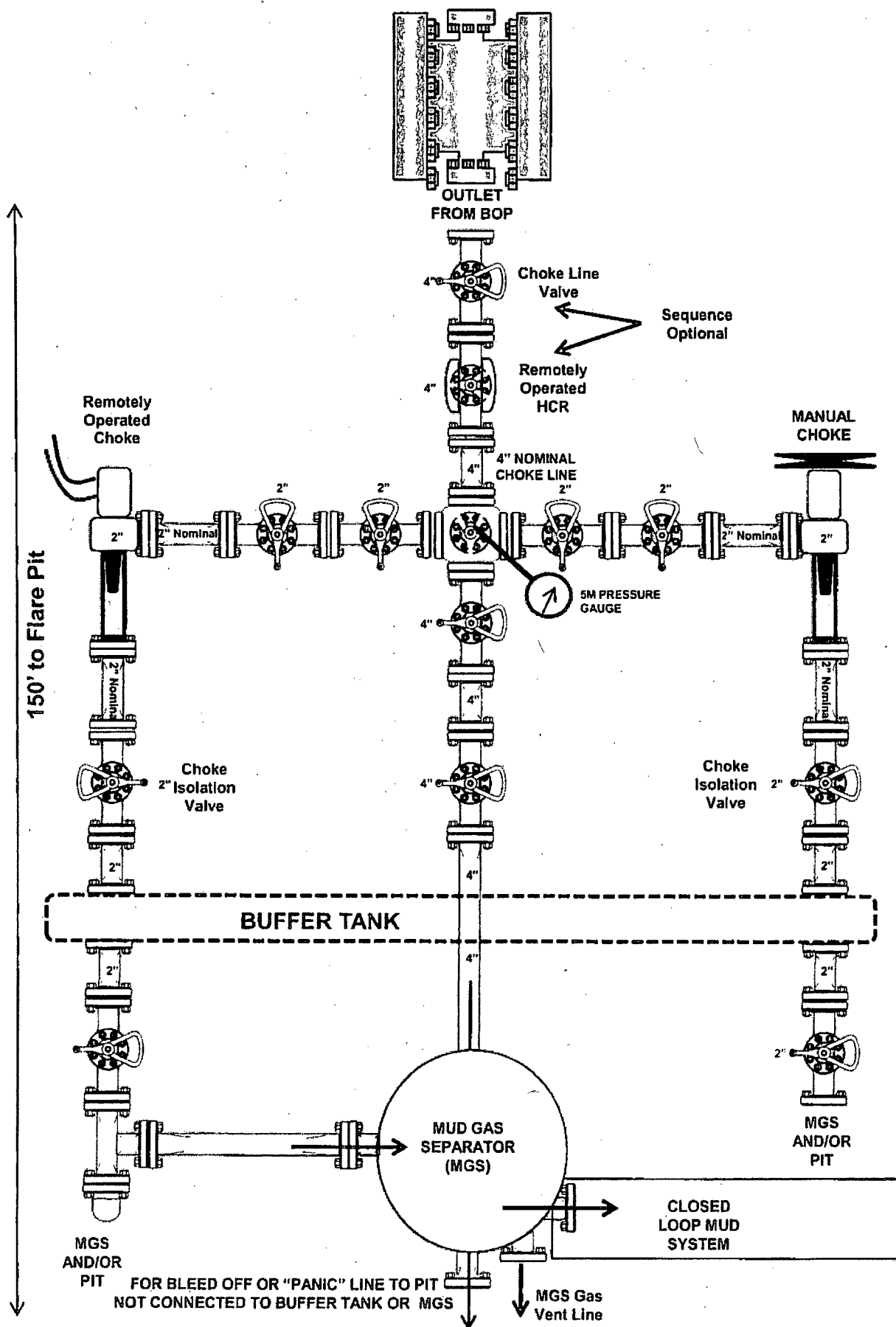
Local Co-ordinate Reference
TVD Reference: Well Road Runner Federal Com #12H
MD Reference: KB @ 3272.70usft (Latshaw 44)
North Reference: KB @ 3272.70usft (Latshaw 44)
Survey Calculation Method: Grid
Output errors are at: Minimum Curvature
Database: 2.00 sigma
Offset TVD Reference: EDM 5000.1 Single User Db
Offset Datum: Offset Datum

Reference Depths are relative to KB @ 3272.70usft (Latshaw 44)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

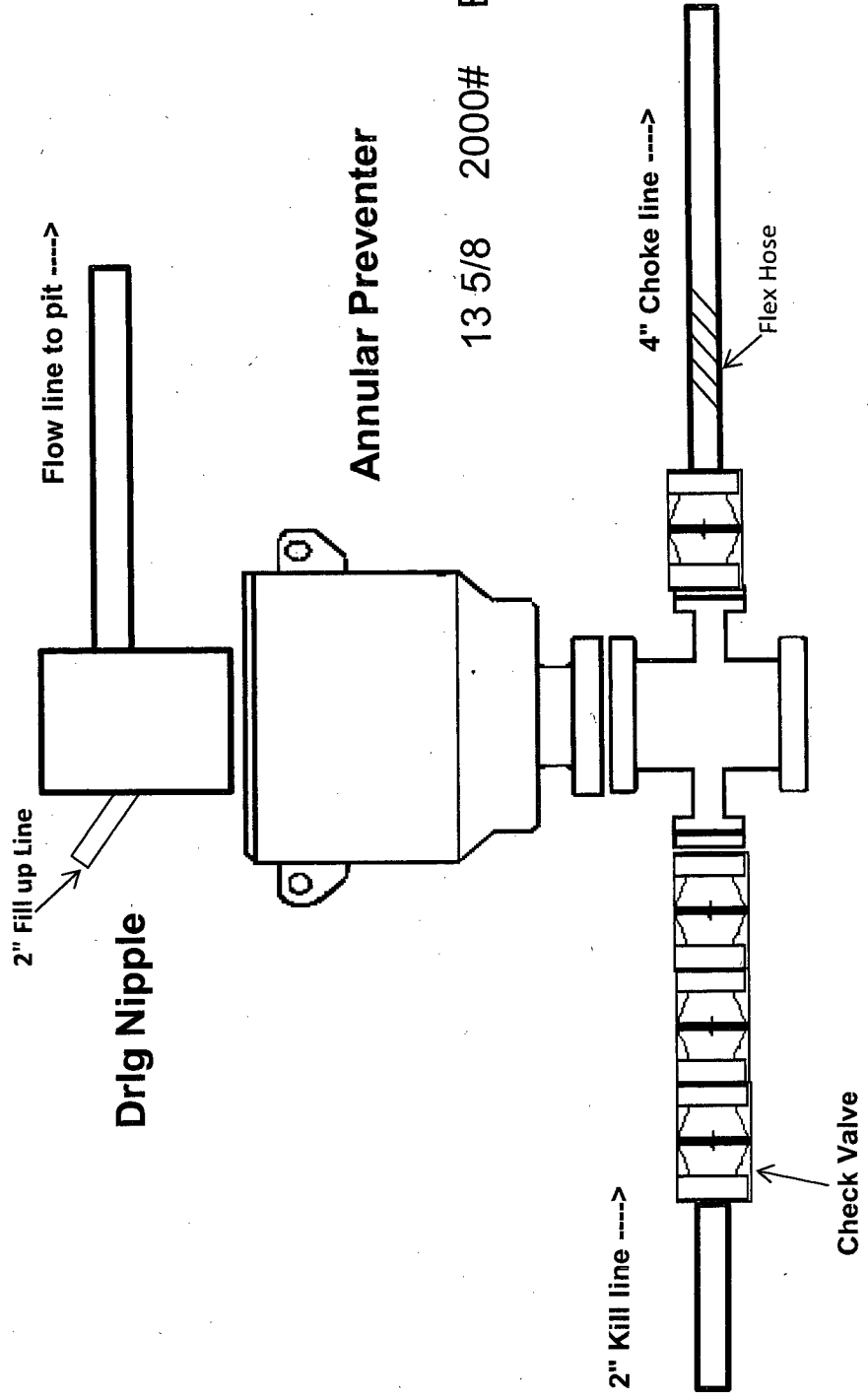
Coordinates are relative to: Road Runner Federal Com #12H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.05°



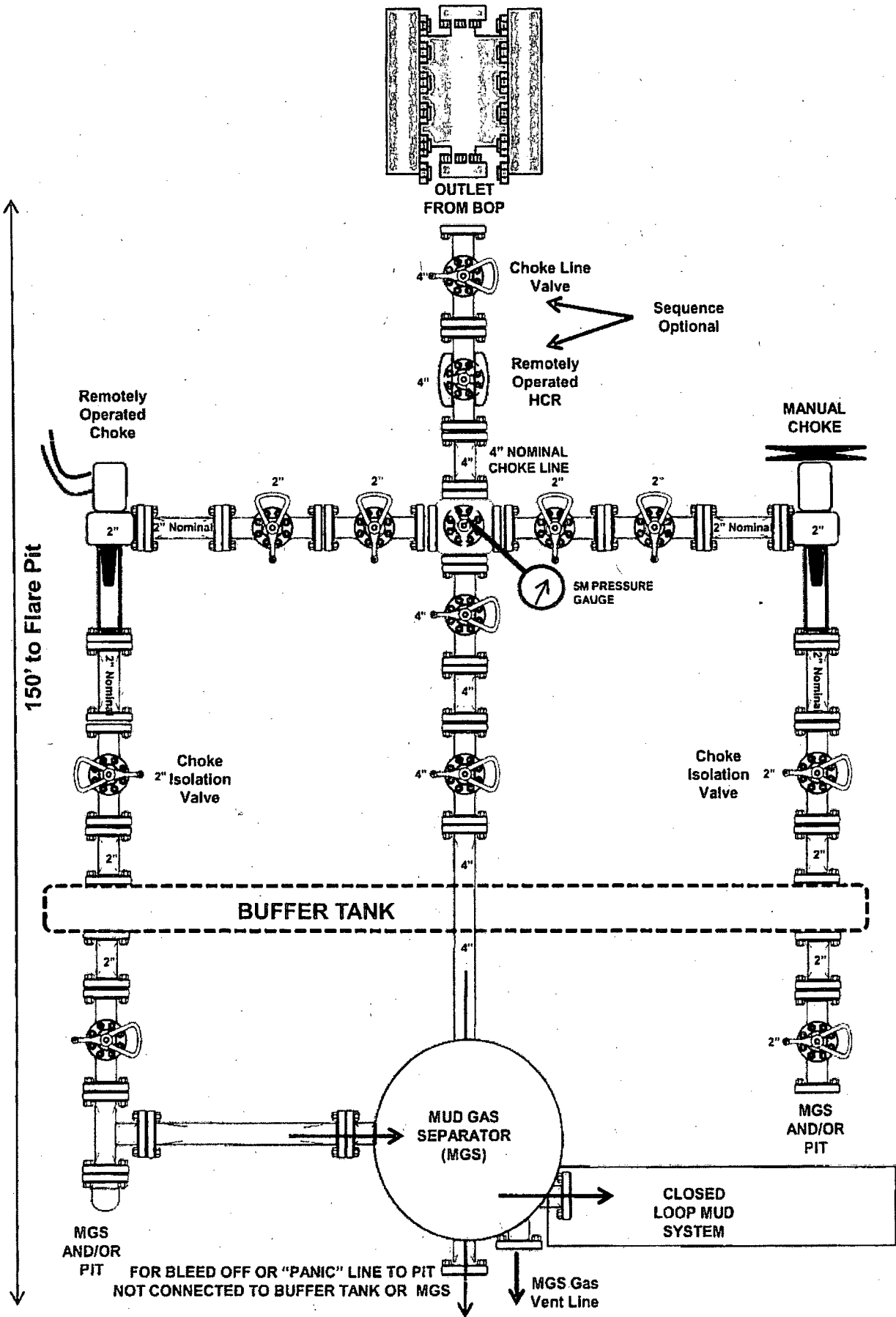
2M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)



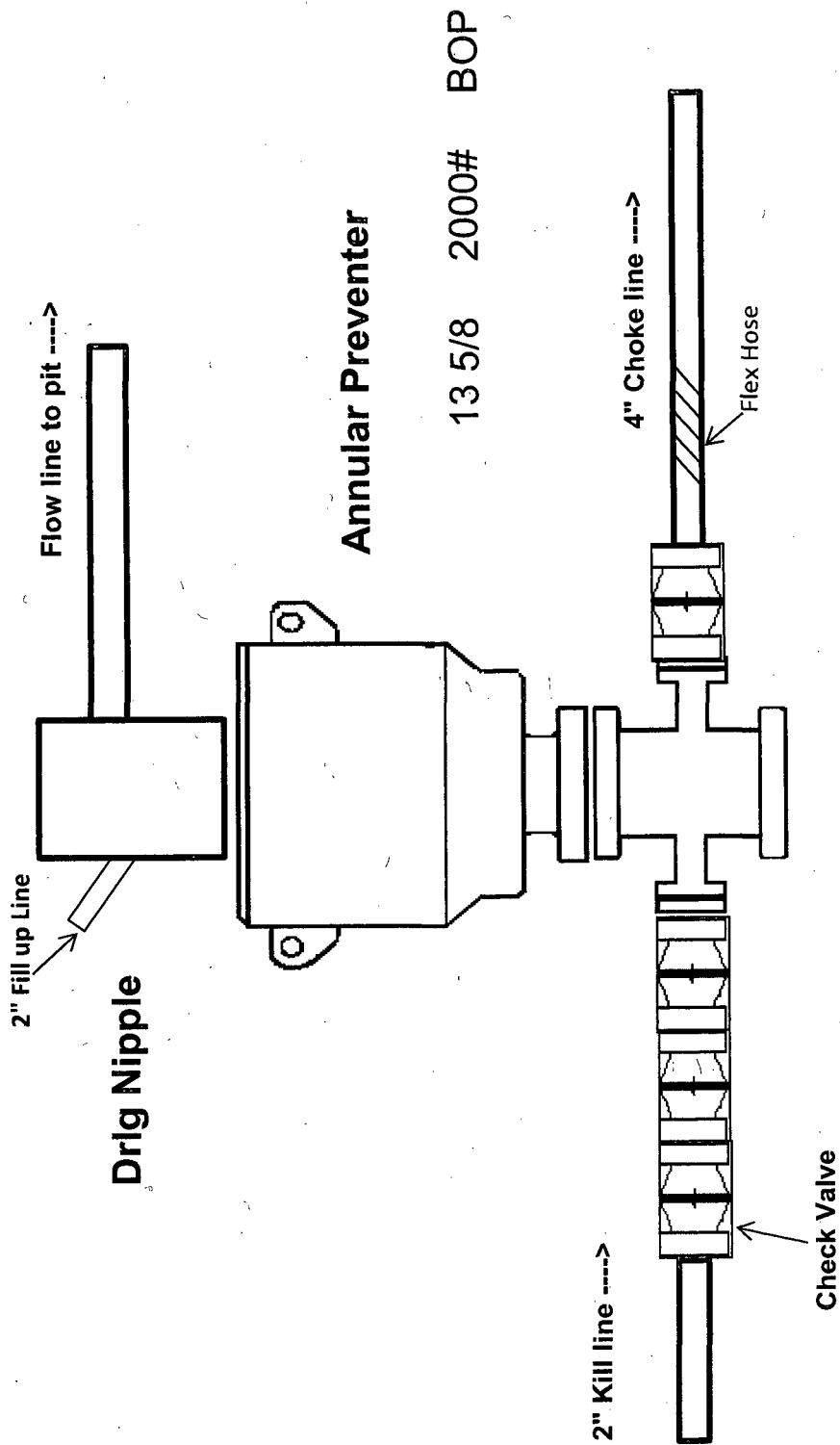
2,000 psi BOP Schematic



3M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)

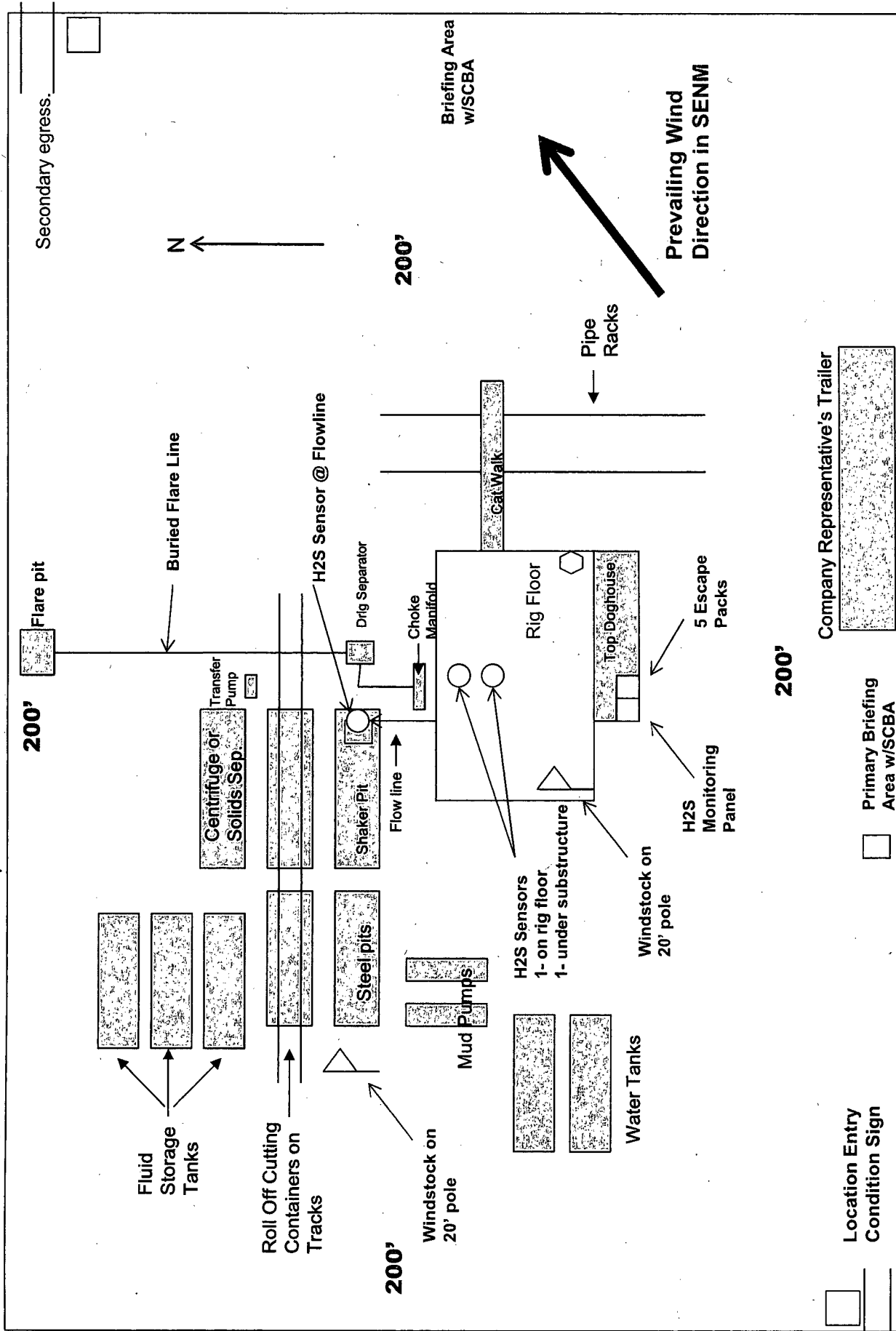


2,000 psi BOP Schematic



COG Operating LLC
H₂S Equipment Schematic
Terrain: Shinnery sand hills.

Well pad will be 400' x 400'
with cellar in center of pad



COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

- a. The hazards and characteristics of hydrogen sulfide (H₂S).
- b. The proper use and maintenance of personal protective equipment and life support systems.
- c. The proper use of H₂S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
- d. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

- a. The effects of H₂S on metal components. If high tensile tubulars are to be used, personnel will be trained in their special maintenance requirements.
- b. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
- c. The contents and requirements of the H₂S Drilling Operations Plan and the Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H₂S zone (within 3 days or 500 feet) and weekly H₂S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H₂S Drilling Operations Plan and the Public Protection Plan. This plan shall be available at the well site. All personnel will be required to carry documentation that they have received the proper training.

2. H₂S SAFETY EQUIPMENT AND SYSTEMS

Note: All H₂S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonably expected to contain H₂S. If H₂S greater than 100 ppm is encountered in the gas stream we will shut in and install H₂S equipment.

- a. Well Control Equipment:
 - Flare line.
 - Choke manifold with remotely operated choke.
 - Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.
 - Auxiliary equipment to include: annular preventer, mud-gas separator, rotating head.

- b. Protective equipment for essential personnel:
Mark II Surviveair 30-minute units located in the dog house and at briefing areas.
- c. H2S detection and monitoring equipment:
2 - portable H2S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 ppm are reached.
- d. Visual warning systems:
Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.
- e. Mud Program:
The mud program has been designed to minimize the volume of H2S circulated to the surface.
- f. Metallurgy:
All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.
- g. Communication:
Company vehicles equipped with cellular telephone.

COG OPERATING LLC has conducted a review to determine if an H2S contingency plan is required for the above referenced well. We were able to conclude that any potential hazardous volume would be minimal. H2S concentrations of wells in this area from surface to TD are low enough; therefore, we do not believe that an H2S contingency plan is necessary.

W A R N I N G

**YOU ARE ENTERING AN H₂S AREA
AUTHORIZED PERSONNEL ONLY**

- 1. BEARDS OR CONTACT LENSES NOT ALLOWED***
- 2. HARD HATS REQUIRED***
- 3. SMOKING IN DESIGNATED AREAS ONLY***
- 4. BE WIND CONSCIOUS AT ALL TIMES***
- 5. CK WITH COG OPERATING LLC FOREMAN AT MAIN OFFICE***

COG OPERATING LLC

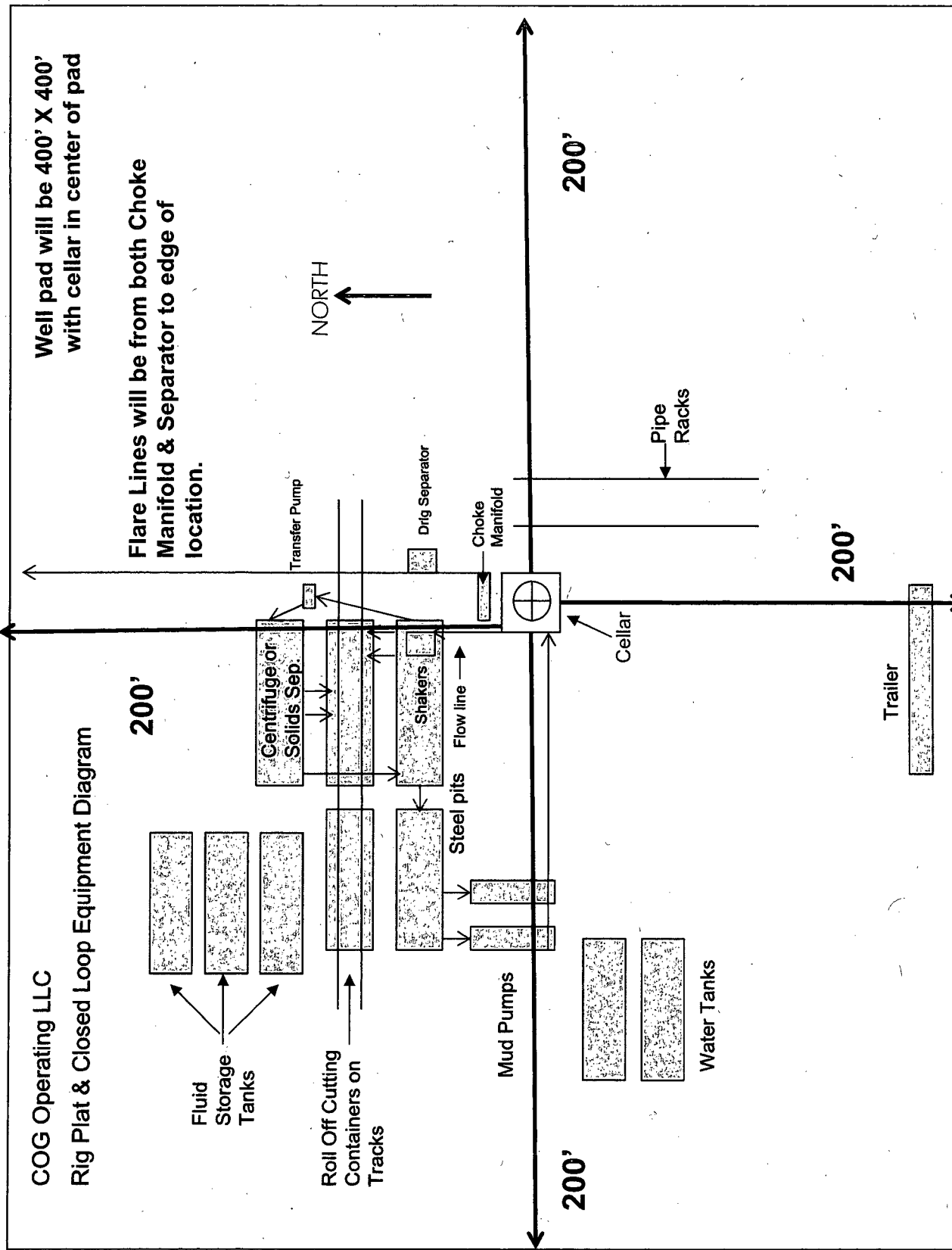
1-575-748-6940

EMERGENCY CALL LIST

	<u>OFFICE</u>	<u>MOBILE</u>
COG OPERATING LLC OFFICE	575-748-6940	
SETH WILD	432-683-7443	432-528-3633
WALTER ROYE	575-748-6940	432-934-1886

EMERGENCY RESPONSE NUMBERS

	<u>OFFICE</u>
STATE POLICE	575-748-9718
EDDY COUNTY SHERIFF	575-746-2701
EMERGENCY MEDICAL SERVICES (AMBULANCE)	911 or 575-746-2701
EDDY COUNTY EMERGENCY MANAGEMENT (HARRY BURGESS)	575-887-9511
STATE EMERGENCY RESPONSE CENTER (SERC)	575-476-9620
CARLSBAD POLICE DEPARTMENT	575-885-2111
CARLSBAD FIRE DEPARTMENT	575-885-3125
NEW MEXICO OIL CONSERVATION DIVISION	575-748-1283
INDIAN FIRE & SAFETY	800-530-8693
HALLIBURTON SERVICES	800-844-8451



"I further certify that COG will comply with Rule 19.15.17 NMAC by using a Closed Loop System."



Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: LATSHAW DRILLING	Customer P.O.# RIG#44
Sales Order # 242739	Date Assembled: 2/9/2015

Specifications

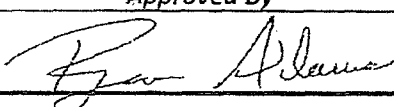
Hose Assembly Type: Choke & Kill	
Assembly Serial # 292614-1	Hose Lot # and Date Code 10900-08/13
Hose Working Pressure (psi) 10000	Test Pressure (psi) 15000

We hereby certify that the above material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards.

Supplier:

Midwest Hose & Specialty, Inc.
3312 S I-35 Service Rd
Oklahoma City, OK 73129

Comments:

Approved By 	Date 2/10/2015
--	--------------------------



Midwest Hose
& Specialty, Inc.

Certificate of Conformity

Customer: LATSHAW DRILLING	Customer P.O.# RIG#44
Sales Order # 242739	Date Assembled: 2/9/2015

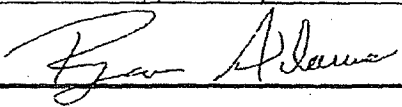
Specifications

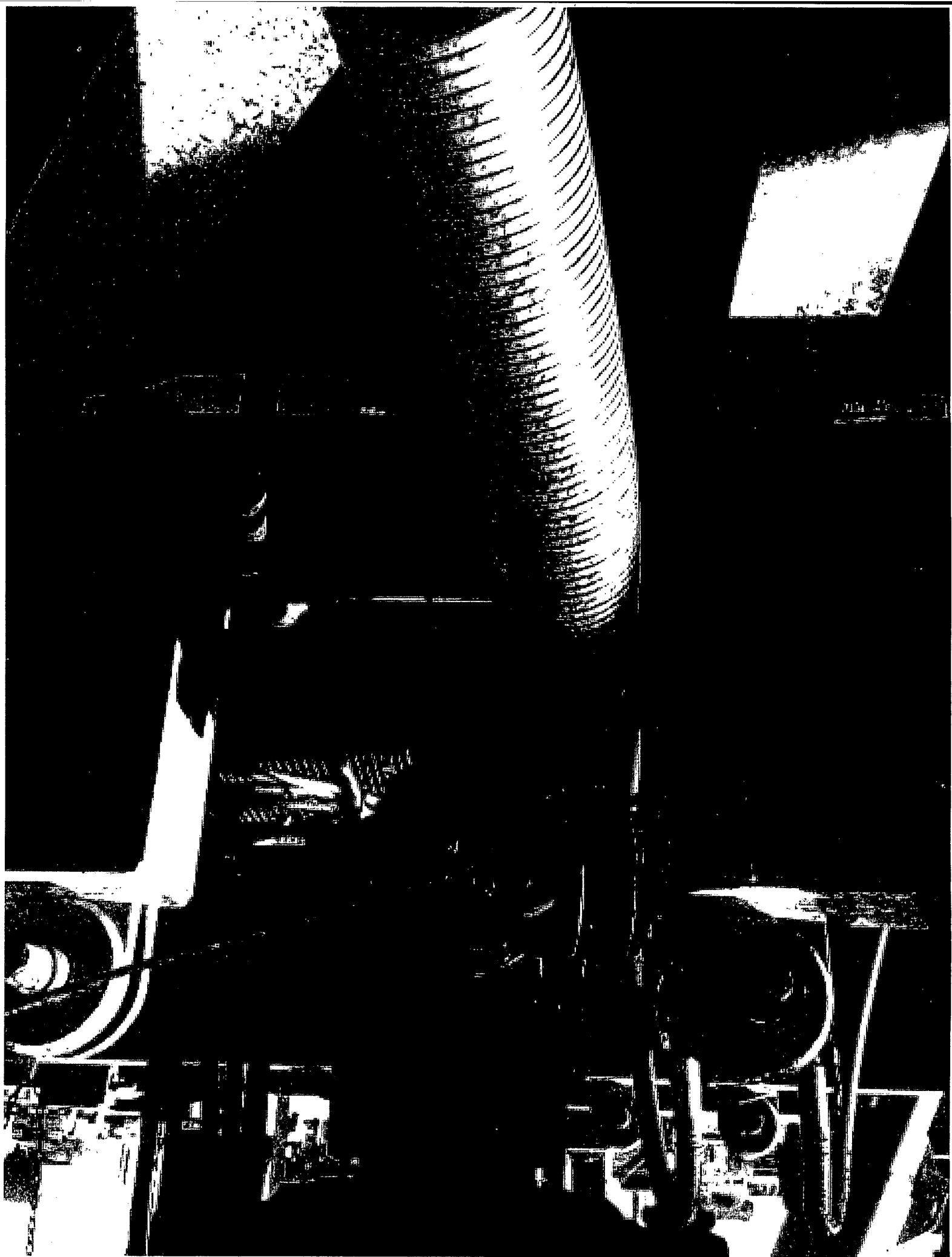
Hose Assembly Type:	Choke & Kill		
Assembly Serial #	292614-2	Hose Lot # and Date Code	11794-10/14
Hose Working Pressure (psi)	10000	Test Pressure (psi)	15000

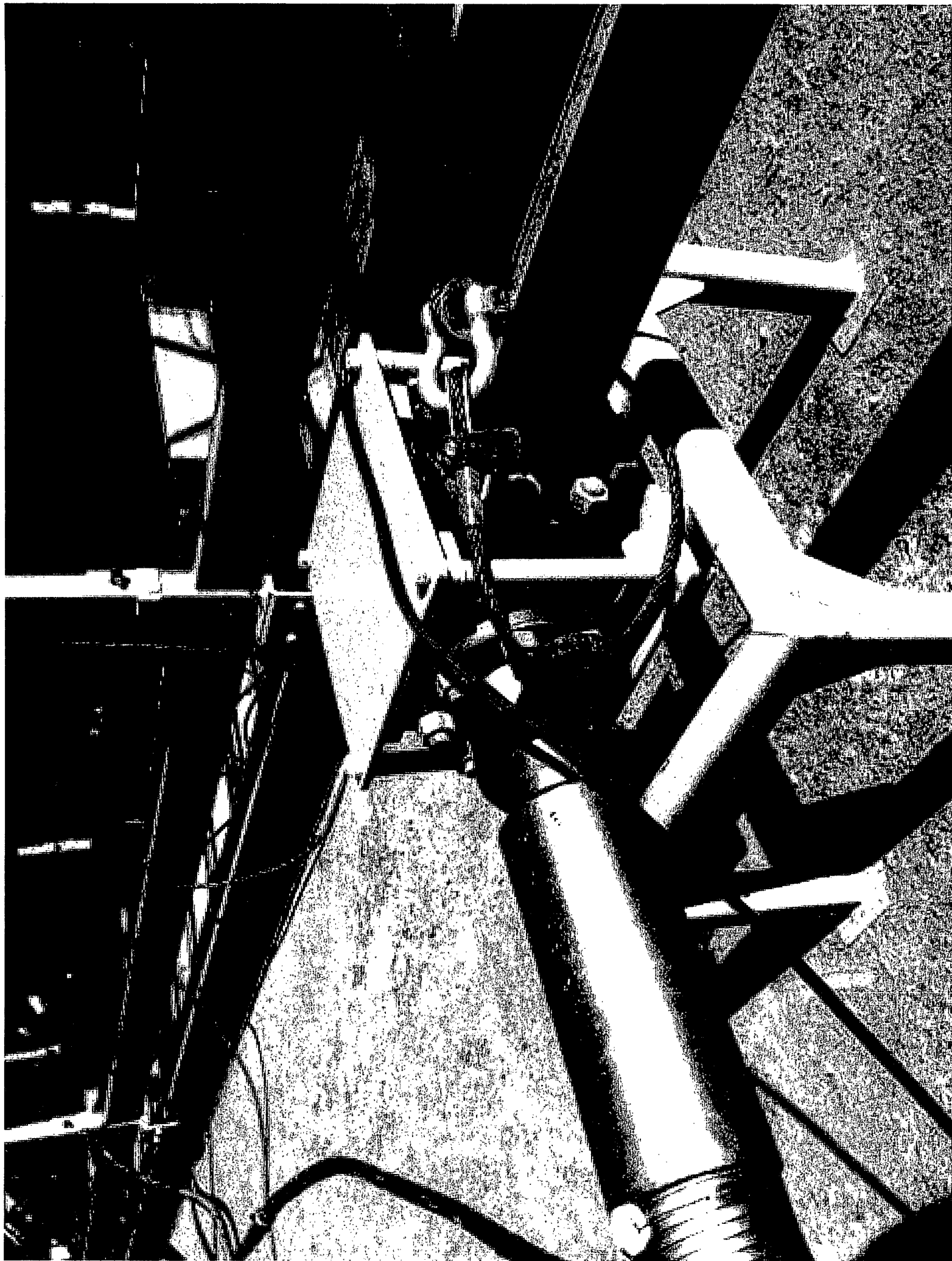
We hereby certify that the above material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards.

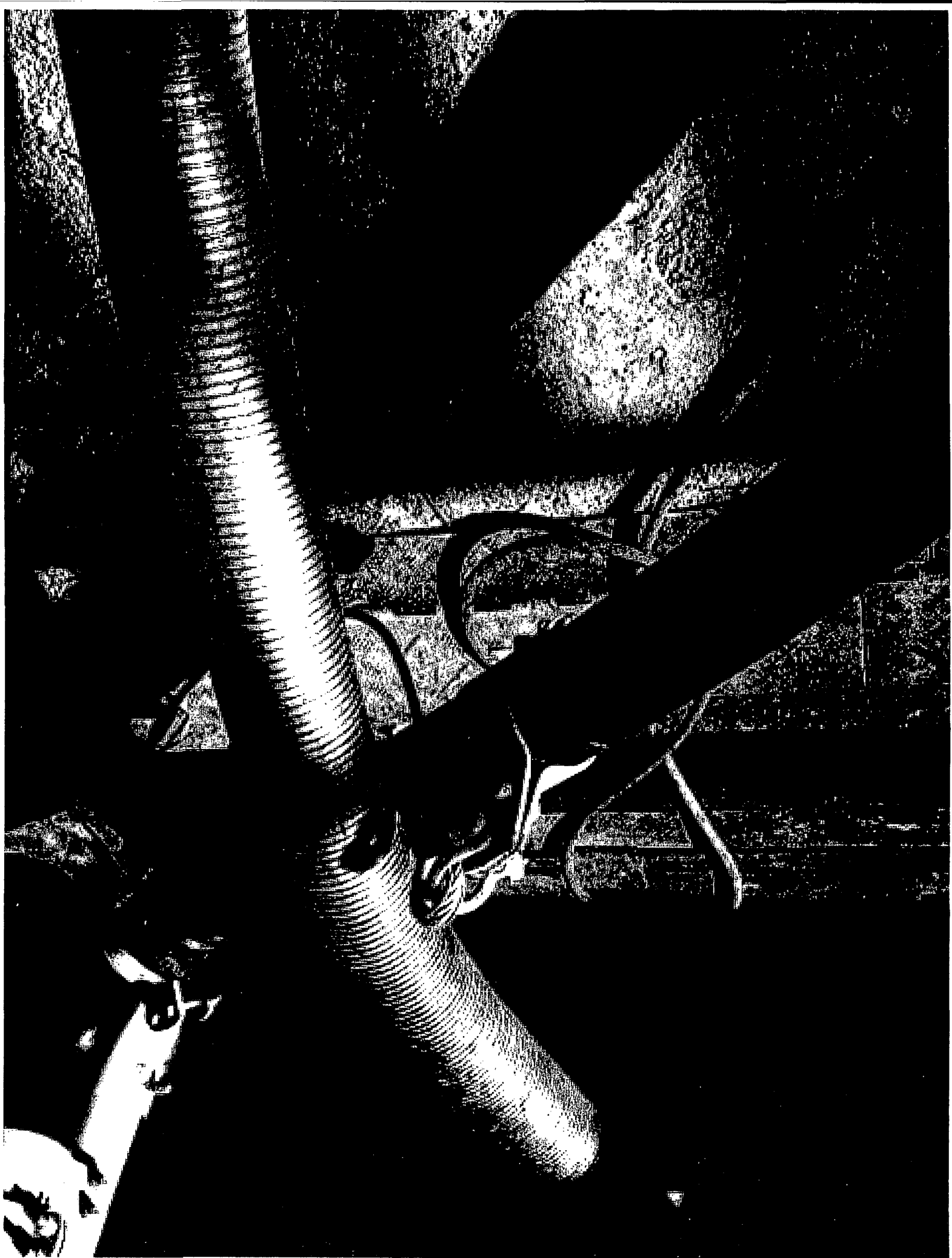
Supplier:
Midwest Hose & Specialty, Inc.
3312 S I-35 Service Rd
Oklahoma City, OK 73129

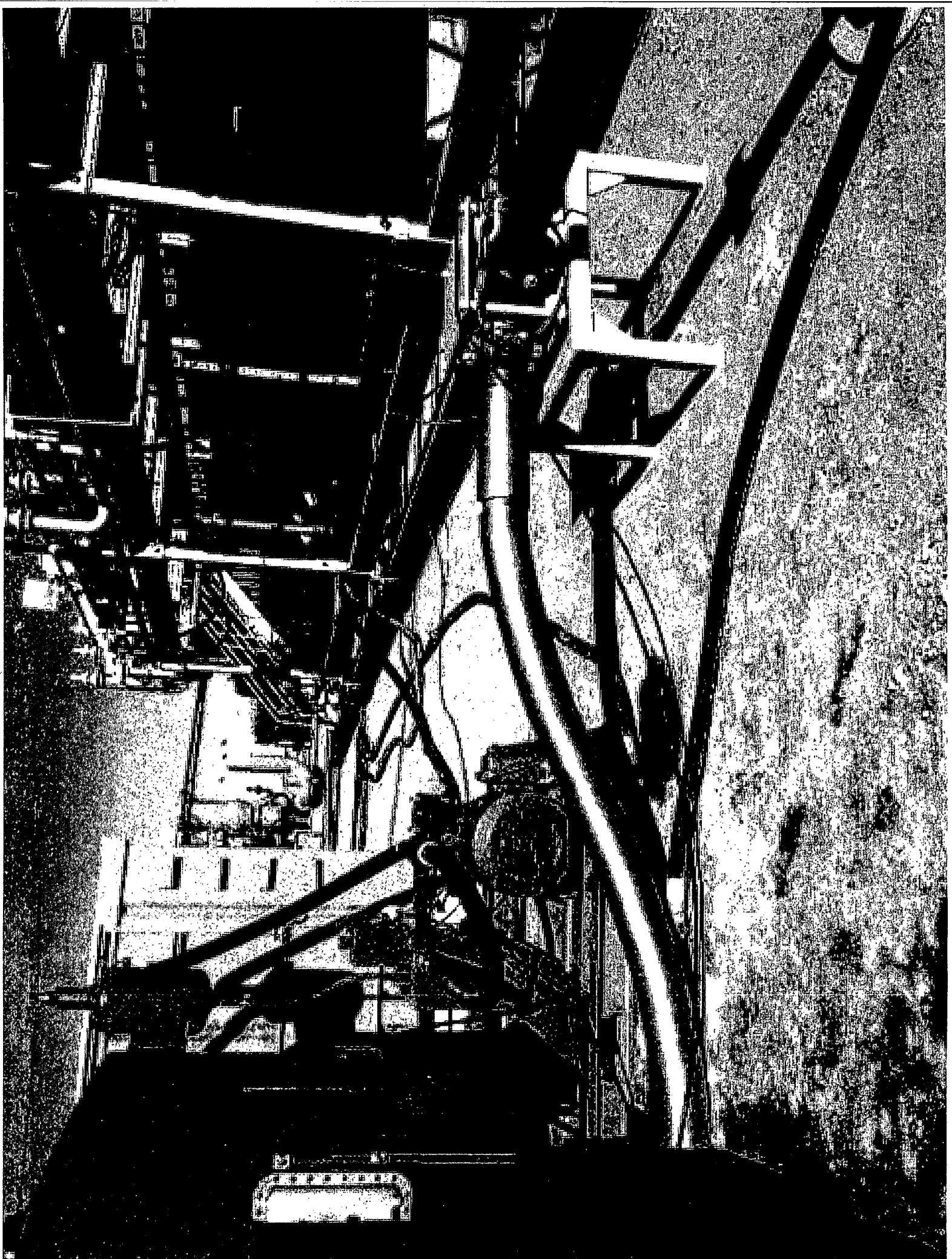
Comments:

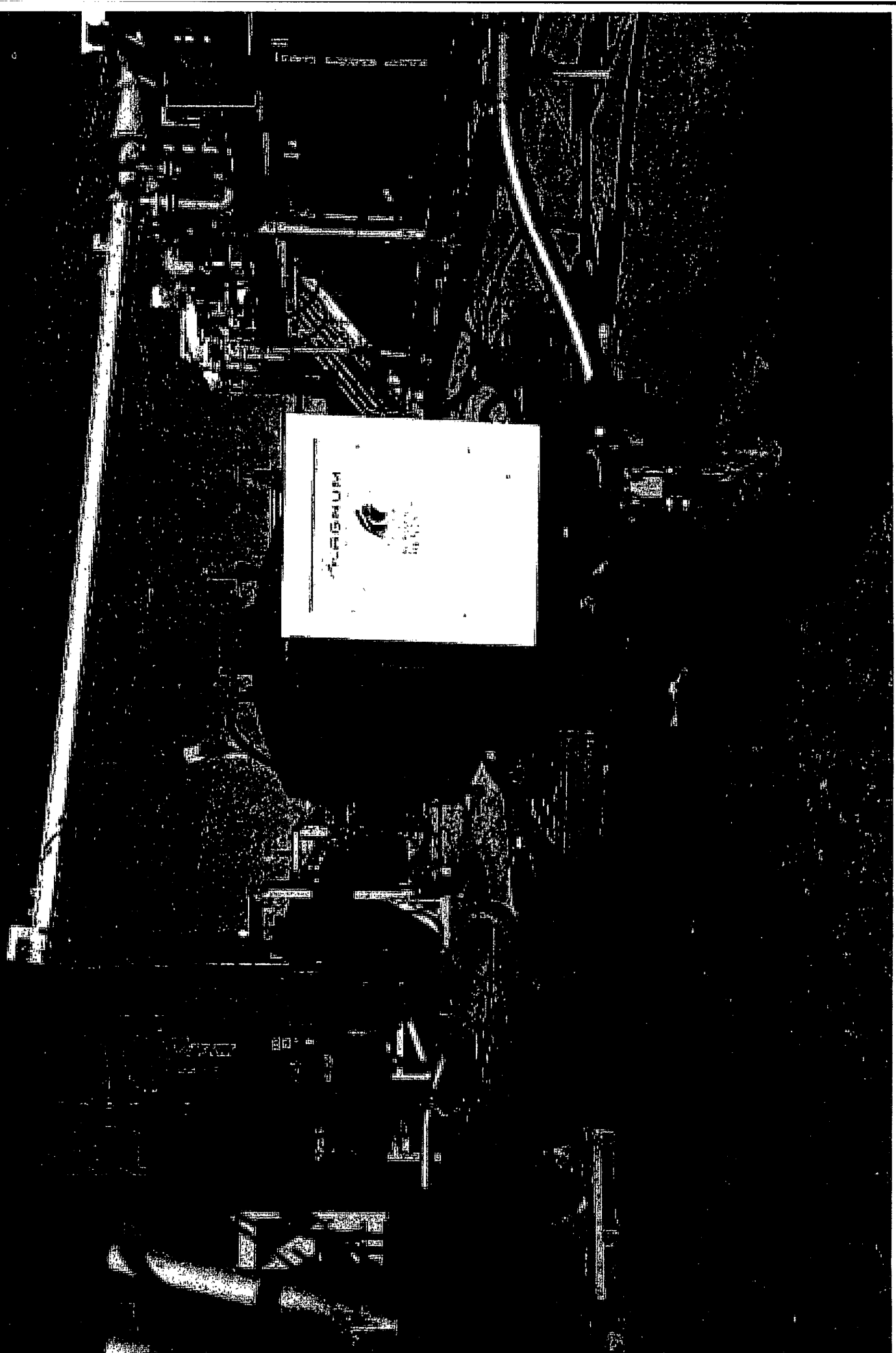
Approved By	Date
	2/10/2015











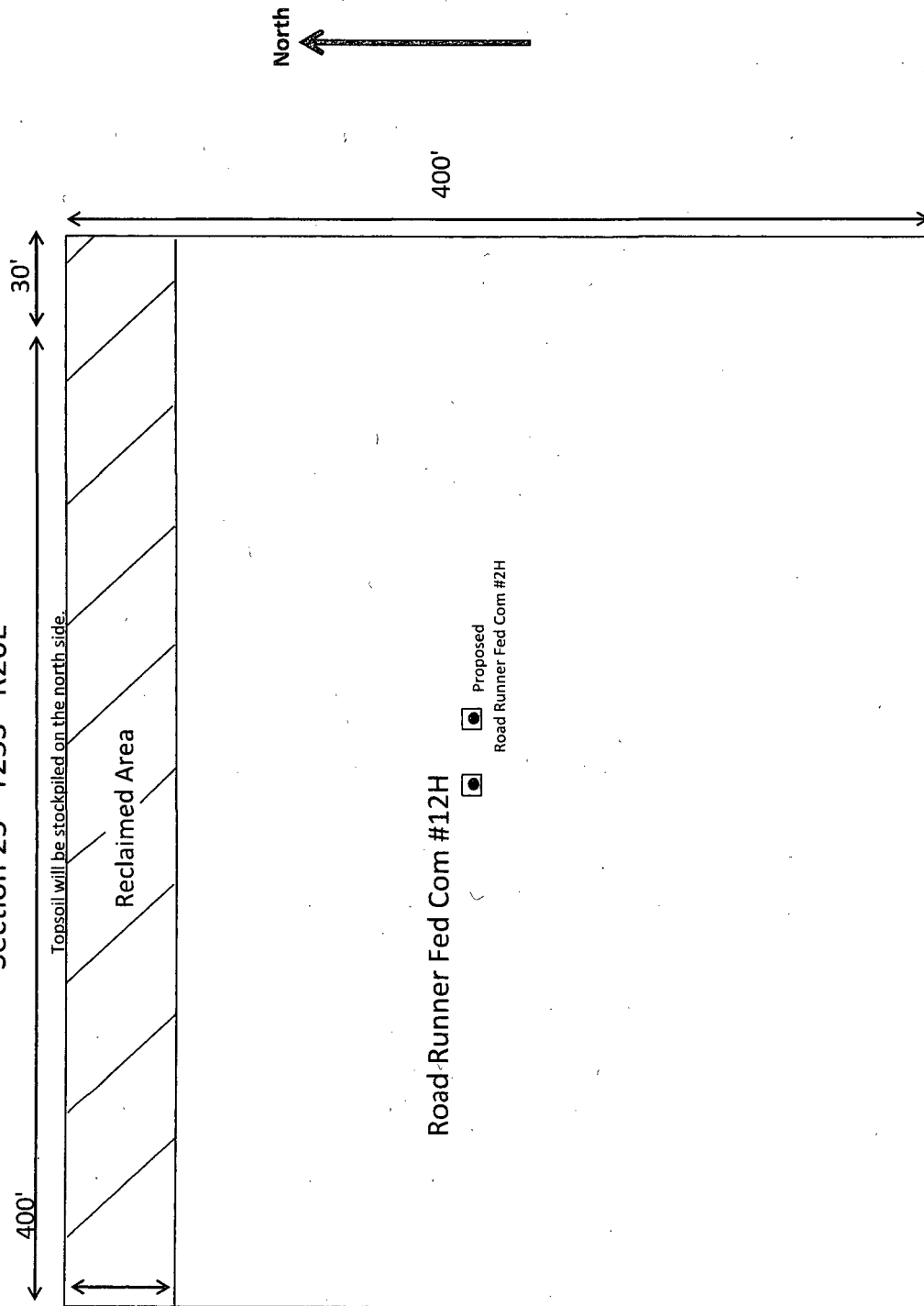


COG Operating LLC
2208 West Main Street
Artesia, NM 88210

Well Site Layout Production Facility Layout

Road Runner Federal Com #12H
Section 25 - T25S - R26E

Exhibit 3



Access Road to Central Tank Battery to be determined.

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Submit Original
to Appropriate
District Office

GAS CAPTURE PLAN

Date: 1/9/2017

☒ Original

Operator & OGRID No.: COG Operating LLC, OGRID 229137

☐ Amended - Reason for Amendment: _____

This Gas Capture Plan outlines actions to be taken by the Operator to reduce well/production facility flaring/venting for new completion (new drill, recomple to new zone, re-frac) activity.

Note: Form C-129 must be submitted and approved prior to exceeding 60 days allowed by Rule (Subsection A of 19.15.18.12 NMAC).

Well(s)/Production Facility – Name of facility

The well(s) that will be located at the production facility are shown in the table below.

Well Name	API	Well Location (ULSTR)	Footages	Expected MCF/D	Flared or Vented	Comments
Road Runner Federal Com #12H	30-015-	O-25-25S-26E	210' FSL & 1995' FEL	1.0 MMCFD		Gas will connect on proposed well pad.

Gathering System and Pipeline Notification

Well(s) will be connected to a production facility after flowback operations are complete, if gas transporter system is in place. The gas produced from production facility is dedicated to Lucid, and will be connected to Coyote low/high pressure gathering system located in Eddy County, New Mexico. It will require 0' of pipeline to connect the facility to low/high pressure gathering system. COG Operating LLC provides (periodically) to Lucid a drilling, completion and estimated first production date for wells that are scheduled to be drilled in the foreseeable future. In addition, COG Operating LLC and Lucid have periodic conference calls to discuss changes to drilling and completion schedules. Gas from these wells will be processed at Palo Duro Processing Plant located in Sec 35 Twn, 23S Rng, 27 E, Eddy County, New Mexico. The actual flow of the gas will be based on compression operating parameters and gathering system pressures.

Flowback Strategy

After the fracture treatment/completion operations, well(s) will be produced to temporary production tanks and gas will be flared or vented. During flowback, the fluids and sand content will be monitored. When the produced fluids contain minimal sand, the wells will be turned to production facilities. Gas sales should start as soon as the wells start flowing through the production facilities, unless there are operational issues on Gas Transporter system at that time. Based on current information, it is Operator's belief the system can take this gas upon completion of the well(s).

Safety requirements during cleanout operations from the use of underbalanced air cleanout systems may necessitate that sand and non-pipeline quality gas be vented and/or flared rather than sold on a temporary basis.

Alternatives to Reduce Flaring

Below are alternatives considered from a conceptual standpoint to reduce the amount of gas flared.

- Power Generation – On lease
 - Only a portion of gas is consumed operating the generator, remainder of gas will be flared
- Compressed Natural Gas – On lease
 - Gas flared would be minimal, but might be uneconomical to operate when gas volume declines
- NGL Removal – On lease
 - Plants are expensive, residue gas is still flared, and uneconomical to operate when gas volume declines

**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

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

- a. Spudding well (minimum of 24 hours)
- b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
- c. BOPE tests (minimum of 4 hours)

☒ **Eddy County**

Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,
(575) 361-2822

1. **Although Hydrogen Sulfide has not been reported in the area, it is always a potential hazard. It is recommended that monitoring equipment be onsite for potential Hydrogen Sulfide. If H₂S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, report measured amounts and formations to the BLM.**
2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a “Major” violation.**
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works is located, this does not include the dog house or stairway area.
4. **The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM**

office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

B. 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 210 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, contact the appropriate BLM office.
3. The minimum required fill of cement behind the **5-1/2** inch production casing is:
- ☒ Cement should tie-back at least **200** feet into the previous string. Operator shall provide method of verification.
4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API 53.
2. Variance approved to use flex line from BOP to choke manifold. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. **Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.** If the BLM inspector questions the straightness of the hose, a BLM engineer will be contacted and will review in the

field or via picture supplied by inspector to determine if changes are required (operator shall expect delays if this occurs).

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 13-3/8" surface casing shoe shall be 2000 (2M) annular. **In the case where the only BOP installed is an annular preventer, it shall be tested to a minimum of 2000 psi (which may require upgrading to 3M or 5M annular).**
4. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 9-5/8" intermediate casing shoe shall be 3000 (3M) psi.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).
 - b. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
 - c. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
 - d. The results of the test shall be reported to the appropriate BLM office.
 - e. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test**

will be submitted to the appropriate BLM office.

- f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

D. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

E. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

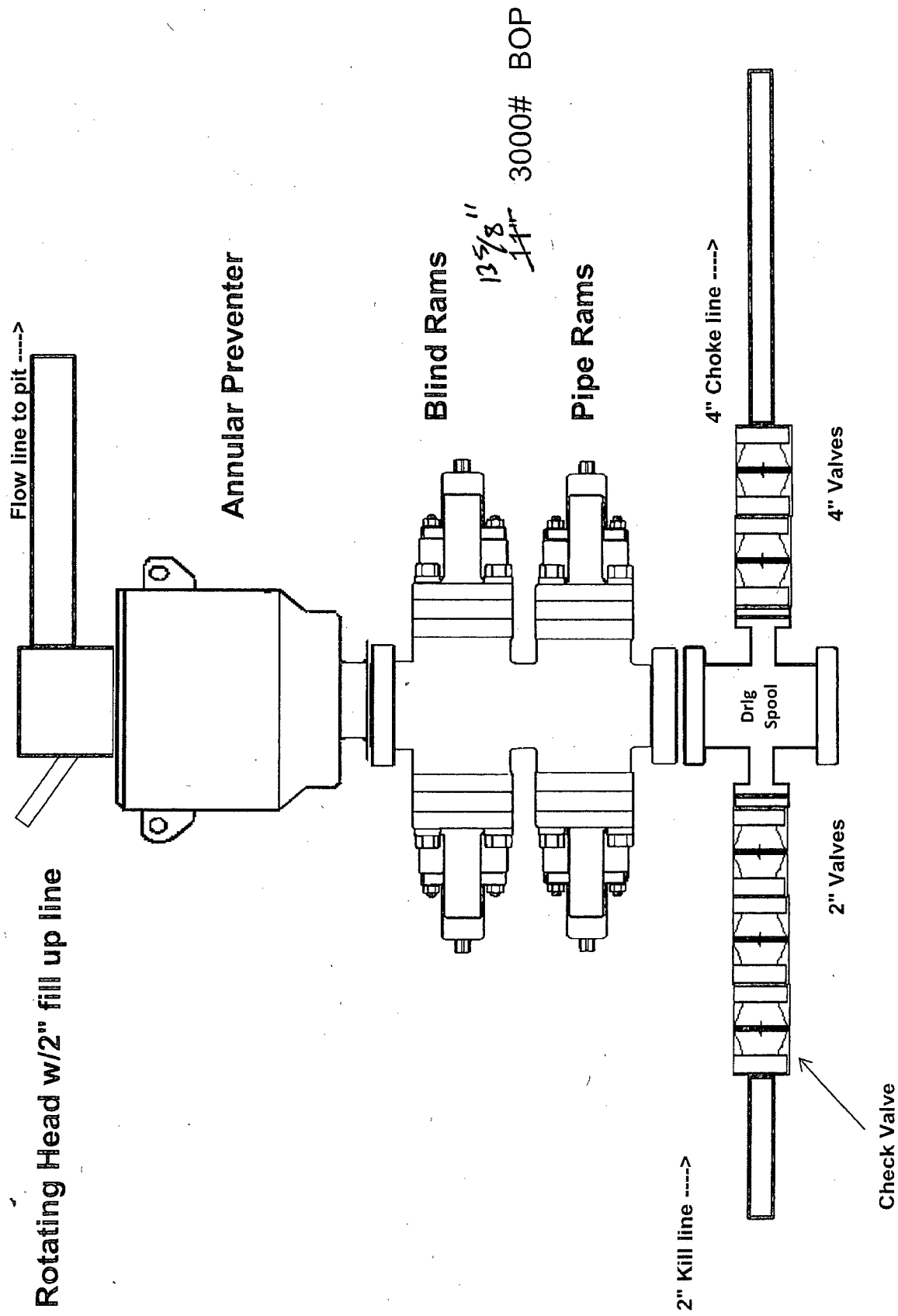
F. SPECIAL REQUIREMENT(S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

MHH 04202017

3,000 psi BOP Schematic



APR 28 2017

RECEIVED

**PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NM112907
WELL NAME & NO.:	Road Runner Federal Com - 12H
SURFACE HOLE FOOTAGE:	210'S & 1995'E
BOTTOM HOLE FOOTAGE:	200'N & 1980'E, sec. 24
LOCATION:	Section 25, T. 25 S., R. 26 E., NMPM
COUNTY:	Eddy County, New Mexico

TABLE OF CONTENTS

Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
 - Cave/Karst
 - Watershed
- ☐ **Construction**
 - Notification
 - Topsoil
 - Closed Loop System
 - Federal Mineral Material Pits
 - Well Pads
 - Roads
- ☐ **Road Section Diagram**
- ☐ **Production (Post Drilling)**
 - Well Structures & Facilities
- ☐ **Interim Reclamation**
- ☐ **Final Abandonment & Reclamation**

I. GENERAL PROVISIONS

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

II. PERMIT EXPIRATION

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

IV. NOXIOUS WEEDS

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

V. SPECIAL REQUIREMENT(S)

Cave and Karst Conditions of Approval

****** Depending on location, additional Drilling, Casing, and Cementing procedures may be required by engineering to protect critical karst groundwater recharge areas.

Cave/Karst Surface Mitigation

The following stipulations will be applied to minimize impacts during construction, drilling and production.

Construction:

In the advent that any underground voids are opened up during construction activities, construction activities will be halted and the BLM will be notified immediately.

No Blasting:

No blasting will be utilized for pad construction. The pad will be constructed and leveled by adding the necessary fill and caliche.

Pad Berming:

The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.

- The compacted berm shall be constructed at a minimum of 12 inches high with impermeable mineral material (e.g. caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.
- The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed.
- Any access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)

Tank Battery Liners and Berms:

Tank battery locations and all facilities will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank.

Leak Detection System:

A method of detecting leaks is required. The method could incorporate gauges to measure loss, siting valves and lines so they can be visually inspected, or installing electronic sensors to alarm when a leak is present. Leak detection plan will be submitted to BLM for approval.

Automatic Shut-off Systems:

Automatic shut off, check valves, or similar systems will be installed for pipelines and tanks to minimize the effects of catastrophic line failures used in production or drilling.

Cave/Karst Subsurface Mitigation

The following stipulations will be applied to protect cave/karst and ground water concerns:

Rotary Drilling with Fresh Water:

Fresh water will be used as a circulating medium in zones where caves or karst features are expected. SEE ALSO: Drilling COAs for this well.

Directional Drilling:

Kick off for directional drilling will occur at least 100 feet below the bottom of the cave occurrence zone. SEE ALSO: Drilling COAs for this well.

Lost Circulation:

ALL lost circulation zones from the surface to the base of the cave occurrence zone will be logged and reported in the drilling report.

Regardless of the type of drilling machinery used, if a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

Abandonment Cementing:

Upon well abandonment in high cave karst areas additional plugging conditions of approval may be required. The BLM will assess the situation and work with the operator to ensure proper plugging of the wellbore.

Pressure Testing:

Annual pressure monitoring will be performed by the operator on all casing annuli and reported in a sundry notice. If the test results indicated a casing failure has occurred, remedial action will be undertaken to correct the problem to the BLM's approval.

Watershed

- The entire well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. Topsoil shall not be used to construct the berm. No water flow from the uphill side(s) of the pad shall be allowed to enter the

well pad. The berm shall be maintained through the life of the well and after interim reclamation has been completed.

- Any water erosion that may occur due to the construction of the well pad during the life of the well will be quickly corrected and proper measures will be taken to prevent future erosion.

VI. CONSTRUCTION

A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

B. TOPSOIL

The operator shall strip the top portion of the soil (root zone) from the entire well pad area and stockpile the topsoil along the edge of the well pad as depicted in the APD. The root zone is typically six (6) inches in depth. All the stockpiled topsoil will be redistributed over the interim reclamation areas. Topsoil shall not be used for berming the pad or facilities. For final reclamation, the topsoil shall be spread over the entire pad area for seeding preparation.

Other subsoil (below six inches) stockpiles must be completely segregated from the topsoil stockpile. Large rocks or subsoil clods (not evident in the surrounding terrain) must be buried within the approved area for interim and final reclamation.

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

D. FEDERAL MINERAL MATERIALS PIT

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation. The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

F. EXCLOSURE FENCING (CELLARS & PITS)

Exclosure Fencing

The operator will install and maintain exclosure fencing for all open well cellars to prevent access to public, livestock, and large forms of wildlife before and after drilling operations until the pit is free of fluids and the operator initiates backfilling. (For examples of exclosure fencing design, refer to BLM's Oil and Gas Gold Book, Exclosure Fence Illustrations, Figure 1, Page 18.)

G. ON LEASE ACCESS ROADS**Road Width**

The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.

Surfacing

Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

Crowning

Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

Ditching

Ditching shall be required on both sides of the road.

Turnouts

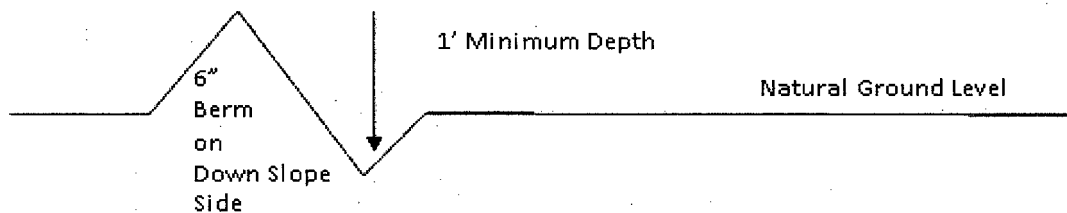
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

Cross Section of a Typical Lead-off Ditch



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

Formula for Spacing Interval of Lead-off Ditches

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

$$400 \text{ foot road with } 4\% \text{ road slope: } \frac{400'}{4\%} + 100' = 200' \text{ lead-off ditch interval}$$

Cattle guards

An appropriately sized cattle guard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattle guards on the access road route shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattle guards that are in place and are utilized during lease operations.

Fence Requirement

Where entry is granted across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting. The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fences.

Public Access

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

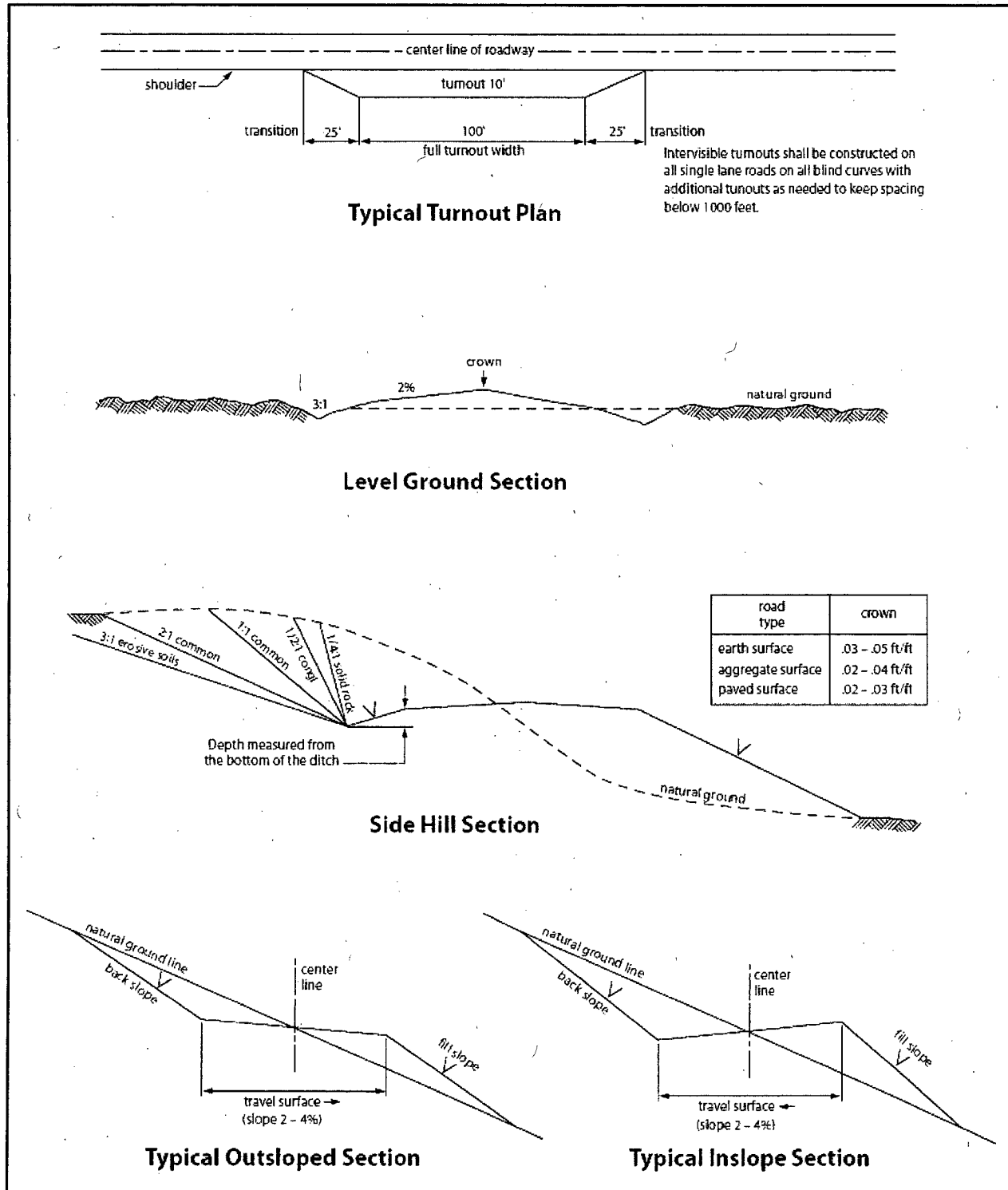


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities

Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

Exclosure Netting (Open-top Tanks)

Immediately following active drilling or completion operations, the operator will take actions necessary to prevent wildlife and livestock access, including avian wildlife, to all open-topped tanks that contain or have the potential to contain salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, or Resource Conservation and Recovery Act of 1976-exempt hazardous substances. At a minimum, the operator will net, screen, or cover open-topped tanks to exclude wildlife and livestock and prevent mortality. If the operator uses netting, the operator will cover and secure the open portion of the tank to prevent wildlife entry. The operator will net, screen, or cover the tanks until the operator removes the tanks from the location or the tanks no longer contain substances that could be harmful to wildlife or livestock. Use a maximum netting mesh size of 1 ½ inches. The netting must not be in contact with fluids and must not have holes or gaps.

Chemical and Fuel Secondary Containment and Exclosure Screening

The operator will prevent all hazardous, poisonous, flammable, and toxic substances from coming into contact with soil and water. At a minimum, the operator will install and maintain an impervious secondary containment system for any tank or barrel containing hazardous, poisonous, flammable, or toxic substances sufficient to contain the contents of the tank or barrel and any drips, leaks, and anticipated precipitation. The operator will dispose of fluids within the containment system that do not meet applicable state or U. S. Environmental Protection Agency livestock water standards in accordance with state law; the operator must not drain the fluids to the soil or ground. The operator will design, construct, and maintain all secondary containment systems to prevent wildlife and livestock exposure to harmful substances. At a minimum, the operator will install effective wildlife and livestock exclosure systems such as fencing, netting, expanded metal mesh, lids, and grate covers. Use a maximum netting mesh size of 1 ½ inches.

Open-Vent Exhaust Stack Exclosures

The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. (*Recommended exclosure structures on open-vent exhaust stacks are in the shape of a cone.*) Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers.

Containment Structures

Proposed production facilities such as storage tanks and other vessels will have a secondary containment structure that is constructed to hold the capacity of 1.5 times the largest tank, plus freeboard to account for precipitation, unless more stringent protective requirements are deemed necessary.

Painting Requirement

All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color, **Shale Green** from the BLM Standard Environmental Color Chart (CC-001: June 2008).

VIII. INTERIM RECLAMATION

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

Within six (6) months of well completion, operators should work with BLM surface management specialists (Jim Amos: 575-234-5909) to devise the best strategies to reduce the size of the location. Interim reclamation should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche that is free of contaminants may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

All disturbed areas after they have been satisfactorily prepared need to be reseeded with the seed mixture provided below.

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

IX. FINAL ABANDONMENT & RECLAMATION

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared, these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jim Amos: 575-234-5909).

Seed Mixture 1 for Loamy Sites

Holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed shall be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed shall be either certified or registered seed. The seed container shall be tagged in accordance with State law(s) and available for inspection by the Authorized Officer.

Seed shall be planted using a drill equipped with a depth regulator to ensure proper depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture shall be evenly and uniformly planted over the disturbed area (small/heavier seeds have a tendency to drop the bottom of the drill and are planted first). Holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed shall be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre shall be doubled. The seeding shall be repeated until a satisfactory stand is established as determined by the Authorized Officer. Evaluation of growth may not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

<u>Species</u>	<u>lb/acre</u>
Plains lovegrass (<i>Eragrostis intermedia</i>)	0.5
Sand dropseed (<i>Sporobolus cryptandrus</i>)	1.0
Sideoats grama (<i>Bouteloua curtipendula</i>)	5.0
Plains bristlegrass (<i>Setaria macrostachya</i>)	2.0

*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed



U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

APD Print Report

04/26/2017

APD ID: 10400010056

Submission Date: 01/13/2017

Highlight

Operator Name: COG OPERATING LLC

Federal/Indian APD: FED

All Changes

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Well Type: OIL WELL

Well Work Type: Drill

Application

Section 1 - General

APD ID: 10400010056

Tie to previous NOS?

Submission Date: 01/13/2017

BLM Office: HOBBS

User: Mayte Reyes

Title: Regulatory Analyst

Federal/Indian APD: FED

Is the first lease penetrated for production Federal or Indian? FED

Lease number: NMNM112907

Lease Acres: 440

Surface access agreement in place?

Allotted?

Reservation:

Agreement in place? NO

Federal or Indian agreement:

Agreement number:

Agreement name:

Keep application confidential? YES

Permitting Agent? NO

APD Operator: COG OPERATING LLC

Operator letter of designation:

Keep application confidential? YES

Operator Info

Operator Organization Name: COG OPERATING LLC

Operator Address: 600 West Illinois Ave

Zip: 79701

Operator PO Box:

Operator City: Midland

State: TX

Operator Phone: (432)683-7443

Operator Internet Address: RODOM@CONCHO.COM

Section 2 - Well Information

Well in Master Development Plan? NO

Master Development Plan name:

Well in Master SUPO? NO

Master SUPO name:

Well in Master Drilling Plan? NO

Master Drilling Plan name:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Well API Number:

Field/Pool or Exploratory? Field and Pool

Field Name: COTTONWOOD
DRAW

Pool Name: BONE SPRING

Is the proposed well in an area containing other mineral resources? OIL

Describe other minerals:

Is the proposed well in a Helium production area? N

Use Existing Well Pad? NO

New surface disturbance?

Type of Well Pad: MULTIPLE WELL

Multiple Well Pad Name: ROAD RUNNER FED COM
Number: 2H AND 12H

Well Class: HORIZONTAL

Number of Legs:

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: EXPLORATORY (WILDCAT)

Describe sub-type:

Distance to town: 10 Miles

Distance to nearest well: 419 FT

Distance to lease line: 200 FT

Reservoir well spacing assigned acres Measurement: 320 Acres

Well plat: COG Road Runner 12H_C102_01-13-2017.pdf

Well work start Date: 03/01/2017

Duration: 30 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83

Vertical Datum: NAVD88

Survey number:

STATE: NEW MEXICO

Meridian: NEW MEXICO PRINCIPAL **County:** EDDY

Latitude: 32.094114

Longitude: -104.244409

SHL

Elevation: 2148

MD: 0

TVD: 0

Leg #: 1

Lease Type: FEDERAL

Lease #: NMNM112907

NS-Foot: 210

NS Indicator: FSL

EW-Foot: 1995

EW Indicator: FEL

Twsp: 25S

Range: 26E

Section: 25

Aliquot: SWSE

Lot:

Tract:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

	STATE: NEW MEXICO	Meridian: NEW MEXICO PRINCIPAL	County: EDDY
	Latitude: 32.094114	Longitude: -104.244409	
KOP	Elevation: 2148	MD: 0	TVD: 0
Leg #: 1	Lease Type: FEDERAL	Lease #: NMNM112907	
	NS-Foot: 210	NS Indicator: FSL	
	EW-Foot: 1995	EW Indicator: FEL	
	Twsp: 25S	Range: 26E	Section: 25
	Aliquot: SWSE	Lot:	Tract:
	STATE: NEW MEXICO	Meridian: NEW MEXICO PRINCIPAL	County: EDDY
	Latitude: 32.094444	Longitude: -104.244361	
PPP	Elevation: -5182	MD: 7330	TVD: 7330
Leg #: 1	Lease Type: FEDERAL	Lease #: NMNM112907	
	NS-Foot: 330	NS Indicator: FSL	
	EW-Foot: 1980	EW Indicator: FEL	
	Twsp: 25S	Range: 26E	Section: 25
	Aliquot: SWSE	Lot:	Tract:
	STATE: NEW MEXICO	Meridian: NEW MEXICO PRINCIPAL	County: EDDY
	Latitude: 32.121739	Longitude: -104.244349	
EXIT	Elevation: -5640	MD: 17500	TVD: 7788
Leg #: 1	Lease Type: FEDERAL	Lease #: NMNM112907	
	NS-Foot: 330	NS Indicator: FNL	
	EW-Foot: 1980	EW Indicator: FEL	
	Twsp: 25S	Range: 26E	Section: 24
	Aliquot: NWNE	Lot:	Tract:
	STATE: NEW MEXICO	Meridian: NEW MEXICO PRINCIPAL	County: EDDY
	Latitude: 32.122096	Longitude: -104.244358	
BHL	Elevation: -5640	MD: 17782	TVD: 7788
Leg #: 1	Lease Type: FEDERAL	Lease #: NMNM112907	
	NS-Foot: 200	NS Indicator: FNL	
	EW-Foot: 1980	EW Indicator: FEL	

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Twsp: 25S

Range: 26E

Section: 24

Aliquot: NWNE

Lot:

Tract:

Drilling Plan

Section 1 - Geologic Formations

ID: Surface formation

Name: UNKNOWN

Lithology(ies):

Elevation: 0

True Vertical Depth: 0

Measured Depth: 0

Mineral Resource(s):

NONE

Is this a producing formation? N

ID: Formation 1

Name: RUSTLER

Lithology(ies):

Elevation: -183

True Vertical Depth: 183

Measured Depth: 183

Mineral Resource(s):

NONE

Is this a producing formation? N

ID: Formation 2

Name: TOP OF SALT

Lithology(ies):

Elevation: -320

True Vertical Depth: 320

Measured Depth: 320

Mineral Resource(s):

NONE

Is this a producing formation? N

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

ID: Formation 3

Name: BASE OF SALT

Lithology(ies):

Elevation: -1753

True Vertical Depth: 1753

Measured Depth: 1753

Mineral Resource(s):

NONE

Is this a producing formation? N

ID: Formation 4

Name: LAMAR LS

Lithology(ies):

Elevation: -1938

True Vertical Depth: 1938

Measured Depth: 1938

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 5

Name: BELL CANYON

Lithology(ies):

Elevation: -1990

True Vertical Depth: 1990

Measured Depth: 1990

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 6

Name: CHERRY CANYON

Lithology(ies):

Elevation: -2846

True Vertical Depth: 2846

Measured Depth: 2846

Mineral Resource(s):

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 7

Name: BRUSHY CANYON

Lithology(ies):

Elevation: -3930

True Vertical Depth: 3930

Measured Depth: 3930

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 8

Name: BONE SPRING LIME

Lithology(ies):

Elevation: -5508

True Vertical Depth: 5508

Measured Depth: 5508

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 9

Name: BONE SPRINGS UPPER SHAL

Lithology(ies):

Elevation: -5790

True Vertical Depth: 5790

Measured Depth: 5790

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

ID: Formation 10

Name: BONE SPRING LOWER

Lithology(ies):

Elevation: -6035

True Vertical Depth: 6035

Measured Depth: 6035

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 11

Name: BONE SPRING 1ST

Lithology(ies):

Elevation: -6465

True Vertical Depth: 6465

Measured Depth: 6465

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 12

Name: BONE SPRING 2ND

Lithology(ies):

Elevation: -7158

True Vertical Depth: 7158

Measured Depth: 7158

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? Y

ID: Formation 13

Name: BONE SPRING 3RD

Lithology(ies):

Elevation: -8298

True Vertical Depth: 8298

Measured Depth: 8298

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

ID: Formation 14

Name: WOLFCAMP

Lithology(ies):

Elevation: -8649

True Vertical Depth: 8649

Measured Depth: 8649

Mineral Resource(s):

NATURAL GAS

OIL

Is this a producing formation? N

Section 2 - Blowout Prevention

Pressure Rating (PSI): 2M

Rating Depth: 12000

Equipment: Annular. The BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.

Requesting Variance? YES

Variance request: A variance is requested for the use of a flexible choke line from the BOP to choke manifold. See attached for specs and hydrostatic test chart.

Testing Procedure: BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all of the components installed will be functional and tested.

Choke Diagram Attachment:

COG Road Runner 12H_2M Choke_01-13-2017.pdf

BOP Diagram Attachment:

COG Road Runner 12H_2M BOP_01-13-2017.pdf

Pressure Rating (PSI): 3M

Rating Depth: 23000

Equipment: Annular. The BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.

Requesting Variance? NO

Variance request: A variance is requested for the use of a flexible choke line from the BOP to choke manifold. See attached for specs and hydrostatic test chart.

Testing Procedure: BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all of the components installed will be functional and

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

tested.

Choke Diagram Attachment:

COG Road Runner 12H_3M Choke_01-13-2017.pdf

BOP Diagram Attachment:

COG Road Runner 12H_3M BOP_01-13-2017.pdf

Section 3 - Casing

String Type: SURFACE

Other String Type:

Hole Size: 17.5

Top setting depth MD: 0

Top setting depth TVD: 0

Top setting depth MSL: -5640

Bottom setting depth MD: 210

Bottom setting depth TVD: 210

Bottom setting depth MSL: -5850

Calculated casing length MD: 210

Casing Size: 13.375

Other Size

Grade: J-55

Other Grade:

Weight: 54.5

Joint Type: STC

Other Joint Type:

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 11.76

Burst Design Safety Factor: 3.24

Joint Tensile Design Safety Factor type: DRY

Joint Tensile Design Safety Factor: 44.91

Body Tensile Design Safety Factor type: DRY

Body Tensile Design Safety Factor: 44.91

Casing Design Assumptions and Worksheet(s):

COG Road Runner 12H_Casing Program_01-13-2017.pdf

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

String Type: INTERMEDIATE

Other String Type:

Hole Size: 12.25

Top setting depth MD: 0

Top setting depth TVD: 0

Top setting depth MSL: -5640

Bottom setting depth MD: 1965

Bottom setting depth TVD: 1965

Bottom setting depth MSL: -7605

Calculated casing length MD: 1965

Casing Size: 9.625

Other Size

Grade: J-55

Other Grade:

Weight: 40

Joint Type: LTC

Other Joint Type: BTC

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 2.47

Burst Design Safety Factor: 1.3

Joint Tensile Design Safety Factor type: DRY

Joint Tensile Design Safety Factor: 6.62

Body Tensile Design Safety Factor type: DRY

Body Tensile Design Safety Factor: 6.62

Casing Design Assumptions and Worksheet(s):

COG Road Runner 12H_Casing Program_01-13-2017.pdf

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

String Type: PRODUCTION

Other String Type:

Hole Size: 8.75

Top setting depth MD: 0

Top setting depth TVD: 0

Top setting depth MSL: -5640

Bottom setting depth MD: 17782

Bottom setting depth TVD: 17782

Bottom setting depth MSL: -22984

Calculated casing length MD: 17782

Casing Size: 5.5

Other Size

Grade: P-110

Other Grade:

Weight: 17

Joint Type: LTC

Other Joint Type: BTC

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 1.96

Burst Design Safety Factor: 3.51

Joint Tensile Design Safety Factor type: DRY

Joint Tensile Design Safety Factor: 3.36

Body Tensile Design Safety Factor type: DRY

Body Tensile Design Safety Factor: 3.36

Casing Design Assumptions and Worksheet(s):

COG Road Runner 12H_Casing Program_01-13-2017.pdf

Section 4 - Cement

Casing String Type: SURFACE

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Stage Tool Depth:

Lead

Top MD of Segment: 0

Additives: 4% Gel + 1% CaCl₂

Density: 13.5

Bottom MD Segment: 210

Quantity (sks): 70

Volume (cu.ft.): 122

Cement Type: Class C

Yield (cu.ff./sk): 1.75

Percent Excess: 50

Tail

Top MD of Segment: 0

Additives: 2% CaCl₂

Density: 14.8

Bottom MD Segment: 210

Quantity (sks): 250

Volume (cu.ft.): 335

Cement Type: C

Yield (cu.ff./sk): 1.34

Percent Excess: 50

Casing String Type: INTERMEDIATE

Stage Tool Depth:

Lead

Top MD of Segment: 0

Additives: No Additives

Density: 12.7

Bottom MD Segment: 1965

Quantity (sks): 290

Volume (cu.ft.): 580

Cement Type: C Blend 35:65:6

Yield (cu.ff./sk): 2

Percent Excess: 50

Tail

Top MD of Segment: 0

Additives: 2% CaCl

Density: 14.8

Bottom MD Segment: 1965

Quantity (sks): 250

Volume (cu.ft.): 335

Cement Type: Class C

Yield (cu.ff./sk): 1.34

Percent Excess: 50

Casing String Type: PRODUCTION

Stage Tool Depth:

Lead

Top MD of Segment: 0

Additives: No additives

Density: 11.9

Bottom MD Segment: 17782

Quantity (sks): 810

Volume (cu.ft.): 2025

Cement Type: Lead: 50:50:10 H Blend

Yield (cu.ff./sk): 2.5

Percent Excess: 25

Tail

Top MD of Segment: 0

Additives: No additives

Density: 14.4

Bottom MD Segment: 17782

Quantity (sks): 2670

Volume (cu.ft.): 3310

Cement Type: Tail: 50:50:2 Class H Blend

Yield (cu.ff./sk): 1.24

Percent Excess: 25

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Top Depth: 210

Bottom Depth: 1965

Mud Type: OTHER

Saturated Brine

Min Weight (lbs./gal.): 10

Max Weight (lbs./gal.): 10.2

Density (lbs/cu.ft.):

Gel Strength (lbs/100 sq.ft.):

PH:

Viscosity (CP):

Filtration (cc):

Salinity (ppm):

Additional Characteristics:

Top Depth: 1965

Bottom Depth: 17782

Mud Type: OTHER

CUT BRINE

Min Weight (lbs./gal.): 8.6

Max Weight (lbs./gal.): 9.4

Density (lbs/cu.ft.):

Gel Strength (lbs/100 sq.ft.):

PH:

Viscosity (CP):

Filtration (cc):

Salinity (ppm):

Additional Characteristics:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Top Depth: 0

Bottom Depth: 210

Mud Type: OTHER

Fresh water gel

Min Weight (lbs./gal.): 8.6

Max Weight (lbs./gal.): 8.8

Density (lbs/cu.ft.):

Gel Strength (lbs/100 sq.ft.):

PH:

Viscosity (CP):

Filtration (cc):

Salinity (ppm):

Additional Characteristics:

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

None planned

List of open and cased hole logs run in the well:

CNL,GR

Coring operation description for the well:

None planned

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 3810

Anticipated Surface Pressure: 2096.64

Anticipated Bottom Hole Temperature(F): 140

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geohazards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG Road Runner 12H_H2S Schematic_01-13-2017.pdf

COG Road Runner 12H_H2S SUP_01-13-2017.pdf

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG Road Runner 12H_Directional Plan_01-13-2017.pdf

COG Road Runner 12H_AC Rpt_01-13-2017.pdf

Other proposed operations facets description:

None

Other proposed operations facets attachment:

COG Road Runner 12H_Drilling Program_01-13-2017.pdf

Other Variance attachment:

COG Road Runner 12H_Flex Hose Variance_01-13-2017.pdf

SUPO

Section 1 - Existing Roads

Will existing roads be used? NO

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

COG Road Runner 12H_Maps Plats_01-13-2017.pdf

New road type: RESOURCE

Length: 241.4 Feet

Width (ft.): 30

Max slope (%): 33

Max grade (%): 1

Army Corp of Engineers (ACOE) permit required? NO

ACOE Permit Number(s):

New road travel width: 14

New road access erosion control: Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

New road access plan or profile prepared? NO

New road access plan attachment:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Access road engineering design? NO

Access road engineering design attachment:

Access surfacing type: OTHER

Access topsoil source: ONSITE

Access surfacing type description: Caliche

Access onsite topsoil source depth: 6

Offsite topsoil source description:

Onsite topsoil removal process: Blading

Access other construction information: No turnouts are planned. Re-routing access road around proposed well location.

Access miscellaneous information:

Number of access turnouts:

Access turnout map:

Drainage Control

New road drainage crossing: OTHER

Drainage Control comments: None necessary

Road Drainage Control Structures (DCS) description: None needed.

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

COG Road Runner 12H_1 Mile Map Data_01-13-2017.pdf

Existing Wells description:

Section 4 - Location of Existing and/or Proposed Production Facilities

Submit or defer a Proposed Production Facilities plan? DEFER

Estimated Production Facilities description: Production will be sent to a Central Tank Battery facility to be determined.

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: ICE PAD CONSTRUCTION & MAINTENANCE, STIMULATION, SURFACE CASING

Water source type: OTHER

Describe type: Fresh water will be furnished by the C-100 water well located in Section 15, T24S, R26E, the water will be purchased from Gregory Rock House Ranch LLC, 1108 W Pierce Street, Carlsbad, NM 88220.

Source longitude:

Source latitude:

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: PRIVATE

Water source transport method: PIPELINE

Source transportation land ownership: PRIVATE

Water source volume (barrels): 450000

Source volume (acre-feet): 58.001892

Source volume (gal): 18900000

Water source use type: INTERMEDIATE/PRODUCTION CASING

Water source type: OTHER

Describe type: Brine water will be provided by Malaga Brine Station. Brine water will be purchased from Mesquite SWD Inc., P O Box 1479, Carlsbad, NM 88221. Phone: 575-706-1840

Source longitude:

Source latitude:

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: COMMERCIAL

Water source transport method: TRUCKING

Source transportation land ownership: COMMERCIAL

Water source volume (barrels): 30000

Source volume (acre-feet): 3.866793

Source volume (gal): 1260000

Water source and transportation map:

COG Road Runner 12H_Brine Water_01-13-2017.pdf

COG Road Runner 12H_Fresh Water_01-13-2017.pdf

Water source comments: Fresh water will be furnished by the C-100 water well located in Section 15, T24S, R26E, the water will be purchased from Gregory Rock House Ranch LLC, 1108 W Pierce Street, Carlsbad, NM 88220. Brine water will be provided by Malaga Brine Station. Brine water will be purchased from Mesquite SWD Inc., P O Box 1479, Carlsbad, NM 88221. Phone: 575-706-1840

New water well? NO

New Water Well Info

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Well latitude:

Well Longitude:

Well datum:

Well target aquifer:

Est. depth to top of aquifer(ft):

Est thickness of aquifer:

Aquifer comments:

Aquifer documentation:

Well depth (ft):

Well casing type:

Well casing outside diameter (in.):

Well casing inside diameter (in.):

New water well casing?

Used casing source:

Drilling method:

Drill material:

Grout material:

Grout depth:

Casing length (ft.):

Casing top depth (ft.):

Well Production type:

Completion Method:

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: Caliche will be obtained from the actual well site. If caliche does not exist or is not plentiful from the well site, the caliche will be hauled from the SRO caliche pit located in Section 18 T26S-R28E.

Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: SEWAGE

Waste content description: Human waste and gray water

Amount of waste: 1000 gallons

Waste disposal frequency : One Time Only

Safe containment description: Waste will be properly contained and disposed of properly at a state approved disposal facility.

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** PRIVATE

Disposal type description:

Disposal location description: Trucked to an approved disposal facility

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Waste type: DRILLING

Waste content description: Drilling fluids and produced oil land water while drilling and completion operations

Amount of waste: 6000 barrels

Waste disposal frequency : One Time Only

Safe containment description: All drilling waste will be stored safely and disposed of properly

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

Disposal type description:

Disposal location description: Trucked to an approved disposal facility

Waste type: GARBAGE

Waste content description: Garbage and trash produced during drilling and completion operations.

Amount of waste: 500 pounds

Waste disposal frequency : One Time Only

Safe containment description: Garbage and trash produced during drilling and completion operations will be collected in a trash container and disposed of properly at a state approved disposal facility

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

Disposal type description:

Disposal location description: Trucked to an approved disposal facility.

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.) **Reserve pit width (ft.)**

Reserve pit depth (ft.) **Reserve pit volume (cu. yd.)**

Is at least 50% of the reserve pit in cut?

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Description of cuttings location Roll off cutting containers on tracks

Cuttings area length (ft.)

Cuttings area width (ft.)

Cuttings area depth (ft.)

Cuttings area volume (cu. yd.)

Is at least 50% of the cuttings area in cut?

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: YES

Ancillary Facilities attachment:

COG Road Runner 12H_GCP_01-13-2017.pdf

Comments: Gas Capture Plan attached

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Road_Runner_12H_Prod_Layout_03-15-2017.pdf

Comments:

Section 10 - Plans for Surface Reclamation

Type of disturbance: NEW

Recontouring attachment:

Drainage/Erosion control construction: As depicted by the well site layout; there is no need to place waddles on the edge of the location, to prevent surface run on or run off of water. No erosion should result from this location.

Drainage/Erosion control reclamation: N/A

Wellpad long term disturbance (acres): 3.12

Wellpad short term disturbance (acres): 3.67

Access road long term disturbance (acres): 0.08

Access road short term disturbance (acres): 0.08

Pipeline long term disturbance (acres): 0

Pipeline short term disturbance (acres): 0

Other long term disturbance (acres): 0

Other short term disturbance (acres): 0

Total long term disturbance: 3.2

Total short term disturbance: 3.75

Reconstruction method: Portions of the pad not needed for production operations will be re-contoured to its original state as much as possible. The caliche that is removed will be reused. The stockpiled topsoil will be spread out over reclaimed area and reseeded with BLM approved seed mixture.

Topsoil redistribution: North 60'

Soil treatment: None

Existing Vegetation at the well pad: Shinnery Oak/Mesquite grassland

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances: N/A

Existing Vegetation Community at other disturbances attachment:

Non native seed used? NO

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? NO

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? NO

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Seed Summary

Total pounds/Acre:

Seed Type

Pounds/Acre

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name: Rand

Last Name: French

Phone: (432)254-5556

Email: rfrench@concho.com

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Weed treatment plan description: N/A

Weed treatment plan attachment:

Monitoring plan description: N/A

Monitoring plan attachment:

Success standards: N/A

Pit closure description: N/A

Pit closure attachment:

COG Road Runner 12H_Closed Loop System_01-13-2017.pdf

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: BUREAU OF LAND MANAGEMENT

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland:

USFS Ranger District:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Fee Owner: Bert Madera

Fee Owner Address: PO Box 2795, Ruidoso NM 88355

Phone: (575)631-4444

Email:)

Surface use plan certification: NO

Surface use plan certification document:

Surface access agreement or bond: Agreement

Surface Access Agreement Need description: As per Surface Use and Occupancy Agreement between COG Operating LLC and S&S, Inc., dated

Surface Access Bond BLM or Forest Service:

BLM Surface Access Bond number:

USFS Surface access bond number:

Section 12 - Other Information

Right of Way needed? NO

Use APD as ROW?

ROW Type(s):

ROW Applications

SUPO Additional Information:

Use a previously conducted onsite? YES

Previous Onsite information: Onsite completed on 11/09/2016 by Rand French (COG) and Jeff Robertson (BLM).

Other SUPO Attachment

COG Road Runner 12H_Certification_01-13-2017.pdf

PWD

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Section 1 - General

Would you like to address long-term produced water disposal? NO

Section 2 - Lined Pits

Would you like to utilize Lined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Lined pit PWD on or off channel:

Lined pit PWD discharge volume (bbl/day):

Lined pit specifications:

Pit liner description:

Pit liner manufacturers information:

Precipitated solids disposal:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

Lined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Lined pit bond number:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Describe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

Do you propose to put the produced water to beneficial use?

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

Does the produced water have an annual average Total Dissolved Solids (TDS) concentration equal to or less than that of the existing water to be protected?

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

Unlined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

Injection well number:

Injection well name:

Assigned injection well API number?

Injection well API number:

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner:

PWD disturbance (acres):

Other PWD discharge volume (bbl/day):

Other PWD type description:

Other PWD type attachment:

Have other regulatory requirements been met?

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

Other regulatory requirements attachment:

Bond Info

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB000215

BIA Bond number:

Do you have a reclamation bond? NO

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment:

Operator Certification

Operator Certification

I hereby certify that I, or someone under my direct supervision, have inspected the drill site and access route proposed herein; that I am familiar with the conditions which currently exist; that I have full knowledge of state and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or the company I represent, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements.

NAME: Mayte Reyes

Signed on: 01/13/2017

Title: Regulatory Analyst

Street Address: 2208 W Main Street

City: Artesia

State: NM

Zip: 88210

Phone: (575)748-6945

Email address: Mreyes1@concho.com

Field Representative

Representative Name: Rand French

Street Address: 2208 West Main Street

Operator Name: COG OPERATING LLC

Well Name: ROAD RUNNER FEDERAL COM

Well Number: 12H

City: Artesia

State: NM

Zip: 88210

Phone: (575)748-6940

Email address: rfrench@concho.com

Payment Info

Payment

APD Fee Payment Method: PAY.GOV

pay.gov Tracking ID: 2602O9VJ