Form 3160-5 (August 2007)

. UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED, OMB NO. 1004-0135 Expires: July 31, 2010

OCD Artesia

√.	Lease Serial Ivo.	
	NMNM103595	

SUNDRY	NOTICES AND REPOR	TS ON WELLS	I NMNN	M103595
Do not use the abandoned we	is form for proposals to di II. Use form 3160-3 (APD)	rill or to re-enter an for such proposals.	6. If India	n, Allottee or Tribe Name
SUBMIT IN TRI	PLICATE - Other instruction	ons on reverse side.	7. If Unit	or CA/Agreement, Name and/or No.
1. Type of Well ☑ Oil Well ☐ Gas Well ☐ Oth	ner			une and No. ROLL 24 FEDERAL 2H
Name of Operator COG OPERATING LLC	Contact: M E-Mail: mreyes1@co	AYTE X REÝES Incho.com	9. API Wo 30-01	ell No. 5-39388-00-X1
3a. Address ONE CONCHO CENTER 600 MIDLAND, TX 79701	W ILLINOIS AVENUE	3b. Phone No. (include area Ph: 575-748-6945	code) 10. Field a	and Pool, or Exploratory CAT
4. Location of Well (Footage, Sec., T	., R., M., or Survey Description)		11. Count	y or Parish, and State
Sec 24 T26S R25E NENE Lot	A 330FNL 430FEL		EDDY	COUNTY, NM
12. CHECK APPI	ROPRIATE BOX(EȘ) TO I	NDICATE NATURE	OF NOTICE, REPORT, O	R OTHER DATA
TYPE OF SUBMISSION		TYP	E OF ACTION	
Notice of Intent	☐ Acidize	□ Deepen	☐ Production (Start/R	esume)
	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	. Well Integrity
🕱 Subsequent Report	Casing Repair	■ New Construction	n Recomplete	⊠ Other
☐ Final Abandonment Notice	Change Plans	Plug and Abando	n	don Change to Original A
	Convert to Injection	Plug Back	■ Water Disposal	The state of the s
13. Describe Proposed or Completed Ope If the proposal is to deepen directions Attach the Bond under which the wor following completion of the involved testing has been completed. Final Ab- determined that the site is ready for fi	ally or recomplete horizontally, gively will be performed or provide the operations. If the operation result and onment Notices shall be filed inal inspection.)	ve subsurface locations and re Bond No. on file with BLM ts in a multiple completion o only after all requirements, i	neasured and true vertical depths 1/BIA. Required subsequent report recompletion in a new interval, including reclamation, have been	of all pertinent markers and zones. orts shall be filed within 30 days. a Form 3160-4 shall be filed once
COG Operating LLC respectfu APD.	illy requests approval for the	e following changes to t		ented for record
Drilling Change:	Alao -		7.00	epted for record NMOCD (b) 20
See attached:	NM OIL CONSEI ARTESIA DISTA JUL 25 20			MINIOCD (10) 20,
Drilling program Directional Plan	ARTESIA DISTE	VATION		W ₂
Plat	JUL 25 20	ACT	SEE ATTAC	CHED FOR '
BOP and Choke Manifold	~ 0 20	14	CONDITIO	NS OF APPROVAL
o	RECEIVED			
14. I hereby certify that the foregoing is	true and correct.	5270	. W-11 I t t	
	Electronic Submission #24 For COG OPE mmitted to AFMSS for proce	ERATING LLC, sent to the	ne Carlsbad	
Name(Printed/Typed) MAYTE X			I on 06/09/2014 (14CQ0289SI GULATORY ANALYST	Ē)
Name(TimedTyped) WATTEX	neilo	Title HE	GULATURY ANALYST	
Signature (Electronic S	ubmission)	Date 05/	12/2014 APPR	OVED
	THIS SPACE FOR	FEDERAL OR STA	TE OFFICE USE	
			7/JUL 1	2014
Approved By .		Title	1 /mary	Date
Conditions of approval, if any, are attached certify that the applicant holds legal or equ which would entitle the applicant to condu	itable title to those rights in the su		B REAU OF LAVO CARLSBAD FI) MANAGEMENT ELD OFFICE
Tists 19 II S.C. Section 1001 and Tists 42 I	U.S.C. Section 1212 make it a si		1 1/6 11 1	

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.

Diatrict 1
1625 N. French Dr., Hobbs, NM 83240
Phone: (575) 393-6161 Fax: (575) 393-0720
Diatrict.II
811 S. First St., Artesia, NM 83210
Phone: (375) 748-1235 Fax: (575) 748-9720
Diatrict.III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (305) 334-6178 Fax: (505) 334-6170
District.IX
1220 S. St., Francis Dr., Santa Fe, NM 87505
Phone: (305) 476-3460 Fax: (305) 476-3462

320

State of New Mexico Energy, Minerals & Natural Resources Department OIL CONSERVATION DIVISION 1220 South St. Francis Dr. Santa Fe, NM 87505

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

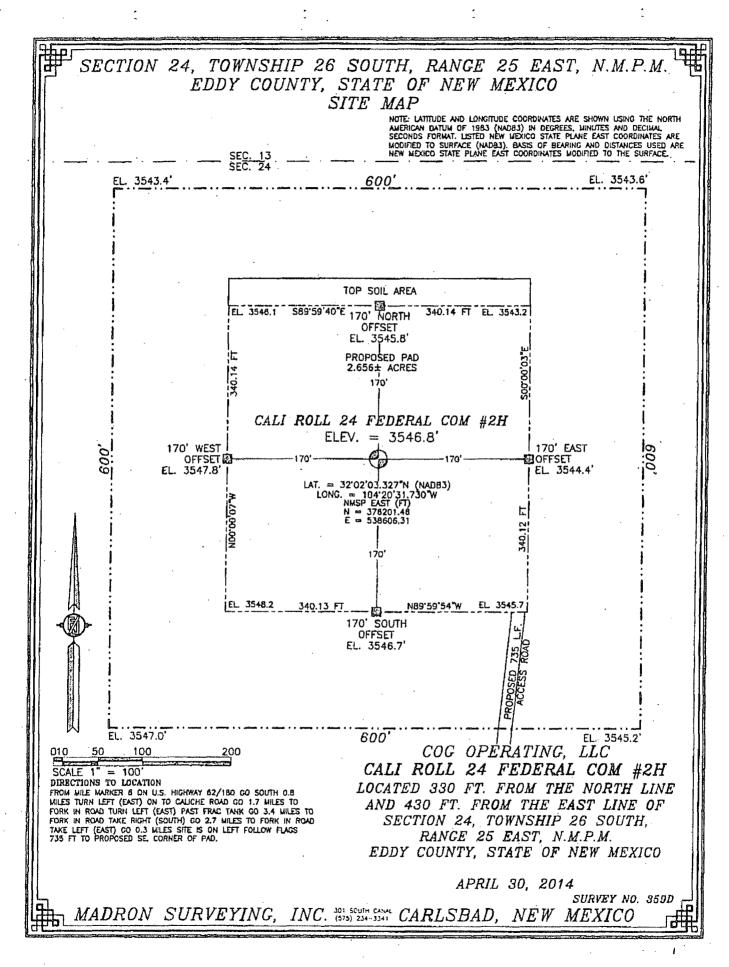
☐ AMENDED REPORT.

WELL LOCATION AND ACREAGE DEDICATION PLAT

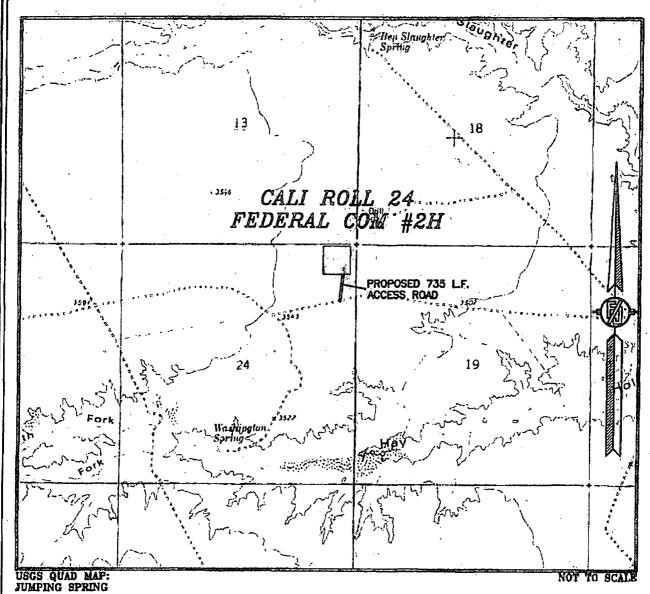
	API Numbe		ı	Pool Cod			Pool Na	ine .	
30-0)15-39	3388		96403		Wild	cat; Bone	Spring	•
Property	Code				5 Property	Name			6 Well Number
				CAL	I ROLL 24 FE	DERAL COM			2H
OGRID	No.				* Operator	Name			⁹ Elevation
22913	7				OG OPERAT	ING, LLC.			3546.8
					¹⁰ Surface	Location .			······································
UL or lot no.	Section	Township	Range	Lot idn	Feet from the	North/South line	Feet from the	East/West fine	County
A ·	. 24	26 S	25 E	•	330	NORTH	430	EAST	EDDY
			" Bo	ttom Ho	le Location I	Different From	n Surface	***************************************	2.
UL or lot au.	Section	Township	Range	Lut Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	25	26 S	25 E		330	SOUTH	380	EAST	EDDY
Dedicated Acre	s "Joint o	r laffil 14 C	onsolidation	Code 15 Or	der No.	<u> </u>	<u> </u>		

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.

n version of the second		
MW CORNER SEE. 24 LUT. = 12 TEZ 06.500 N LUNG. = 10472 N2.331 W MASP LIST (TT H = 374326) E = 533742.83	LONG = 10470374778 SURFACE LONG = 104707873778 HASP EAST (FT) LOQATION S MISP EAST (FT) HIS JUSTICE STATE OF THE PARTY O	OPERATOR CERTIFICATION I hereby certify that the information contained berein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral burress in the hand inchalling
W O CORNER SEC. 24 LUT. = 32701-40.2167N LONG. = 1047178.13478 NASP LSST (FT) N = 373286.13 E = 533740.23	CALI ROLL 24 FEDERAL CON \$2H LAT = 3202'03.327N (NAD83) LONG = 104'20'31.730'W L-0 CORRER SIC 24 NISSP EAST (FT) LAT = 3701'40.259'N N = 578201.46 IONG = 1042072.772'U E = 538608.31 Masp East (FT) H = 373670.43 C = 339337.25	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 a mineral or working interest, or to a voluntary pooling agreement of occasions pooling order of minings entered by the divisory. Signature
SECTION CORNER (J.1. = 3201 (1882*N LONG = 10+27:28,72*V HASP EAST (FT) H = 331203-9 E = \$33736.27	OUARTER CORNER Lat. = 310113.9141v Lat. = 10113.9141v Lat. = 10	Printed Name mparker@concho.com E-mail Address I*SURVEYOR CERTIFICATION I hereby certify that the well location shown on this
w o corner scc. 25 Scald	HOTE: LATITUDE AND LONGITUDE COORDINATE, THE SHOWN USING THE MORTH AMERICAN DATUM OF 1983 (MADA3) IN DECREES, MINUTES AND DECIMAL SECONDS FORMAT. LISTED NEW MEXICOL STATE PLANE LEST COORDINATE AND MODIFIED TO SURFACE (MADA3). BUSS OF BRAINED AND DISTANCES USED ARE NEW MEXICOL STATE PLANE EAST COORDINATES MODIFIED TO THE SURFACE. SEC. 25 BOTTOM OF HOLE E SHOWN SUBSTITUTE MASS EAST (FT) LONG. 1047 7311.0744.42711 LONG. 1047 7311.0744.42711 NASP EAST (FT)	plat was plotted from field notes of actual surveys made by me ar wider in hipper spin and that the same is tructural carrective the best of the belief. APRIL 19-2014 Date of Survey 12797
54 CD8467 SEC. 25 SCALD	S 0 CORREST 25 LUT 1200 21.1827M SOTTOM SULT - 250 21.1847M LONG 1007 107 71.915 W SOTTOM SULT - 250 21.1847M LONG 1007 107 71.915 W SOTTOM SULT - 250 21.1847M LONG 1007 107 107 107 107 107 107 107 107 10	Signature and Sease Proposition of Jaran III. O. PLS 12797 SURVEY NO. 1590



SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M. EDDY COUNTY, STATE OF NEW MEXICO LOCATION VERIFICATION MAP

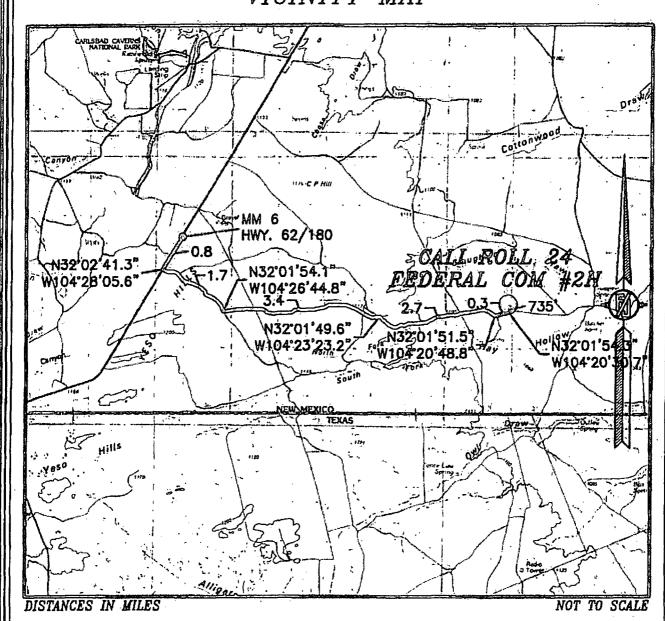


COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 30, 2014

SURVEY NO. 359D MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M. EDDY COUNTY, STATE OF NEW MEXICO VICINITY MAP



DIRECTIONS TO LOCATION
FROM MILE MARKER 8 CM U.S. HIGHWAY 82/180 CO SOUTH 0.8
MILES TURN LEFT (EAST) ON TO CALICHE ROAD CO 1.7 MILES TO
FORK IN ROAD TURN LEFT (EAST) PAST FRAC TANK CO 3.4 MILES TO
FORK IN ROAD TAKE RICHT (SOUTH) GO 2.7 MILES TO FORK IN ROAD
TAKE LEFT (EAST) GO 0.3 MILES SITE IS ON LEFT FOLLOW FLAGS
7.35 FT TO PROPOSED SE CORNER OF PAD.

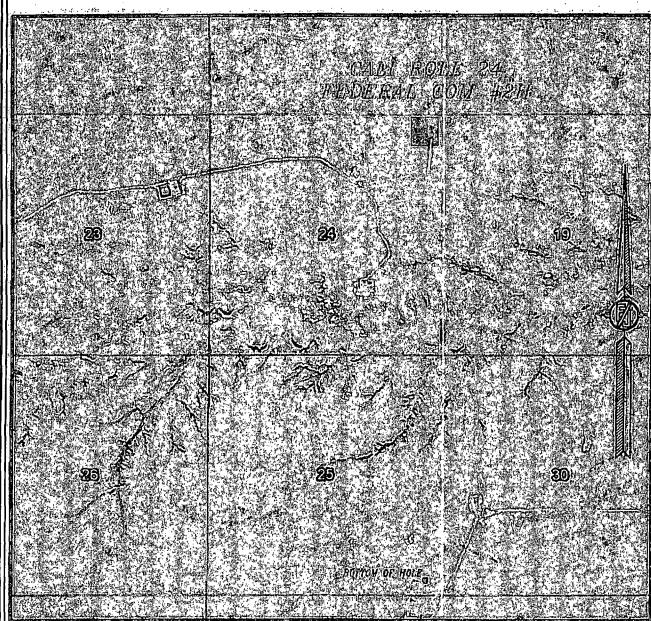
COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 30, 2014

SURVEY NO. 359D

MADRON SURVEYING, INC. 301 SOUTH CARLSBAD, NEW MEXICO

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M. EDDY COUNTY, STATE OF NEW MEXICO AERIAL PHOTO



NOT TO SCALE ARRIAL PHOTO: GOOGLE BARTH JANUARY 2013

COC OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

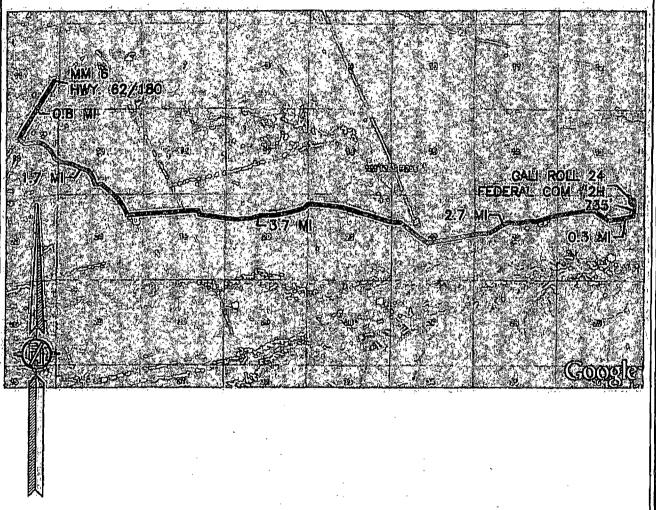
APRIL 30, 2014

SURVEY NO. 359D

MADRON SURVEYING, INC. 301 SOUTH CAPAL CARLSBAD, NEW MEXICO

F

SECTION 24, TOWNSHIP 26 SOUTH, RANGE 25 EAST, N.M.P.M. EDDY COUNTY, STATE OF NEW MEXICO AERIAL ACCESS ROUTE MAP



NOT TO SCALE AERIAL PHOTO: GOOGLE EARTH JANUARY 2013

COG OPERATING, LLC
CALI ROLL 24 FEDERAL COM #2H
LOCATED 330 FT. FROM THE NORTH LINE
AND 430 FT. FROM THE EAST LINE OF
SECTION 24, TOWNSHIP 26 SOUTH,
RANGE 25 EAST, N.M.P.M.
EDDY COUNTY, STATE OF NEW MEXICO

APRIL 30, 2014

SURVEY NO. 359D
MADRON SURVEYING, INC. 201 SOUTH CAME CARLSBAD, NEW MEXICO

COG Operating LLC DRILLING AND OPERATIONS PROGRAM

Cali Roll 24 Federal COM #2H

SHL: 330' FNL & 430' FEL, Section 24 BHL: 330' FSL & 380' FEL, Section 25 T26S, R25E

Eddy County, New Mexico

COG Operating LLC submits the following requested changes to the approved drilling plan.

1. No change

2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

TD (Pilot) No Pilot Hole Lateral TD MD 17,765' Lateral TD TVD 7,800'

Other intervals will be isolated by setting 5 1/2" casing to total depth and circulating cement back to 1200' (300' overlap into 9-5/8" intermediate casing).

3. Proposed Casing Program: All casing is new and API approved

Hole Size	Depths	Section	OD Casing	New/ Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
8 3/4"	0' – 17,765'	Production Curve & Lateral	5 1/2"	New	17#	втс	P-110	1.125	1.125	1.6

Will run one centralizer every other joint in lateral section of well.

4. Proposed Cement Program

5 1/2" Production

Lead:

950 sx 50:50:10 H w/ 8# salt, 5# kolseal, 0.5%

Halad-322, 0.3% HR-601 & 1/4# D-Air 5000 (11.9

ppg / 14.07 gal/sk / $2.51 \text{ ft}^3/\text{sk}$)

Tail:

2900 sx 50:50:2 H w/ 1% salt, 0.4% GasStop,

0.3% CFR-3 & 0.1% HR601, & CFR-3 (14.4 ppg /

5.66 gal/sk 1.25 ft³/sk)

**Calculated w/45% excess on OH volumes

- The production string will be cemented in one stage with the planned TOC 300' up into the 9-5/8" casing.
- Pilot hole will not be drilled. The estimated KOP is 7498'.

5. Minimum Specifications for Pressure Control:

Nipple up on 9 5/8" with minimum 3M annular and double ram preventers. Annular will be tested to 50% of WP and remainder of system tested to 3000 psi by independent tester.

6. Estimated BHP & BHT:

Lateral TD = 3407 psi Lateral TD = 141° F

7. Mud Program: The applicable depths and properties of this system are as follows:

		Mud	Viscosity	Waterloss
Depth	Type System	Weight	(sec)	(cc)
1,500' - 17,765' (Lateral)	Cut Brine	8.8 - 9.3	29	N.C.

8. Auxiliary Well Control and Monitoring Equipment:

No changes.

9. Testing, Logging and Coring Program:

No changes.

10. Potential Hazards:

No changes.

11. Anticipated starting date and Duration of Operations:

No changes.



COG Production, LLC

Eddy County, NM (NAD 83) Sec 24, T26S, R25E Cali Roll 24 Federal Com #2H

Wellbore #1

Plan: Design #1

DDC Well Planning Report

08 May, 2014





Map Zone:

DDC Well Planning Report



Local Co-ordinate Reference: Well @:3577 Ousft (Precision #77) Company: TVD Reference: Project: MD Reference: Well @ 3577 Ousft (Precision North Reference: Survey Calculation Method: Well: Wellbore: Wellbore #1 Design: Design#1

Project. Eddy County NM (NAD 83)

Map System: US State Plane 1983 System Datum:

New Mexico Eastern Zone

Mean Sea Level North American Datum 1983 Geo Datum:

Site *Sec 24 T26S R25E* Northing: 376,201.46 usft Site Position: Latitude: 32° 2' 3.327 N Easting: Мар 538,606.31 usft 104° 20' 31.730 W Fròm: Longitude: Slot Radius: 13-3/16 " Grid Convergence: Position Uncertainty: 0.0 usft 0.00

Cali Roll 24 Federal #2H & Well Northing: Well Position +N/-S 0.0 usft 376,201.46 usft Latitude: 32° 2′ 3.327 N +E/-W 0.0 usft Easting: 538,606,31 usft Longitude: 104° 20' 31.730 W 0.0 usft Wellhead Elevation: 0.0 usft **Position Uncertainty** Ground Level: 3,547.0 usft

Wellbore Declination Sample Date Magnetics Model Name Field Strength Dip Angle (%) (°). (nT) , 59.81 IGRF2010 5/7/2014 7.57 48,127

Design Audit Notes: Version: Phase: PLAN Tie On Depth: 0.0 Vertical Section: Depth From (TVD) +E/-W +N/-S Direction (usft) (usft) ု(usft) ု ခ ** (°) \$ * 0.0 0.0 0.0 179.68

Plan Sections	THE STATE OF THE S	Programme and the	ing the Enterior	and the second	A STATE OF THE STATE OF	Maria Children				
Measured			Vertical			Dogleg "".	Bulld	3 Turn		
Depth li	nclination∌	Azimuth	Depth	+N/-S	+E/-W.	Rate	Rate	Rate	TFO.	
(usft)	(%)	(°) (°)	(usft)	(usft)	(usft)	. (°/100usft)	(°/100usft)	(°(100usft)	(0)	Target
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7,497.7	0.00	0.00	7,497.7	0.0	0.0	0.00	0.00	0.00	0.00	
8,259.7	91.44	179.68	7,975.0	-489.4	2.7	12.00	12.00	23.58	179.68	
15,200.5	91.44	179.68	7,800.9	-7,428.0	41.5	0.00	0.00	0.00	0.00 S	tart Drop Cali Roll 24
15,272.4	90.00	179.68	7,800.0	-7,499.8	41.9	2.00	-2.00	0.01	179.83	+
17,764.7	90.00	179.68	7,800.0	-9,992.1	55.6	0.00	0.00	0.00	0.00 P	BHL Cali Roll '24' Fe



DDCWell Planning Report



Planned Survey								17.77 F/B	
			Vortical			ertical	Modlog	Build	Turn
Measured Depth	Inclination	zimuth	Vertical 1	+N/-S	St. 76	ction	Dogleg Rate	Rate	Rate
(usft)	(°)	(9)	, (üsft)	(usft)	(usft)	usft)	/100úsft) ; (°	/100usft) (//100usft)
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Rustler 65.0	0.00	0.00	65.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
. 200.0 300.0	0.00 0.00	0.00 0.00	200.0 300.0	0.0 0.0	0.0 0.0	0.0	0.00 0.00	0.00 0.00	0.00
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BOS (Fletcher) (0.00	1,437.0	0.0	0.0	0.0	0.00 0.00	0.00	0.00
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LMAR (Top De	laware)/*/- 5/-	The state of the s	大小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小	Carlotte Maria				ME TOTAL	and the state of t
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3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
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3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	. 0.00
BYCN	r :		1. * * * * * * * * * * * * * * * * * * *	e ^e					
3,636.0 3,700.0	0.00 0.00	0.00 0.00	3,636.0 3,700.0	0.0	· 0.0 0.0	0.0 0.0	0.00 0.00	0.00 0.00	0.00 0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0:00
3,000.0	0.00	0.00	3,000.0	U.U	U.U		0.00	0.00	0.00



Project:

Design:

Well: Wellbore:

Site:"

DDC; Well Planning Report



Databáse: Company:

EDM: 5000"1; Single; User Db COG!Production: LEC Eddy.(County; NM; (NAD:83) Sec 24. T26S; R25E; Cali Roll:24 Federal Com #2H; Wellbore #1; Design:#1;

Local Co-ordinate Reference:

TVD Reference: MD Reference: North Reference:

Survey Calculation Method:

Well Call Roll 24 Federal #2Hi Well @ 3577 Oust (Precision #77) Well @ 3577 Oust (Precision #77) Grid Minimum Curvature

		4.0				the state of the second section of the second	بتعلقها ويهدلنك لاستهامات والمتباث	وسقالها وتزون وهواكواهى السند ادور ورقاعت فاستروه	بمتنعها لمصحابة بمعايضة سنتج وشيان	manager agreement between the control of
: B										1. 3. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
	Measured, 🦿		The same of	Vertical			Vertical	Dogleg	Build'	Turn
	Depth	inclination	Azimuth	Depth	+N/-S	+E/-W	Section	Rate	Rate	Rate
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft) (°	/100usft)	(°/100usft)
	3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,200.0	0.00	0.00	, 4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	: 0.00	0.00
	4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,700.0	0.00	0.00	4,700.0	0.0	0.0	. 0.0	0.00	0.00	0.00
1	4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
	4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
	5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
	5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
	Bone Spring	STATE AND STATE	或的规模点点	Self-Self-Middle	Taria (anasis)	电特别机场		The Control of the Control	A State Control of the	
	5,133.0	0.00	0.00	5,133.0	0.0	0.0	0.0	. 0.00	0.00	0.00
	5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
	Upper Avalo		i replacej naj			a second		and the second second		A Commence of the Commence of
	5,240.0	0.00	0.00	5,240.0	0.0	0.0	0.0	0.00	0.00	0.00
	5,300.0	0.00	• 0.00	5,300.0	. 0.0	0.0	0.0	0.00+	0.00	0.00
1	5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
	5,500.0	0.00	. 0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
l		alibidated in Alicha	to the contract of	المستعددات سمد	osi salata.	ي مي د	Service Service	and the state of		1000年代的1000年
/ /	Lower Avalo 5,557.0	n≀Shale ∞ (*) 0.00	িক: (১৯৯৯) ক 0.00	अंधल, के अंधिक के 5,557.0	対象の研究を指数。 0.0	(1 €) × (5 g (1 0,0	0.0	0.00	0.00	0.00
	5,600.0	0.00	0.00	5,600.0	0.0	. 0.0	0.0	0.00	0.00	0.00
	5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
	5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
	5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	. 0.00
	6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	. 0.00	0.00	0.00
	First Bone S			- 17 - 17 - 17 - 17 - 17 - 17 - 17 - 17	0.0	4	. 0.0	0,00		
· · · · ·	6,021.0	0.00	0.00	6,021.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,300.0	. 0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
ĺ	6,600.0	0.00	0.00	. 6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	. 0.00	0.00
j	Second Bond	e Spring Sand	5 5	124, 11 12	·			W		
	6,722.0	0.00	0.00	6,722.0	0.0	0.0	0.0	0.00	0.00	0.00
	6,800.0 .	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1	6,900.0	0.00	0,00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
i i	7.000.0	0.00	0,00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
	7,100.0	0.00	0,00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
ļ.	7,200.0	0.00	0,00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
 	7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
	7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
		Build-12°/100'		7,100.0			5.3	3.33		0.00
,	7,497.7	0.00	0.00	7,497.7	0.0	0.0	0.0	0.00	0.00	0.00
	7,500.0	0.28	179.68	7,500.0	0.0	0.0	0.0	12.00	12.00	0.00
	7,525.0	3.28	179.68	7,525.0	-0.8	0.0	0.8	12.00	12.00	0.00
	7,550.0	6.28	179.68	7,549.9	2.9	0.0	. 2.9	12.00	12.00	0.00
	7,550.0 7,575.0	9.28	179.68	7,549.9 7,574.7	2.9 -6.2	0.0	2.9 6.2	12.00	12.00	0.00
1	7,600.0	12.28	179.68	7,599.2	-10.9	0.0	10.9	12.00	12.00	0.00



DDC Well Planning Report



Database: | EDM:5000\;|Single User Db: | Local Co-ordinate Reference: | Well Cali Roll(24 Federal #2H) |
Company: | COG:Production LLC | FVD.Reference: | Well @:3577:0usft (Recision #77) |
Project: | rEddy:County NM:(NAD:03) | IMD:Reference: | Well @:3577:0usft (Precision #77) |
Site: | Sec 24 | T265 | R25E | | North:Reference: | Grid |
Well: | Cali Roll 24 Federal Com #2H | Survey:Calculation Method: | Minimum Curvature. |
Wellbore: | Wellbore #1 |
Design: | Design:#1

Planned St	irvēy.	established to								
13. 15.	机械控制性									
G 4 1 2 2 2 3 4 7 1	easured 🐎 🕌		# 15 7 7 A	Vertical			Vertical .	Dogleg	Build	Turn's recognition
1 230 % 75-1997		clination 🛣 🔭	Azimuth 🛴 🔭	, Depth	+N/ ₅ S;	38	Section	Rate	c Rate √	Rate
100	(usft)			(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100ùsft).	°/100usft),
	7,625.0	15.28	179.68	7,623.5	-16.9	0.1	16.9	12.00	12.00	0.00
	7,650.0	18.28	179.68	7,647.4	-24.1	0.1	24.1	12.00	12.00	0.00
	7,675.0	21.28	179.68	7,671.0	-32.5	0.2	32.5	12.00	12.00	0.00
	7,700.0	24.28	179.68	7,694.0	-42.2	0.2	42.2	12.00	12.00	0.00
1	7,725.0	27.28	179.68	7,716.5	-53.1 ·	0.3	53.1	12.00	12.00	0.00
1.	.7,750.0	30.28	179,68°	7,738.4	-65.1	0.4	65.1	12.00	12.00	0.00
	7,775.0	33.28	179.68	7,759.7	-78.3	0.4	78.3	12.00	12.00	0.00
	7,800.0	36.28	179,68	7,780.2	-92.5	0.5	92.5	12.00	12.00	0.00
	hird Bone Sprii	ng Sand	水温度物	FARE CONTRACTOR	A. C. M. M. M. M. M.			对视频		
	7,805.5	36.93	179.68	7,784.6	-95.8	0.5	95.8	· 12.00	12.00	. 0.00
	7,825.0	39.28	179.68	7,800.0	-107.9	0.6	107.9		12.00	0.00
	7,850.0	42.28	179.68	7,818.9	-124.2	0.7	, 124.2	12.00	12.00	0.00
1	7,875.0	45.28	179.68	7,836.9	-141.5	8.0	141.5	12.00	12.00	0.00
	7,900.0	48.28	179,68	7,854.1	-159.7	. 0.9	159.7	12.00	12.00	0.00
1	7,925.0	51.28	179:68	7,870.2		1.0	178.8	12.00	12.00	0.00
Ì	7,950.0	54.28	179.68	7,885.3	-198.7	1.1	198.7	12.00	12.00	0.00
	7,975.0	57.28	179.68	7,899.4	-219.3	1.2	219.4	12.00	12.00	0.00
}	8,000.0	60.28	179.68	7,912.3	-240.7	1.3	240.7	12.00	12.00	0.00
"	8,025.0	63.28	179:68	7,924.2	-262,7	* 1.5 .	262.8	12.00	12.00	0.00
	8,050.0	66.28	179.68	7,934.8	-285.4	1.6	285.4	12.00	12.00	0.00
	8,075.0	69.28	179.68	7,944.3	-308.5	1.7	308.5 ,	12.00	12.00	0.00
,	8,100.0	72.28	179.68	7,952.5	-332.1	1.9	332.1	12.00	12.00	0.00
	8,125.0	75.28	179.68	7,959.5	-356.1	2.0	356.1	12.00	12.00	0.00
	8,150.0	78.28	179.68	7,965.2	-380.4	√2.1	380.4	12.00	12.00	0.00
	8,175.0	81.28	179.68	7,969.6	-405.0	2.3	405.0	12.00	12.00	0.00
	-8,200.0	84.28	179.68	7,972.8	-429.8	2.4	429.8	12.00	12.00	0.00
	8,225.0	87.28	179.68	7,974.6	-454.8	2.5	454.8	12.00	12.00	0.00
1	8,250.0	90.28	179,68	7,975.2	-479.8	2.7	479.8	12.00	12.00	0.00
. daya E i	nd of Curve @	8260 MD //91	44° Inc. //7975	TVD	Carlos Salas Salas		ر واز برقی در در خاص و در در در در در	The state of the s	in the standing of the	William Commencer
	8,259.7	91.44	179.68	7,975.0	-489.4	2.7	489.4	12.00	12.00	0.00
!	8,300.0	91.44	179.68	7,974.0	-529.7	3.0	529.8	0.00	0.00	0.00
	8,400.0	91.44	179.68	7,971.5	-629.7	3.5	629.7	0.00	0.00	0.00
i	8;500.0	91.44	179.68	7,969.0	-729.7	4.1	729.7	0.00	0.00	. 0.00
	8,600.0	91.44	179.68	7,966.5	-829.6	. 4.6	829.7	0.00	0.00	0.00
	8,700.0	91.44	179.68	7,964.0	-929.6	5.2	929.6	0.00	0.00	0.00
	8,800.0	91.44	179.68	7,961.5	-1,029.6	5.8	1,029.6	0.00	0.00	0.00
1	8,900.0	91.44	179.68	7,959.0	-1,129.5	6.3	1,129.6	0.00	0.00	0.00
-	9,000.0	91.44	179.68	7,956.4	-1,229.5	6.9	1,229.5	0.00	0.00	0.00
	9,100.0	91.44	179.68	7,953.9	-1,329.5	7.4	1,329.5	0.00	0.00	0.00
	9,200.0	91.44	179.68	7,951.4	-1,429.4	8.0	1,429.5	0.00	. 0.00	0.00
-	9,300.0	91.44	179.68	7,948.9	-1,529.4	8.5	1,529.4	0.00	. 0.00	0.00
1	9,400.0	91.44	179.68	7,946.4	-1,629.4	9.1	1,629.4	0.00	0.00	0.00
	9,500.0	91.44	179.68	7,943.9	-1,729.3	9.7	1,729.4	0.00	0.00	. 0.00
	9,600.0	91.44	179.68	7,941.4	-1,829.3	10.2	1,829.3	0.00	0.00	0.00
	9,700.0	91.44	179.68	7,938.9	-1,929.3	10.8	1,929.3	0.00	0.00	0.00
	9,800.0	91.44	179.68	7,936.4	-2,029.2	11.3	2,029.3	0.00	0.00	0.00
-	9,900.0	91.44	179.68	7,933.9	-2,129.2	11.9	2,129.2	0.00	0.00	Ö.00`
i	10,000.0	91.44	179.68	7,931.4	-2,229.2	12.5	2,229.2	0.00	0.00	0.00
	10,100.0	91.44	179.68	7,928.8	-2,329.1	13.0	2,329.2	0.00	0.00	0.00
-	10,200.0	91.44	179.68	7,926.3	-2,429.1	13.6	2,429.2	0.00	0.00	0.00
	10,300.0	91.44	179.68	7,923.8	-2,529.1	14.1	2,529.1	0.00	0.00	0.00
:	10,400.0	91.44	179.68	7,921.3	-2,629.0	14.7 .	2,629.1	0.00	0.00	0.00
1	10,500.0	91.44	179.68	7,918.8	-2,729.0	15.2	2,729.1	0.00	0.00	0.00
	10,600.0	91.44	179.68	7,916.3	-2,829.0	15.8	2,829.0	0.00	0.00	0.00



Well Planning Report



Database: Company: Project: Site: Well Wellbore: Design

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

New York	Bearing Assessment	and the second								
Measured Mortical Double Mortical Mortical Double Mortical Morti	Diagnod Suriou	The state of			स्पे से अस्ति।	ton marks	The Part of the		The second second	ति संबद्धाः के किंग संबद्धाः हा स्थानकारि
Pept	Flameu Survey	a property of the	Company of the second			الميكا وأحسراني كالمتزلب ووالانتاج	an espera		A MARKET AND THE	
Pepth Inclination Azimuth Pepth Inclination Azimuth Pepth Inclination		"一个"		200	والمستجد والمستجدون	16 1 10 10 1		and the second		17. 我man and 17. 15.
Pepth Inclination Azimuth Pepth Inclination Azimuth Pepth Inclination	Measured Measured	80	A	 Vertical 5. 		Color Town of	Vertical	Dogleg	Build	Turn
10,700.0	Denth	nclination	The second second second	Denth	TN/S	LEIM.			3 1 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
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13,800.0 91.44 179.68 7,836.0 -6,027.9 33.7 6,028.0 0.00 0.00 0.00 13,900.0 91.44 179.68 7,833.5 -6,127.9 34.2 6,128.0 0.00 0.00 0.00 14,000.0 91.44 179.68 7,831.0 -6,227.9 34.8 6,228.0 0.00 0.00 0.00 14,100.0 91.44 179.68 7,828.5 -6,327.8 35.3 6,327.9 0.00 0.00 0.00	13 700 0	91 //	170.68	7 838 5	-5'028 N	22.1	E 029 1	0.00	0.00	0.00
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14,600.0 91.44 179.68 7,816.0 -6,827.7 38.1 6,827.8 0.00 0.00 0.00 0.00	14,600.0	91.44	179.68	7,816.0	-6,827.7	38.1	6,827.8	0.00	0.00	0.00
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15,000.0 91.44 179.68 7,805.9 -7,227.5 40.4 7,227.6 0.00 0.00 0.00	15,000.0	91.44	179.68	7,805.9	-7,227.5	40.4		0.00		
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15,300.0 90.00 179.68 7,800.0 -7,527.5 42.0 7,527.6 0.00 0.00 0.00	15,300.0	90.00	179.68	7,800.0	-7,527.5	42.0	7,527.6	0.00	0.00	0.00
15,400.0 90.00 179.68 7,800.0 -7,627.5 42.6 7,627.6 0.00 0.00 0.00	15.400.0	90.00			•					
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	·							0.00	0.00	0.00
<u> 15,600.0 90.00 179.68 7,800.0 -7,827.4 43.7 7,827.6 0.00 0.00 0.00</u>	15,600.0	90.00	179.68	7,800.0	-7,827.4	43.7	7,827.6	0.00	0.00	0.00



DDCWell Planning Report



Database: Company: Project: Site: Well: Wellbore: Design:

EDM 5000 1 Single User Db COG Production LLC Eddy County (NM) (NAD 83) Sec 24 1726S R25E Local Co-ordinate Reference: TVD Reference: MD:Reference: North Reference: Survey Calculation Method Well Cai)Roli/24 Federal #2H Well @3577 Ousft (Precision #77) Well @3577 Ousft (Precision #77) Grid Minimum Curvature

Planned Su	rvey					TO THE		and the state of	gang of great the line	
Me	asured :		V	ertical.		, , , , , , , , , , , , , , , , , , ,	ertical Do	gleg B	ulid (Tur	n A
	Depth Inclin usft) (°	ation Az	imuth: (°)	Depth (usft)			the transfer of the state of th		ate / Rat Ousft) (°/100i	4.52
-be	15.700.0	90.00	179.68	7,800.0	-7.927.4	44.2	7,927.6	0.00	0.00	0.00
	15,800.0	90.00	179.68	7,800.0	-8,027.4	44.8	8,027.6	0.00 .	0.00	0.00
	15,900.0	90.00	179.68	7,800.0	-8,127.4	45.3	8,127.6	0.00	0.00	0.00
	16,000.0	90.00	179.68	7,800.0	-8,227.4	45.9	8,227.6	0.00	0.00	0.00
	16,100:0	90.00	179.68	7,800.0	-8,327.4	46.4	8,327.6	0.00	0.00	0.00
	16,200.0	90.00	179.68	7,800.0	-8,427.4	47.0	8,427.6	0.00	0.00	0.00
	16,300.0	90.00	179.68	7,800.0	-8,527.4	47.5	8,527.6	0.00	0.00	0.00
	16,400.0	90.00	179.68	7,800.0	-8,627.4	48.1	8,627.6	0.00	0.00	0.00
•	16,500.0	90.00	179.68	7,800.0	-8,727.4	48.6	8,727.6	0.00	0.00	0.00
	16,600.0	90.00	179.68	7,800.0	-8,827.4	49.2	8;827.6	0.00	0.00	0.00
	16,700.0	90.00	179.68	7,800.0	-8,927.4`	49.8	8,927.6	0.00	0.00	0.00
	16,800.0	90.00	179.68	7,800.0	-9,027.4	50.3	9,027.6	0.00	0.00	0.00
	16,900.0	90.00	179.68	7,800.0	-9,127.4	50.9	9,127.6	0.00	0.00	0.00
	17,000.0	90.00	179.68	7,800.0	-9,227.4	51.4	9,227.6	0.00	0.00	0.00 -
	17,100.0	90.00	179.68	7,800.0	-9,327.4	52.0	9,327.6	0.00	0.00	0.00
	17,200.0	90.00	179.68	7,800.0	-9,427:4	52.5	9,427.6	0.00	0.00	0.00
	17,300.0	90.00	179.68	7,800.0 .	-9,527.4	53.1	9,527.6	0.00	0.00	0.00
	17,400.0	90.00	179.68	7,800.0	-9,627.4	53.6	9,627.6	0.00	0.00	0.00
	17,500.0	90.00	179.68	7,800.0	-9,727.4	54.2	9,727.6	0.00	0.00	0.00
	17,600.0	90.00	179.68	7,800.0	-9,827.4	54.7	9,827.6	0.00	0.00	0.00
'	17,700.0	90.00	179.68	7,800.0	-9,927.4	55:3	9,927.6	0.00	0.00	0.00
PĚ	HL @47765 MD /	7800' TVD		The state of the state of		A Section of			The second secon	·
	17,764.7	90.00	179.68	7,800.0	-9,992.1	55.6	9,992.2	0.00	0.00	0.00
	•									

Design Targets Target Name hit/miss target E)ip Angle	Dip Dir	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL Cali Roll '24' Fede - plan hits target center - Point	0.00	0.01	7,800.0	-9,992.1	55.6	366,209.38	538,661.93	32° 0' 24.442 N	104° 20' 31.075 W
Start Drop Cali Roll 24 F - plan hits target center - Point	0.00	0.01	7,800.9	-7,428.0	41.5	368,773.47	538,647.80	32° 0′ 49.817 N	104° 20' 31.241 W



DDC Well Planning Report



Database: | EDM 5000 #Single User Db. |
Company: | COG Production | LLO |
Project: | Edd (County NM (NAD 83))
Site: | Sec. 24 #126 S R 25E |
Well: | Cali Roll 24 Federal Com #2H |
Wellbore: | Wellbore #1 |
Design # 1

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

李 张 明朝祖 董卓中等

Well-Cali⊩Roll/24 Federal #2H Well-@1357/ Oustf (Rrecision #77), Well-@1357/ Oustf (Rrecision #77), Grid* Minimum'Curvature

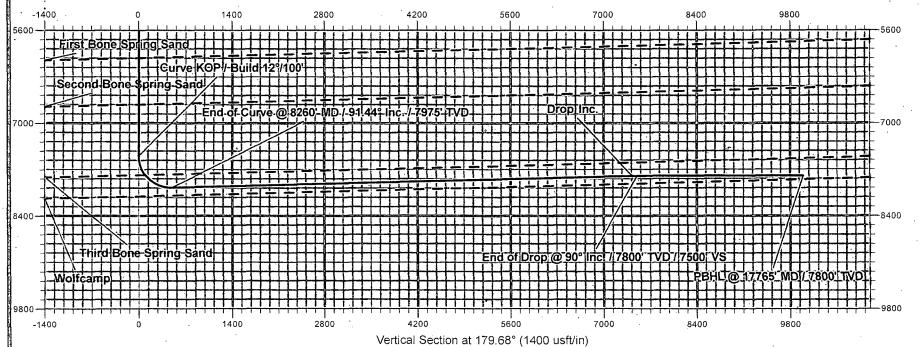
Formations					C.
A CAMPA	sured pth sft)	Vertical Depth (usft)	/Name Litthology	Dip Dip Direction (°)	
	65.0	65.0	Rustler	-1.44 179.68	
	393.0	393.0	TOS	-1.44 179.68	
•	1,437.0	1,437.0	BOS (Fletcher)	-1.44 179.68	
•	1,624.0	1,624.0	LMAR (Top Delaware)	-1.44 179.68	
•	1,668.0	1,668.0	BLCN	-1.44 179.68	
2	2,527.0	2,527.0	CYCN	-1.44 179.68 ·	
;	3,636.0	3,636.0	BYCN	-1.44 179.68	
	5,133.0	5,133.0	Bone Springs	-1.44 179.68	
5	5,240.0	5,240.0	Upper Avalon Shale	-1.44 179.68	
	5,557.0	5,557.0	Lower Avalon Shale	-1.44 179.68	
e	3,021.0	6,021.0	First Bone Spring Sand	-1.44 179.68	
6	6,722.0	6,722.0	Second Bone Spring Sand	-1.44 179.68	
·	7,805.5	7,784.6	Third Bone Spring Sand	-1.44 179.68	

Plan Annotations	his day as a fall har before do to the second	and the first of the second second	alder market in the built set.	The state of the s
Measured	Vertical	Local Coord	inates	
Depth	Depth	+N7-S	+É/-W	
(usft)	* *(jusft);	(usft)	(usft)	Comment
7,497.7	7,497.7	0.0	0.0	Curve KOP / Build 12°/100'
8,259.7	7,975.0	-489.4	2.7	End of Curve @ 8260' MD / 91.44° Inc. / 7975' TVD
15,200.5	7,800.9	-7,428.0	41.5	Drop Inc.
15,272.4	7,800.0	-7,499.8	41.9	End of Drop @ 90° Inc. / 7800' TVD / 7500' VS
17,764.7	7,800.0	-9,992.1	55.6	PBHL @ 17765' MD / 7800' TVD



Eddy County, NM (NAD 83)
Sec 24, T26S, R25E
Cali Roll 24 Federal COM #2H
Design #1

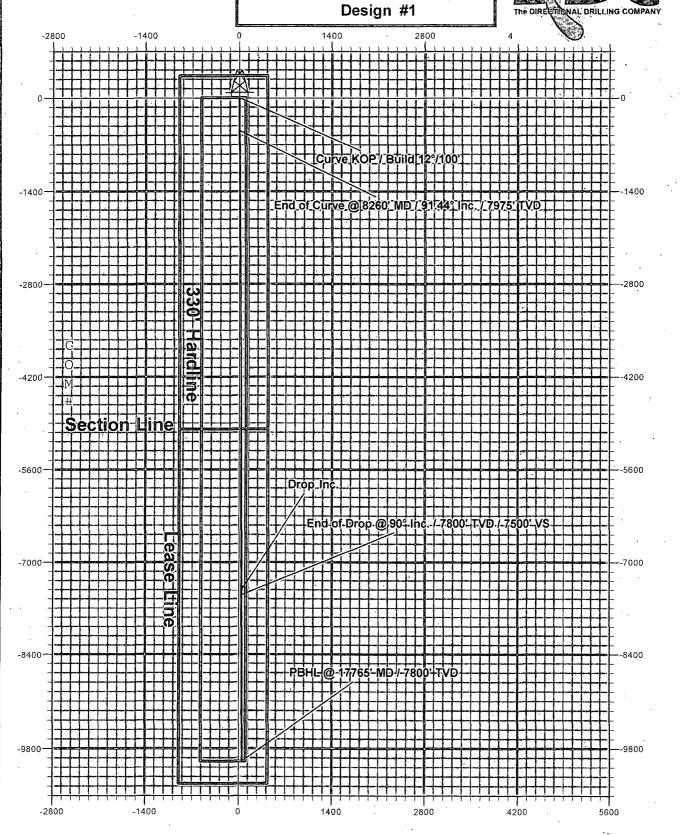




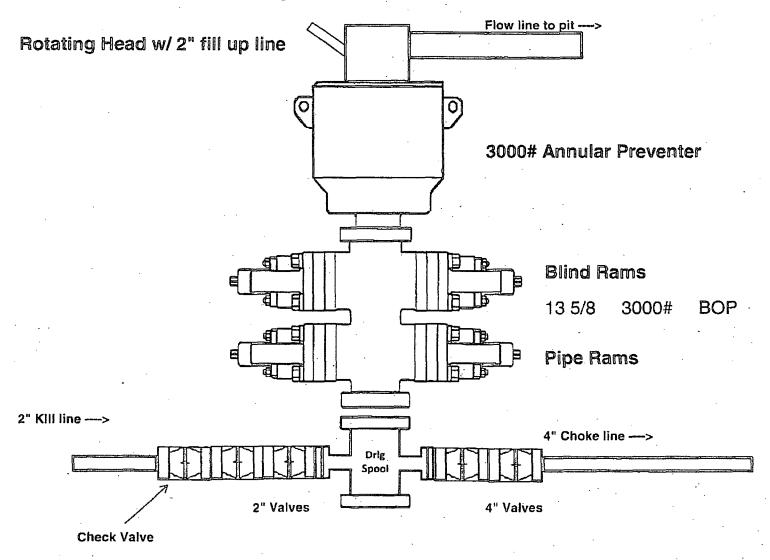


Eddy County, NM (NAD 83) Sec 24, T26S, R25E Call Roll 24 Federal COM #2H

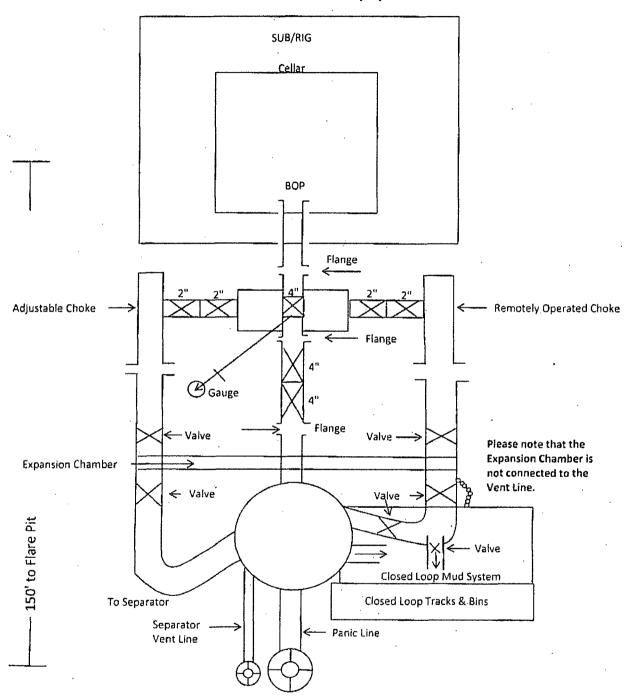




3,000 psi BOP Schematic



3M Choke Manifold Equipment



PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME: COG Operating, LLC

LEASE NO.: NMNM-104666

WELL NAME & NO.: | Cali Roll 24 Federal Com 2H SURFACE HOLE FOOTAGE: | 0330' FNL & 0430' FEL

BOTTOM HOLE FOOTAGE | 0330' FSL & 0380' FEL Sec. 25, T. 26 S., R. 25 E.

LOCATION: Section 24, T. 26 S., R. 25 E., NMPM

COUNTY: | Eddy County, New Mexico

The original COAs still stand with the following drilling modifications:

Special Requirements:

Communitization Agreement

A Communitization Agreement covering the acreage dedicated to this well must be filed for approval with the BLM. The effective date of the agreement shall be prior to any sales. In addition, the well sign shall include the surface and bottom hole lease numbers. If the Communitization Agreement number is known, it shall also be on the sign. If not, it shall be placed on the sign when the sign is replaced.

I. DRILLING

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. 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 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.).

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

Wait on cement (WOC) time prior to drilling out for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater for all casing strings. DURING THIS WOC TIME, NO DRILL PIPE, ETC. SHALL BE RUN IN THE HOLE. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. IF OPERATOR DOES NOT HAVE THE WELL SPECIFIC CEMENT DETAILS ONSITE PRIOR TO PUMPING THE CEMENT FOR EACH CASING STRING, THE WOC WILL BE 30 HOURS. 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.

CRITICAL CAVE/KARST

Possible sulfur water flows within the Castile formation. Possible loss of circulation in the Delaware. Possible abnormally high pressures in the Wolfcamp.

A MINIMUM OF TWO CASING STRINGS CEMENTED TO SURFACE IS REQUIRED IN CRITICAL 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. IF THE PRIMARY CEMENT JOB ON THE SURFACE CASING DOES NOT CIRCULATE, THEN THE NEXT TWO CASING STRINGS MUST BE CEMENTED TO SURFACE.

- 1. The 13-3/8 inch surface casing shall be set at approximately 400 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:

Centralizers required on horizontal leg, must be type for horizontal service and a minimum of one every other joint.

3.	The minimum	required fill	of cement	behind	the 5-1/	$^{\prime 2}$ inch pr	oduction	casing is:

Cement should tie-back at least 300 feet into previous casing 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 RP 53 Sec. 17.
- 2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 3000 (3M) psi.
 - a. For surface casing only: If the BOP/BOPE is to be tested against casing, the wait on cement (WOC) time for that casing is to be met (see WOC statement at start of casing section). Independent service company required.
- 3. 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 (18 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.

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