

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER

SECRETARY'S POTASH

HOBBS OCD

FEB 08 2016

RECEIVED

1a. Type of Work: ☒ DRILL ☐ REENTER		7. If Unit or CA Agreement, Name and No.	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		8. Lease Name and Well No. (38946) Airbonita 12 Federal Com #5H	
2. Name of Operator COG Operating LLC. (229137)		9. API Well No. 30-025-43063	
3a. Address 2208 West Main Street Artesia, NM 88210	3b. Phone No. (include area code) 575-748-6940	10. Field and Pool, or Exploratory (51683) Red Tank; Bone Spring	
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface 190' FSL & 360' FEL Unit Letter P (SESE) SHL At proposed prod. Zone 330' FNL & 380' FEL Unit Letter A (NENE) BHL		11. Sec., T.R.M. or Blk and Survey or Area Sec. 12 - T22S - R32E	
14. Distance in miles and direction from nearest town or post office* About 25 miles from Malaga		12. County or Parish Lea County	13. State NM
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any) 190'	16. No. of acres in lease SHL: 800, BHL: 160	17. Spacing Unit dedicated to this well 160	
18. Distance from location* to nearest well, drilling, completed, SHL: 30' (Proposed Airbonita #9H) applied for, on this lease, ft. BHL: 1759'	19. Proposed Depth TVD: 10835' MD: 15389'	20. BLM/BIA Bond No. on file NMB000740 & NMB000215	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3623.7' GL	22. Approximate date work will start* 9/1/2015	23. Estimated duration 30 days	

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, shall 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 shall be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be required by the authorized officer. |

25. Signature <i>Mayte Reyes</i>	Name (Printed/Typed) Mayte Reyes	Date 5-6-15
Title Regulatory Analyst		
Approved by (Signature) /s/George MacDonell	Name (Printed/Typed)	Date FEB - 3 2016
Title FIELD MANAGER	Office CARLSBAD FIELD OFFICE	

Application approval does not warrant or certify that the applicant holds legan 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.

APPROVAL FOR TWO YEARS

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)

Carlsbad Controlled Water Basin

KZ
02/10/16

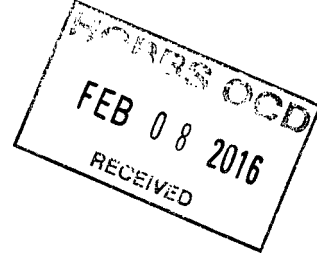
Approval Subject to General Requirements
& Special Stipulations Attached

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

FEB 11 2016

AIRBONITA 12 FED COM #5H

FID	OPERATOR	WELL_NAME	LATITUDE	LONGITUDE	API	SECTION	TOWNSHIP	RANGE	FTG_NS	NS_CD	FTG_EW	EW_CD	PRODUCING_	TVD_DEPTH	COMPL_STAT
0	CABOT CORP	NEW MEXICO K STATE 001	32.400885	-103.617759	3002501796	7	22.05	33E	660 S		660 W			4999	Plugged
1	RAY SMITH DRILLING CO	B & H FEDERAL 001	32.386362	-103.622033	3002508106	13	22.05	32E	660 S		660 E			5070	Plugged
2	OXY USA INC	NBR 001	32.38999	-103.609583	3002526976	18	22.05	33E	1980 S		1980 E		51683	15372	TA
3	PENROC OIL CORP	STATE 7 SST 001	32.404502	-103.609614	3002527466	7	22.05	33E	1980 S		1980 E			15323	Plugged
4	AMTEX ENERGY INC	DAGGER LAKE 6 STATE 002	32.422654	-103.609645	3002527573	6	22.05	33E	1980 N		1980 E		37870	15250	Active
5	OXY USA INC	NBR 002	32.393623	-103.613828	3002527780	18	22.05	33E	1980 N		1864 W		72650	15300	Active
6	OXY USA INC	WBR FEDERAL 001	32.393621	-103.623119	3002530137	13	22.05	32E	1980 N		990 E		51683	15261	Active
7	COG OPERATING LLC	PROHIBITION FEDERAL UNIT 001	32.408109	-103.634871	3002531137	12	22.05	32E	1980 N		660 W		6925	15112	Active
8	COG OPERATING LLC	PROHIBITION FEDERAL UNIT 003	32.40814	-103.623143	3002532142	12	22.05	32E	1980 N		990 E		6925	13780	Active
9	POGO PRODUCING CO	FLINT 6 STATE 001	32.421757	-103.617793	3002534175	6	22.05	33E	2310 N		660 W		5100	Plugged	
10	OXY USA INC	NBR 7 STATE 001	32.400883	-103.616685	3002534992	7	22.05	33E	660 S		990 W		72650	15140	Active
11	OXY USA INC	WBR FEDERAL 007	32.389965	-103.62947	3002535722	13	22.05	32E	1980 S		2310 W		51683	10150	Active
12	OXY USA INC	WBR FEDERAL 009	32.393107	-103.629671	3002536063	13	22.05	32E	2160 N		2250 W		51683	10050	Active
13	OXY USA INC	WBR FEDERAL 010	32.396736	-103.629482	3002536064	13	22.05	32E	840 N		2310 W		51683	10050	Active
14	OXY USA INC	WBR FEDERAL 012	32.39286	-103.634423	3002536415	13	22.05	32E	2245 N		790 W		51683	10080	Active
15	YATES PETROLEUM CORPORATION	MICRO BREW BEU FEDERAL 001	32.387251	-103.627405	3002536883	13	22.05	32E	990 S		2310 E		51683	10200	Active
16	OXY USA INC	WBR FEDERAL 004	32.387502	-103.626331	3002537007	13	22.05	32E	1080 S		1980 E		0	0	
17	OXY USA INC	WBR FEDERAL 011D	32.398126	-103.633781	3002537009	13	22.05	32E	330 N		990 W		0	0	
18	COG OPERATING LLC	PROHIBITION 12 FEDERAL 008	32.404609	-103.635028	3002537227	12	22.05	32E	2030 S		610 W		6925	8998	Active
19	COG OPERATING LLC	PROHIBITION 12 FEDERAL 007	32.408392	-103.631648	3002537228	12	22.05	32E	1880 N		1650 W		6925	8960	Active
20	COG OPERATING LLC	PROHIBITION 12 FEDERAL 010	32.404485	-103.630567	3002537819	12	22.05	32E	1980 S		1980 W		51683	8990	Active
21	COG OPERATING LLC	PROHIBITION 12 FEDERAL 012	32.400856	-103.630562	3002537821	12	22.05	32E	660 S		1980 W		6925	8990	Active
22	COG OPERATING LLC	PROHIBITION 12 FEDERAL 013	32.407716	-103.627744	3002537822	12	22.05	32E	2130 N		2310 E		0	0	
23	OXY USA INC	WBR FEDERAL 011	32.398119	-103.635929	3002537929	13	22.05	32E	330 N		330 W		51689	10050	Active
24	COG OPERATING LLC	PROHIBITION 12 FEDERAL 014	32.404496	-103.626751	3002538238	12	22.05	32E	1980 S		2100 E		0	0	
25	COG OPERATING LLC	PROHIBITION 12 FEDERAL 015	32.400868	-103.626745	3002538239	12	22.05	32E	660 S		2100 E		0	0	
26	OXY USA INC	NBR 003H	32.385489	-103.618743	3002540720	18	22.05	33E	340 S		350 W		14229	New (Not drilled or compl)	
27	COG OPERATING LLC	AIRBONITA 12 FEDERAL COM 002	32.400085	-103.626353	3002540179	12	22.05	32E	375 S		1980 E		14110	New (Not drilled or compl)	
28	OXY USA INC	WBR 13 SWD 001	32.389974	-103.622159	3002541380	13	22.05	32E	1974 S		697 E		0	New (Not drilled or compl)	
29	COG OPERATING LLC	AIRBONITA 12 FEDERAL COM 001H	32.399593	-103.62098	3002541491	12	22.05	32E	190 S		330 E		11937	New (Not drilled or compl)	
30	OXY USA INC	SPEAK EASY UNIT 002H	32.418496	-103.635961	3002540306	1	22.05	32E	1800 S		330 W		12735	New (Not drilled or compl)	
31	OXY USA INC	RIDGE RUNNER 7 STATE 001H	32.403746	-103.619375	3002541646	7	22.05	33E	1700 S		165 W		0	New (Not drilled or compl)	



COG Operating LLC, Airbonita 12 Federal Com 5H

1. Geologic Formations

TVD of target	10835'	Pilot hole depth	N/A
MD at TD:	15389'	Deepest expected fresh water:	580'

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	878	Water	
Top of Salt	956	Salt	
Lamar	4769		
Delaware Group	4891	Oil/Gas	
Bone Spring	8640	Oil/Gas	
Second Bone Spring	10365	Target Zone	
Third Bone Spring	11612	Will Not Penetrate	

*H2S, water flows, loss of circulation, abnormal pressures, etc.

See
COA

2. Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	920 960	13.375"	54.5	J55	STC	2.62	1.22	10.25
12.25"	0	4300	9.625"	40	J55	BTC	1.28	0.78*	3.28
12.25"	4300	4800	9.625"	40	L80	BTC	1.38	1.13	45.80
8.75"	0	15389	5.5"	17	P110	LTC	1.47	2.10	1.70D
BLM Minimum Safety Factor							1.125	1	1.6 Dry 1.8 Wet

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
- BLM standard formulas used on all safety factor calculations
- Assumed 9 ppg MW equivalent pore pressure
- *Explanation for SF's below BLM's minimum standards:
 - 9-5/8" Burst SF @ 0.78 – used BLM's frac gradient scenario to qualify
 - 3950 psi/4800' = 0.82 > 0.7

	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).	N

COG Operating LLC, Airbonita 12 Federal Com 5H

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?	Y
If yes, are the first 2 strings cemented to surface and 3 rd string cement tied back 500' into previous casing?	Y
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?	

3. Cementing Program

Casing	# Sk	Wt. lb/ gal	Yld ft3/ sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	430	13.5	1.75	9.15	5.5	Lead: Class C + 4.0% Gel + 2.0% CaCl ₂
	240	14.8	1.35	6.57	7	Tail: Class C + 2.0% CaCl ₂
Inter.	1100	13.5	1.73	9.15	5.5	Lead: Class C + 4.0% Gel
	350	14.8	1.34	6.47	5.5	Tail: Class C
Prod.	1055	10.3	3.5	21.16	90	Lead: Tuned Lite + 2 lb/sk Kol-Seal + 0.125 lb/sk. Pol-E-Flake + 0.5 lb/sk HALAD-9 + 0.25 lb/sk D-Air 5000
	1200	14.4	1.25	5.69	19	Tail: Class H + 0.5% HALAD-9 + 0.05% SA-1015 + 1% NaCL + 2% Gel

Casing String	TOC	% Excess
Surface	0'	66%
Intermediate	0'	66%
Production	0'	45%

4. Pressure Control Equipment

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

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

See COA

N	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. See attached schematic.

COG Operating LLC, Airbonita 12 Federal Com 5H

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. shoe	FW Gel	8.4-9.4	32-34	N/C
Surf csg	Int shoe	Saturated Brine	10.0-10.2	28-30	N/C
Int shoe	TD	Cut Brine	8.8-9.2	28-30	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
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6. Logging and Testing Procedures

Logging, Coring and Testing	
X	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.
	No Logs are planned based on well control or offset log information.
	Drill stem test? If yes, explain
	Coring? If yes, explain

Additional logs planned	Interval
Resistivity	
Density	
CBL	
X Mud log	Production
PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	5073 psi @ 10840' TVD
Abnormal Temperature	No

Mitigation measure for abnormal conditions. Describe: No abnormal drilling conditions are expected to occur.

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	H ₂ S is present
Y	H ₂ S Plan attached

See
CORA

COG Operating LLC, Airbonita 12 Federal Com 5H

8. Other facets of operation

Is this a walking operation? Yes *No, submit sundry if drilling multiple*
Will be pre-setting casing? No

Attachments

- Directional Plan
- BOP & Choke Schematics
- C102 and supporting maps
- Rig plat
- H2S schematic
- H2S contingency plan
- Interim reclamation plat
- Variance for Flex Hose



COG Operating LLC

Lea County, NM

Airbonita 12 Federal Com

#5H

OH

Plan: Plan #1

Standard Survey Report

08 March, 2015





TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Lea County, NM	TVD Reference:	KB @ 3654.8usft
Site:	Airbonita 12 Federal Com	MD Reference:	KB @ 3654.8usft
Well:	#5H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

Project	Lea County, NM		
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	Airbonita 12 Federal Com		
Site Position:	Map	Northing:	509,773.30 usft
From:		Easting:	718,065.70 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 23' 58.202 N
		Longitude:	103° 37' 36.519 W
		Grid Convergence:	0.38 °

Well	#5H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 23' 58.259 N
		Longitude:	103° 37' 13.785 W
		Ground Level:	3,623.7 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	3/8/2015	7.16
			Dip Angle
			(°)
			60.25
			Field Strength
			(nT)
			48,342

Design	Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			359.36

Survey Tool Program	Date 3/8/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
0.0	15,389.2	Plan #1 (OH)	MWD
			Description
			MWD - Standard

Planned Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
0.0	0.00	0.00	0.0	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	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00	



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Lea County, NM	TVD Reference:	KB @ 3654.8usft
Site:	Airbonita 12 Federal Com	MD Reference:	KB @ 3654.8usft
Well:	#5H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

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)	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
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	
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	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	
3,900.0	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	
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	
5,200.0	0.00	0.00	5,200.0	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	



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Lea County, NM	TVD Reference:	KB @ 3654.8usft
Site:	Airbonita 12 Federal Com	MD Reference:	KB @ 3654.8usft
Well:	#5H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

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)	
5,400.0	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	
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	
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	
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	
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
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	
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	
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00	
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,000.0	0.00	0.00	9,000.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,100.0	0.00	0.00	9,100.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,200.0	0.00	0.00	9,200.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,300.0	0.00	0.00	9,300.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,400.0	0.00	0.00	9,400.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,500.0	0.00	0.00	9,500.0	0.0	0.0	0.0	0.00	0.00	0.00	
9,600.0	0.00	0.00	9,600.0	0.0	0.0	0.0	0.00	0.00	0.00	



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Lea County, NM	TVD Reference:	KB @ 3654.8usft
Site:	Airbonita 12 Federal Com	MD Reference:	KB @ 3654.8usft
Well:	#5H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

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)
9,700.0	0.00	0.00	9,700.0	0.0	0.0	0.0	0.00	0.00	0.00
9,800.0	0.00	0.00	9,800.0	0.0	0.0	0.0	0.00	0.00	0.00
9,900.0	0.00	0.00	9,900.0	0.0	0.0	0.0	0.00	0.00	0.00
10,000.0	0.00	0.00	10,000.0	0.0	0.0	0.0	0.00	0.00	0.00
10,100.0	0.00	0.00	10,100.0	0.0	0.0	0.0	0.00	0.00	0.00
10,200.0	0.00	0.00	10,200.0	0.0	0.0	0.0	0.00	0.00	0.00
10,300.0	0.00	0.00	10,300.0	0.0	0.0	0.0	0.00	0.00	0.00
10,357.5	0.00	0.00	10,357.5	0.0	0.0	0.0	0.00	0.00	0.00
KOP - Start DLS 12.00 TFO 359.36									
10,375.0	2.10	359.36	10,375.0	0.3	0.0	0.3	12.00	12.00	0.00
10,400.0	5.10	359.36	10,399.9	1.9	0.0	1.9	12.00	12.00	0.00
10,425.0	8.10	359.36	10,424.8	4.8	-0.1	4.8	12.00	12.00	0.00
10,450.0	11.10	359.36	10,449.4	8.9	-0.1	8.9	12.00	12.00	0.00
10,475.0	14.10	359.36	10,473.8	14.4	-0.2	14.4	12.00	12.00	0.00
10,500.0	17.10	359.36	10,497.9	21.1	-0.2	21.1	12.00	12.00	0.00
10,525.0	20.10	359.36	10,521.6	29.1	-0.3	29.1	12.00	12.00	0.00
10,550.0	23.10	359.36	10,544.8	38.3	-0.4	38.3	12.00	12.00	0.00
10,575.0	26.10	359.36	10,567.6	48.7	-0.5	48.7	12.00	12.00	0.00
10,600.0	29.10	359.36	10,589.7	60.3	-0.7	60.3	12.00	12.00	0.00
10,625.0	32.10	359.36	10,611.2	73.0	-0.8	73.0	12.00	12.00	0.00
10,650.0	35.10	359.36	10,632.0	86.8	-1.0	86.8	12.00	12.00	0.00
10,675.0	38.10	359.36	10,652.1	101.7	-1.1	101.7	12.00	12.00	0.00
10,700.0	41.10	359.36	10,671.4	117.7	-1.3	117.7	12.00	12.00	0.00
10,725.0	44.10	359.36	10,689.8	134.6	-1.5	134.6	12.00	12.00	0.00
10,750.0	47.10	359.36	10,707.3	152.4	-1.7	152.4	12.00	12.00	0.00
10,775.0	50.10	359.36	10,723.8	171.2	-1.9	171.2	12.00	12.00	0.00
10,800.0	53.10	359.36	10,739.3	190.8	-2.1	190.8	12.00	12.00	0.00
10,825.0	56.10	359.36	10,753.8	211.1	-2.4	211.2	12.00	12.00	0.00
10,850.0	59.10	359.36	10,767.2	232.3	-2.6	232.3	12.00	12.00	0.00
10,875.0	62.10	359.36	10,779.5	254.0	-2.8	254.0	12.00	12.00	0.00
10,900.0	65.10	359.36	10,790.6	276.4	-3.1	276.4	12.00	12.00	0.00
10,925.0	68.10	359.36	10,800.5	299.4	-3.3	299.4	12.00	12.00	0.00
10,950.0	71.10	359.36	10,809.2	322.8	-3.6	322.8	12.00	12.00	0.00
10,975.0	74.10	359.36	10,816.7	346.6	-3.9	346.7	12.00	12.00	0.00
11,000.0	77.10	359.36	10,822.9	370.8	-4.1	370.9	12.00	12.00	0.00
11,025.0	80.10	359.36	10,827.9	395.4	-4.4	395.4	12.00	12.00	0.00
11,050.0	83.10	359.36	10,831.5	420.1	-4.7	420.1	12.00	12.00	0.00
11,075.0	86.10	359.36	10,833.9	445.0	-5.0	445.0	12.00	12.00	0.00
11,100.0	89.10	359.36	10,834.9	469.9	-5.3	470.0	12.00	12.00	0.00
11,106.9	89.93	359.36	10,835.0	476.9	-5.3	476.9	12.00	12.00	0.00
EOC - Start 4282.3 hold at 11106.9 MD									
11,200.0	89.93	359.36	10,835.1	569.9	-6.4	570.0	0.00	0.00	0.00
11,300.0	89.93	359.36	10,835.2	669.9	-7.5	670.0	0.00	0.00	0.00
11,400.0	89.93	359.36	10,835.3	769.9	-8.6	770.0	0.00	0.00	0.00



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Lea County, NM	TVD Reference:	KB @ 3654.8usft
Site:	Airbonita 12 Federal Com	MD Reference:	KB @ 3654.8usft
Well:	#5H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

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)
11,500.0	89.93	359.36	10,835.4	869.9	-9.7	870.0	0.00	0.00	0.00
11,600.0	89.93	359.36	10,835.5	969.9	-10.8	970.0	0.00	0.00	0.00
11,700.0	89.93	359.36	10,835.7	1,069.9	-12.0	1,070.0	0.00	0.00	0.00
11,800.0	89.93	359.36	10,835.8	1,169.9	-13.1	1,170.0	0.00	0.00	0.00
11,900.0	89.93	359.36	10,835.9	1,269.9	-14.2	1,270.0	0.00	0.00	0.00
12,000.0	89.93	359.36	10,836.0	1,369.9	-15.3	1,370.0	0.00	0.00	0.00
12,100.0	89.93	359.36	10,836.1	1,469.9	-16.4	1,470.0	0.00	0.00	0.00
12,200.0	89.93	359.36	10,836.2	1,569.9	-17.5	1,570.0	0.00	0.00	0.00
12,300.0	89.93	359.36	10,836.4	1,669.9	-18.7	1,670.0	0.00	0.00	0.00
12,400.0	89.93	359.36	10,836.5	1,769.9	-19.8	1,770.0	0.00	0.00	0.00
12,500.0	89.93	359.36	10,836.6	1,869.8	-20.9	1,870.0	0.00	0.00	0.00
12,600.0	89.93	359.36	10,836.7	1,969.8	-22.0	1,970.0	0.00	0.00	0.00
12,700.0	89.93	359.36	10,836.8	2,069.8	-23.1	2,070.0	0.00	0.00	0.00
12,800.0	89.93	359.36	10,837.0	2,169.8	-24.3	2,170.0	0.00	0.00	0.00
12,900.0	89.93	359.36	10,837.1	2,269.8	-25.4	2,270.0	0.00	0.00	0.00
13,000.0	89.93	359.36	10,837.2	2,369.8	-26.5	2,370.0	0.00	0.00	0.00
13,100.0	89.93	359.36	10,837.3	2,469.8	-27.6	2,470.0	0.00	0.00	0.00
13,200.0	89.93	359.36	10,837.4	2,569.8	-28.7	2,570.0	0.00	0.00	0.00
13,300.0	89.93	359.36	10,837.5	2,669.8	-29.8	2,670.0	0.00	0.00	0.00
13,400.0	89.93	359.36	10,837.7	2,769.8	-31.0	2,770.0	0.00	0.00	0.00
13,500.0	89.93	359.36	10,837.8	2,869.8	-32.1	2,870.0	0.00	0.00	0.00
13,600.0	89.93	359.36	10,837.9	2,969.8	-33.2	2,970.0	0.00	0.00	0.00
13,700.0	89.93	359.36	10,838.0	3,069.8	-34.3	3,070.0	0.00	0.00	0.00
13,800.0	89.93	359.36	10,838.1	3,169.8	-35.4	3,170.0	0.00	0.00	0.00
13,900.0	89.93	359.36	10,838.2	3,269.8	-36.6	3,270.0	0.00	0.00	0.00
14,000.0	89.93	359.36	10,838.4	3,369.8	-37.7	3,370.0	0.00	0.00	0.00
14,100.0	89.93	359.36	10,838.5	3,469.7	-38.8	3,470.0	0.00	0.00	0.00
14,200.0	89.93	359.36	10,838.6	3,569.7	-39.9	3,570.0	0.00	0.00	0.00
14,300.0	89.93	359.36	10,838.7	3,669.7	-41.0	3,670.0	0.00	0.00	0.00
14,400.0	89.93	359.36	10,838.8	3,769.7	-42.1	3,770.0	0.00	0.00	0.00
14,500.0	89.93	359.36	10,839.0	3,869.7	-43.3	3,870.0	0.00	0.00	0.00
14,600.0	89.93	359.36	10,839.1	3,969.7	-44.4	3,970.0	0.00	0.00	0.00
14,700.0	89.93	359.36	10,839.2	4,069.7	-45.5	4,070.0	0.00	0.00	0.00
14,800.0	89.93	359.36	10,839.3	4,169.7	-46.6	4,170.0	0.00	0.00	0.00
14,900.0	89.93	359.36	10,839.4	4,269.7	-47.7	4,270.0	0.00	0.00	0.00
15,000.0	89.93	359.36	10,839.5	4,369.7	-48.8	4,370.0	0.00	0.00	0.00
15,100.0	89.93	359.36	10,839.7	4,469.7	-50.0	4,470.0	0.00	0.00	0.00
15,200.0	89.93	359.36	10,839.8	4,569.7	-51.1	4,570.0	0.00	0.00	0.00
15,300.0	89.93	359.36	10,839.9	4,669.7	-52.2	4,670.0	0.00	0.00	0.00
15,389.2	89.93	359.36	10,840.0	4,758.9	-53.2	4,759.2	0.00	0.00	0.00
TD at 15389.2									



TDS
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #5H
Project:	Lea County, NM	TVD Reference:	KB @ 3654.8usft
Site:	Airbonita 12 Federal Com	MD Reference:	KB @ 3654.8usft
Well:	#5H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

Design Targets

Target Name

- hit/miss target:	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
EOC (A12FC #5H/OH P - plan hits target center - Point	0.00	0.00	10,835.0	476.8	-5.3	510,268.84	720,009.47	32° 24' 2.978 N	103° 37' 13.810 W
PBHL (A12FC #5H/OH) - plan hits target center - Point	0.00	0.00	10,840.0	4,758.9	-53.2	514,550.90	719,961.60	32° 24' 45.354 N	103° 37' 14.035 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,358	10,358	0	0	KOP - Start DLS 12.00 TFO 359.36
11,107	10,835	477	-5	EOC - Start 4282.3 hold at 11106.9 MD
15,389	10,840	4759	-53	TD at 15389.2

Checked By: _____ Approved By: _____ Date: _____



COG Operating LLC
Project: Lea County, NM
Site: Airbonita 12 Federal Com

Well: #5H
Wellbore: OH
Plan: Plan #1 (#5H/OH)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V/Sect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	0.0
2	10357.5	0.00	0.00	10357.5	0.0	0.0	0.00	0.00	0.0	0.0
3	11106.9	89.93	359.36	10835.0	476.9	-5.3	12.00	359.36	476.9	PBHL (A12FC #5H/OH)
4	15389.2	89.93	359.36	10840.0	4758.9	-53.2	0.00	0.00	4759.2	PBHL (A12FC #5H/OH)

WELL DETAILS: #5H

Ground Elevation: 3623.7

RKB Elevation: KB @ 3654.8usft

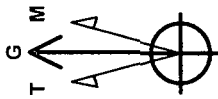
Rig Name:

Northing
509792.00

Easting
720014.80

Latitude
32° 23' 58.259 N

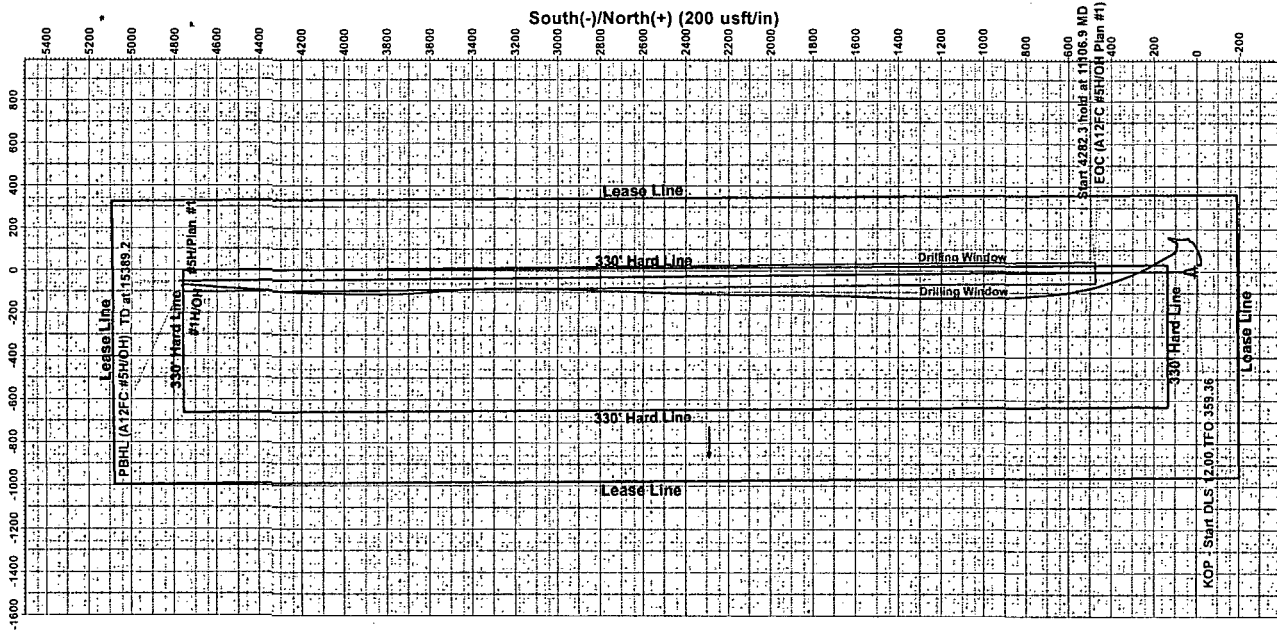
Longitude
103° 37' 13.785 W



Magnetic Field
Strength: 48341.9sn T
Dip Angle: 60.25°
Date: 3/8/2015
Model: IGRF2010

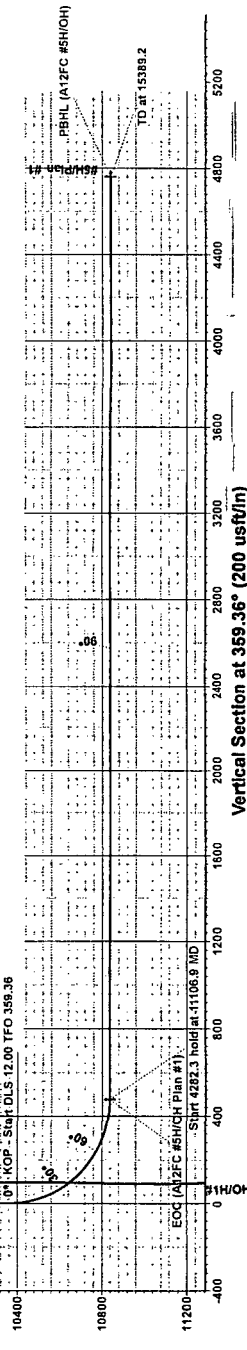
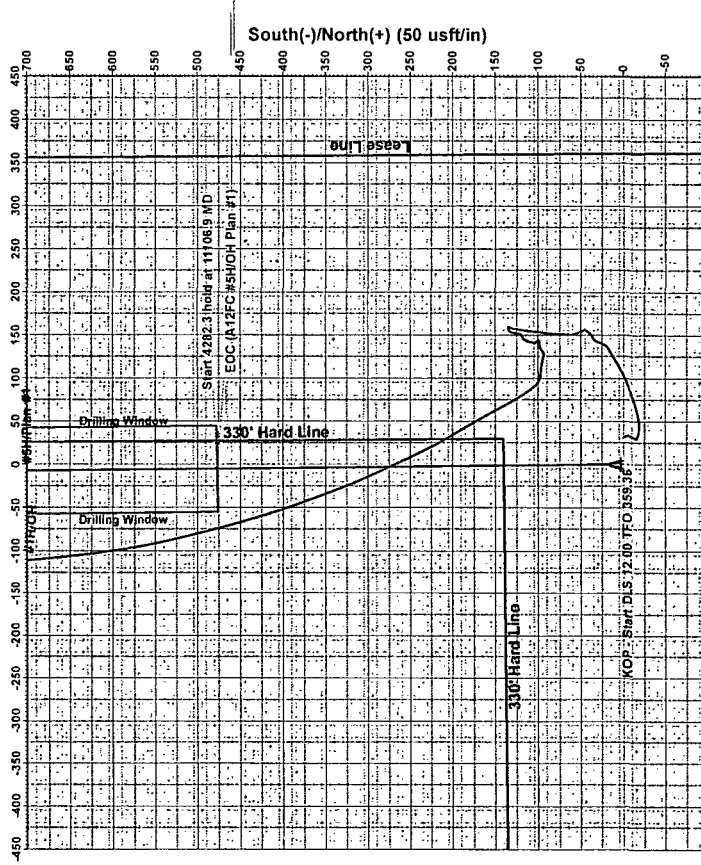
Azimuths to Grid North
True North: -0.38°
Magnetic North: 6.78°

West(-)/East(+) (200 usft/in)



South(-)/North(+) (50 usft/in)

West(-)/East(+) (50 usft/in)



Vertical Section at 359.36° (200 usft/in)

PROJECT DETAILS: Lea County, NM
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

Terra Directional Services LLC
322 Spring Hill Drive, Suite A300, Spring, Tx 77386
Phone: 432-425-7532





New Mexico Office of the State Engineer

Water Column/Average Depth to Water

(A CLW##### in the
POD suffix indicates the
POD has been replaced
& no longer serves a
water right file.)

(R=POD has
been replaced,
O=orphaned,
C=the file is
closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest) (NAD83 UTM in meters)

(In feet)

POD Number	POD Sub-Code	basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Depth Well	Depth Water	Water Column
C 02096			ED	2	3	14	22S	32E		627204	3584464*	435	360	75
C 02821	C	LE		2	2	3	14	22S	32E	627303	3584563*	540	340	200
C 02939	C	LE		3	3	1	19	22S	32E	620234	3583042*	280		

Average Depth to Water: **350 feet**

Minimum Depth: **340 feet**

Maximum Depth: **360 feet**

Record Count: 3

PLSS Search:

Township: 22S

Range: 32E

*UTM location was derived from PLSS - see Help

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.



New Mexico Office of the State Engineer **Water Column/Average Depth to Water**

No records found.

PLSS Search:

Section(s): 12

Township: 22S

Range: 32E

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