

NMOCD Hobbs

Form 3160-4
(August 2007)

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires: July 31, 2010

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

1a. Type of Well ☒ Oil Well ☐ Gas Well ☐ Dry ☐ Other		5. Lease Serial No. NMNM124664	
b. Type of Completion ☒ New Well ☐ Work Over ☐ Deepen ☐ Plug Back ☐ Diff. Resvr. Other _____		6. If Indian, Allottee or Tribe Name	
2. Name of Operator COG OPERATING LLC		7. Unit or CA Agreement Name and No.	
3. Address ONE CONCHO CENTER 600 W ILLINOIS AVENUE MIDLAND, TX 79701-4287		8. Lease Name and Well No. GUNNER 8 FEDERAL COM 6H	
3a. Phone No. (include area code) Ph: 575.748.6946		9. API Well No. 30-025-41181-00-S1	
4. Location of Well (Report location clearly and in accordance with Federal requirements)* At surface SESW 190FSL 2625FWL At top prod interval reported below Sec 5 T26S R34E Mer NMP At total depth NENW 351FNL 2296FWL		10. Field and Pool, or Exploratory WC-025 G06 S263407P	
14. Date Spudded 06/11/2015		15. Date T.D. Reached 07/10/2015	
16. Date Completed ☐ D & A ☒ Ready to Prod. 10/20/2015		17. Elevations (DF, KB, RT, GL)* 3351 GL	
18. Total Depth: MD 19640 TVD 9769	19. Plug Back T.D.: MD 19568 TVD 9769	20. Depth Bridge Plug Set: MD 19568 TVD 9769	
21. Type Electric & Other Mechanical Logs Run (Submit copy of each) NONE		22. Was well cored? ☒ No ☐ Yes (Submit analysis) Was DST run? ☒ No ☐ Yes (Submit analysis) Directional Survey? ☐ No ☒ Yes (Submit analysis)	

23. Casing and Liner Record (Report all strings set in well)

Hole Size	Size/Grade	Wt. (#/ft.)	Top (MD)	Bottom (MD)	Stage Cementer Depth	No. of Sk. & Type of Cement	Slurry Vol. (BBL)	Cement Top*	Amount Pulled
17.500	13.375 J55	54.5	0	815		660		0	
12.250	9.625 J55	40.0	0	5393		1710		0	
8.750	5.500 P110	17.0	0	19640	6392	4265		0	

24. Tubing Record

Size	Depth Set (MD)	Packer Depth (MD)	Size	Depth Set (MD)	Packer Depth (MD)	Size	Depth Set (MD)	Packer Depth (MD)
2.875	10034	9202						

25. Producing Intervals

Formation	Top	Bottom	Perforated Interval	Size	No. Holes	Perf. Status
A) BONE SPRING UPPER			10102 TO 19543	0.000	2268	OPEN
B)						
C)						
D)						

27. Acid, Fracture, Treatment, Cement Squeeze, Etc.

Depth Interval	Amount and Type of Material
10102 TO 19543	SEE IN REMARKS
	Information lacking in remarks.

28. Production - Interval A

Date First Produced	Test Date	Hours Tested	Test Production	Oil BBL	Gas MCF	Water BBL	Oil Gravity Corr. API	Gas Gravity	Production Method
11/15/2015	11/17/2015	24	→	245.0	561.0	2705.0			FLOW FROM WELL
Choke Size	Tbg. Press. Flwg.	Csg. Press.	24 Hr. Rate	Oil BBL	Gas MCF	Water BBL	Gas:Oil Ratio	Well Status	
SI	440		→	245	561	2705		POW	

28a. Production - Interval B

Date First Produced	Test Date	Hours Tested	Test Production	Oil BBL	Gas MCF	Water BBL	Oil Gravity Corr. API	Gas Gravity	Production Method
			→						
Choke Size	Tbg. Press. Flwg.	Csg. Press.	24 Hr. Rate	Oil BBL	Gas MCF	Water BBL	Gas:Oil Ratio	Well Status	
SI			→						

(See Instructions and spaces for additional data on reverse side)

ELECTRONIC SUBMISSION #323879 VERIFIED BY THE BLM WELL INFORMATION SYSTEM

** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED **

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28b. Production - Interval C

Date First Produced	Test Date	Hours Tested	Test Production	Oil BBL	Gas MCF	Water BBL	Oil Gravity Corr. API	Gas Gravity	Production Method
			→						
Choke Size	Tbg. Press. Flwg. SI	Csg. Press.	24 Hr. Rate	Oil BBL	Gas MCF	Water BBL	Gas:Oil Ratio	Well Status	
			→						

28c. Production - Interval D

Date First Produced	Test Date	Hours Tested	Test Production	Oil BBL	Gas MCF	Water BBL	Oil Gravity Corr. API	Gas Gravity	Production Method
			→						
Choke Size	Tbg. Press. Flwg. SI	Csg. Press.	24 Hr. Rate	Oil BBL	Gas MCF	Water BBL	Gas:Oil Ratio	Well Status	
			→						

29. Disposition of Gas(Sold, used for fuel, vented, etc.)
FLARED

30. Summary of Porous Zones (Include Aquifers):

Show all important zones of porosity and contents thereof: Cored intervals and all drill-stem tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures and recoveries.

31. Formation (Log) Markers

Formation	Top	Bottom	Descriptions, Contents, etc.	Name	Top Meas. Depth
DELAWARE	5317	5354		RUSTLER	817
BELL CANYON	5355	6385		TOP OF SALT	1176
CHERRY CANYON	6386	8133		BASE OF SALT	5066
BRUSHY CANYON	8134	9639		DELAWARE	5317
BONE SPRING LIME	9640	9889		BELL CANYON	5355
				CHERRY CANYON	6386
				BRUSHY CANYON	8134
				BONE SPRING LIME	9640

32. Additional remarks (include plugging procedure):

Stages 7 1/2% Sand# Fluid (Gal)

1 1512 301467 272286
2 3024 298341 363300
3 3024 299748 309960
4 3012 299029 513144
5 3012 299329 312132
6 3012 298242 334456
7 3012 300500 399744

33. Circle enclosed attachments:

- | | | | |
|---|--------------------|---------------|-----------------------|
| 1. Electrical/Mechanical Logs (1 full set req'd.) | 2. Geologic Report | 3. DST Report | 4. Directional Survey |
| 5. Sundry Notice for plugging and cement verification | 6. Core Analysis | 7 Other: | |

34. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records (see attached instructions):

Electronic Submission #323879 Verified by the BLM Well Information System.
For COG OPERATING LLC, sent to the Hobbs
Committed to AFMSS for processing by LINDA JIMENEZ on 12/01/2015 (16LJ0216SE)

Name (please print) STORMI DAVISTitle REGULATORY ANALYSTSignature (Electronic Submission)Date 11/18/2015

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.

**** REVISED ** REVISED ** REVISED ** REVISED ** REVISED ** REVISED ** REVISED ****

Additional data for transaction #323879 that would not fit on the form

32. Additional remarks, continued

8 3066 300199 352212
9 3024 297715 314244
10 3024 321359 406644
11 3024 299412 297654
12 3024 299289 296058
13 3012 300424 302010
14 3012 298833 313434
15 3024 300408 290220
16 3108 298173 290304
17 3024 299557 295134
18 3000 298751 288348
19 3000 299552 285954
20 3000 299664 283518
21 3054 300724 283866
22 3066 297471 294714
23 3024 300045 283957
24 3012 292545 305832
25 3108 299619 353052
26 3738 299366 331464
27 3066 300270 298137
28 3066 300110 310548
29 3012 298619 313948
30 3012 300591 306956
31 3066 300339 299796
32 2814 298351 305970
33 3012 300221 291718
34 3024 300125 291289
35 3066 299699 294546
36 2982 299832 294798
37 3024 300870 286104
38 3024 300305 289212
39 3066 299630 290932
40 3024 301224 292758
41 3024 301358 290850
42 3024 300420 285096
43 3012 297733 298281
44 3024 301450 286986
45 3570 301352 288960
46 3012 300184 288864
47 3822 302276 301896
48 3234 301662 285390
49 3012 299344 288528

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

Well Name and Num: Gunner 8 Federal Com # 6H
Location: Sec 8, T26S, R34E
Operator: COG
Drilling Contractor: McVay Drilling Company

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
1.30	398	2.80	6216	90.80	11405	92.20	11689
0.30	698	2.90	6594	91.50	11688	92.70	17161
0.20	770	2.80	6895	93.10	11971	91.00	17445
0.40	847	2.40	6973	91.30	12160	92.20	17537
2.40	1218	2.90	7361	91.10	12349	89.70	17726
2.30	1593	1.80	7728	90.60	12821	91.50	17820
1.90	1971	2.60	8105	91.70	13292	90.30	17914
1.10	2348	2.40	8438	89.60	13481	88.70	18197
1.50	2725	1.60	8860	90.80	13764	88.90	18575
2.10	3480	1.70	9238	90.80	13858	90.10	18669
1.40	3857	34.00	9584	90.60	14047	91.1	18763
2.50	4234	50.60	9772	90.40	14423	90.1	18669
2.90	4423	66.40	9961	91.30	14802	91.1	18763
1.00	4800	71.00	10055	92.70	15274	90.1	18952
1.10	5178	86.20	10338	89.70	15841	88.2	19046
1.90	5273	91.00	10744	89.90	15936	89.7	19518
2.70	5838	90.80	11027	92.90	16129	0.10	200

By: Matt A. Canina

Subscribed and sworn to before me this 17th day of August, 2015

Tina Flemens
Notary Public, Lea County, New Mexico





McVAY DRILLING COMPANY
P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

Well Name and Num: Gunner 8 Federal Com # 6H
Location: Sec 8, T26S, R34E
Operator: COG
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<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.10	590						
0.40	770						
0.30	850						
1.10	1220						
2.10	1596						
2.30	1974						
1.80	2163						
2.30	2540						
1.60	2917						
3.30	3389						
1.90	3766						
2.60	4144						



COG Operating, LLC

Lea County, NM

Sec 8, T26S, R34E

Gunner 8 Federal COM #6H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

13 July, 2015





HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal COM #6H
Project:	Lea County, NM	TVD Reference:	Well @ 3379.4usft (McVay 8)
Site:	Sec 8, T28S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	Sec 8, T28S, R34E		
Site Position:		Northing:	383,330.50 usft
From:	Map	Easting:	760,820.40 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 3' 3.943 N
		Longitude:	103° 29' 29.432 W
		Grid Convergence:	0.45 °

Well	Gunner 8 Federal COM #6H		
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° 3' 3.943 N
		Longitude:	103° 29' 29.432 W
		Ground Level:	3,351.4 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2015	6/5/2015	7.12
			Dip Angle
			59.94
			Field Strength
			48,053

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			359.55

Survey Program	Date 7/13/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
398.0	770.0	GYRO (Wellbore #1)	Good_gyro
847.0	19,640.0	MWD (Wellbore #1)	MWD default
			Good Gyro
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map			
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting	Latitude	Longitude	
(usft)			(usft)			(usft)	(usft)			
0.0	0.00	0.00	0.0	0.0	0.0	383,330.50	760,820.40	32° 3' 3.943 N	103° 29' 29.432 W	
398.0	1.30	327.00	398.0	3.8	-2.5	383,334.29	760,817.94	32° 3' 3.980 N	103° 29' 29.460 W	
698.0	0.30	340.00	697.9	7.4	-4.8	383,337.88	760,815.82	32° 3' 4.016 N	103° 29' 29.485 W	
770.0	0.20	322.00	769.9	7.7	-4.7	383,338.15	760,815.67	32° 3' 4.019 N	103° 29' 29.488 W	
Tie In @ 770' MD / 770' TVD										
847.0	0.40	325.20	846.9	8.0	-5.0	383,338.48	760,815.44	32° 3' 4.022 N	103° 29' 29.489 W	
1,032.0	2.50	282.50	1,031.9	9.4	-9.3	383,339.88	760,811.13	32° 3' 4.036 N	103° 29' 29.539 W	
1,218.0	2.40	288.10	1,217.7	11.5	-16.9	383,341.97	760,803.47	32° 3' 4.058 N	103° 29' 29.628 W	
1,405.0	2.60	282.80	1,404.5	12.2	-24.9	383,342.66	760,795.54	32° 3' 4.065 N	103° 29' 29.720 W	
1,593.0	2.30	254.90	1,592.4	10.6	-32.7	383,341.14	760,787.66	32° 3' 4.051 N	103° 29' 29.612 W	
1,782.0	2.10	250.80	1,781.2	8.5	-39.7	383,339.01	760,780.73	32° 3' 4.030 N	103° 29' 29.892 W	



HP
Survey Report - Geographic



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Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,971.0	1.90	248.00	1,970.1	8.2	-45.8	383,338.70	780,774.56	32° 3' 4.008 N	103° 29' 29.884 W
2,159.0	1.80	248.40	2,158.0	4.1	-51.2	383,334.57	780,769.23	32° 3' 3.987 N	103° 29' 30.026 W
2,348.0	1.10	252.60	2,347.0	2.6	-55.4	383,333.05	780,765.04	32° 3' 3.972 N	103° 29' 30.075 W
2,537.0	1.70	270.20	2,535.9	2.0	-59.9	383,332.52	780,760.51	32° 3' 3.967 N	103° 29' 30.128 W
2,725.0	1.50	279.30	2,723.8	2.4	-65.1	383,332.93	780,755.29	32° 3' 3.972 N	103° 29' 30.188 W
2,914.0	2.70	274.40	2,912.7	3.2	-72.0	383,333.67	780,748.41	32° 3' 3.980 N	103° 29' 30.268 W
3,103.0	2.10	283.70	3,101.5	4.3	-79.8	383,334.83	780,740.81	32° 3' 3.992 N	103° 29' 30.359 W
3,291.0	1.30	290.60	3,289.4	5.9	-85.1	383,336.40	780,735.27	32° 3' 4.008 N	103° 29' 30.421 W
3,480.0	2.10	266.50	3,478.4	8.4	-90.6	383,336.84	780,729.80	32° 3' 4.013 N	103° 29' 30.484 W
3,668.0	1.90	280.70	3,666.2	8.8	-87.1	383,337.31	780,723.30	32° 3' 4.018 N	103° 29' 30.560 W
3,857.0	1.40	301.30	3,855.2	8.6	-102.1	383,339.09	780,718.25	32° 3' 4.036 N	103° 29' 30.618 W
4,046.0	1.90	301.50	4,044.1	11.4	-106.8	383,341.83	780,713.61	32° 3' 4.084 N	103° 29' 30.672 W
4,234.0	2.50	276.50	4,232.0	13.5	-113.5	383,344.02	780,706.88	32° 3' 4.085 N	103° 29' 30.750 W
4,423.0	2.90	281.30	4,420.7	14.9	-122.3	383,345.42	780,698.09	32° 3' 4.100 N	103° 29' 30.852 W
4,612.0	3.00	288.60	4,609.5	15.7	-131.9	383,346.24	780,688.46	32° 3' 4.109 N	103° 29' 30.964 W
4,800.0	1.00	257.70	4,797.4	15.3	-138.5	383,345.77	780,681.84	32° 3' 4.104 N	103° 29' 31.039 W
4,989.0	1.50	230.30	4,986.3	13.3	-142.0	383,343.84	780,678.42	32° 3' 4.088 N	103° 29' 31.080 W
5,178.0	1.10	228.80	5,175.3	10.5	-145.2	383,341.01	780,675.20	32° 3' 4.058 N	103° 29' 31.118 W
5,273.0	1.90	255.40	5,270.3	9.5	-147.4	383,339.99	780,673.01	32° 3' 4.048 N	103° 29' 31.144 W
5,461.0	1.00	267.40	5,458.2	8.6	-152.0	383,339.13	780,668.35	32° 3' 4.040 N	103° 29' 31.198 W
5,649.0	2.80	249.80	5,646.1	7.0	-158.0	383,337.47	780,662.40	32° 3' 4.024 N	103° 29' 31.267 W
5,838.0	2.70	252.60	5,834.9	4.0	-166.8	383,334.55	780,653.82	32° 3' 3.996 N	103° 29' 31.367 W
6,027.0	2.90	252.60	6,023.6	1.3	-175.4	383,331.79	780,645.01	32° 3' 3.969 N	103° 29' 31.470 W
6,216.0	2.80	253.70	6,212.4	-1.4	-184.4	383,329.06	780,638.02	32° 3' 3.943 N	103° 29' 31.574 W
6,405.0	2.70	252.30	6,401.2	-4.1	-193.0	383,326.41	780,627.35	32° 3' 3.917 N	103° 29' 31.675 W
6,594.0	2.90	253.10	6,590.0	-6.8	-201.9	383,323.67	780,618.53	32° 3' 3.891 N	103° 29' 31.778 W
6,782.0	2.80	257.30	6,777.7	-9.2	-210.9	383,321.28	780,609.50	32° 3' 3.888 N	103° 29' 31.883 W
6,973.0	2.60	260.30	6,968.5	-11.0	-220.0	383,319.47	780,600.35	32° 3' 3.851 N	103° 29' 31.990 W
7,162.0	2.90	260.70	7,157.3	-12.6	-228.3	383,317.92	780,591.09	32° 3' 3.836 N	103° 29' 32.098 W
7,351.0	2.90	259.30	7,348.0	-14.2	-238.7	383,316.25	780,581.67	32° 3' 3.820 N	103° 29' 32.207 W
7,539.0	2.00	266.10	7,533.8	-15.3	-246.7	383,315.15	780,573.72	32° 3' 3.810 N	103° 29' 32.299 W
7,728.0	1.80	262.40	7,722.7	-16.0	-252.9	383,314.53	780,567.49	32° 3' 3.804 N	103° 29' 32.372 W
7,917.0	1.80	261.00	7,911.7	-16.8	-258.8	383,313.67	780,561.62	32° 3' 3.798 N	103° 29' 32.440 W
8,105.0	2.60	276.70	8,099.5	-16.8	-265.9	383,313.71	780,554.47	32° 3' 3.797 N	103° 29' 32.523 W
8,294.0	2.30	289.00	8,286.3	-16.4	-274.0	383,314.14	780,546.42	32° 3' 3.802 N	103° 29' 32.617 W
8,483.0	2.40	282.30	8,477.2	-17.0	-281.7	383,313.55	780,538.70	32° 3' 3.797 N	103° 29' 32.707 W
8,671.0	1.90	281.40	8,665.1	-16.9	-288.7	383,313.84	780,531.75	32° 3' 3.798 N	103° 29' 32.787 W
8,860.0	1.80	270.90	8,854.0	-16.2	-294.4	383,314.30	780,526.04	32° 3' 3.805 N	103° 29' 32.854 W
9,049.0	1.80	285.80	9,042.9	-16.4	-300.0	383,314.12	780,520.44	32° 3' 3.804 N	103° 29' 32.919 W
9,238.0	1.70	265.40	9,231.8	-16.8	-305.7	383,313.66	780,514.68	32° 3' 3.800 N	103° 29' 32.986 W
9,300.0	2.70	312.20	9,293.8	-15.9	-307.7	383,314.59	780,512.68	32° 3' 3.809 N	103° 29' 33.009 W
9,347.0	8.10	341.90	9,340.5	-12.0	-309.6	383,316.46	780,510.83	32° 3' 3.848 N	103° 29' 33.030 W
9,395.0	14.40	350.20	9,387.6	-2.9	-311.6	383,327.59	780,508.77	32° 3' 3.938 N	103° 29' 33.053 W
9,442.0	19.40	2.10	9,432.6	10.7	-312.3	383,341.16	780,508.06	32° 3' 4.072 N	103° 29' 33.060 W
9,489.0	24.70	3.90	9,478.1	28.3	-311.4	383,358.77	780,508.01	32° 3' 4.248 N	103° 29' 33.047 W
9,536.0	29.40	3.00	9,518.0	49.6	-310.1	383,380.10	780,510.28	32° 3' 4.457 N	103° 29' 33.031 W
9,584.0	34.00	359.10	9,558.8	74.8	-309.7	383,405.30	780,510.69	32° 3' 4.707 N	103° 29' 33.024 W
9,631.0	37.30	357.50	9,597.0	102.2	-310.5	383,432.67	780,509.88	32° 3' 4.976 N	103° 29' 33.031 W
9,678.0	39.60	356.50	9,633.8	131.4	-312.1	383,461.86	780,508.33	32° 3' 5.267 N	103° 29' 33.046 W
9,667.1	40.63	356.65	9,640.7	137.2	-312.4	383,467.71	780,507.98	32° 3' 5.325 N	103° 29' 33.050 W
Crossed 330' Hard Line @ 9687' MD / 9641' TVD									
9,725.0	44.90	357.20	9,668.6	162.9	-313.6	383,483.40	780,506.60	32° 3' 5.579 N	103° 29' 33.063 W
9,772.0	50.60	358.20	9,700.1	197.6	-315.2	383,528.15	780,505.22	32° 3' 5.923 N	103° 29' 33.076 W
9,819.0	52.30	358.10	9,729.4	234.4	-316.4	383,564.88	780,504.03	32° 3' 6.286 N	103° 29' 33.087 W
9,867.0	57.50	358.60	9,757.0	273.6	-317.5	383,604.12	780,502.91	32° 3' 6.675 N	103° 29' 33.096 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal COM #6H
Project:	Lea County, NM	TVD Reference:	Well @ 3379.4usft (McVay 8)
Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,914.0	63.00	358.60	9,780.3	314.4	-318.5	383,644.90	760,501.91	32° 3' 7.078 N	103° 29' 33.104 W
9,981.0	66.40	358.60	9,800.4	356.9	-319.5	383,687.38	760,500.87	32° 3' 7.499 N	103° 29' 33.112 W
10,008.0	70.40	358.40	9,817.7	400.6	-320.7	383,731.05	760,499.73	32° 3' 7.931 N	103° 29' 33.122 W
10,055.0	71.00	359.00	9,833.3	444.9	-321.7	383,775.40	760,498.72	32° 3' 8.370 N	103° 29' 33.129 W
10,102.0	72.60	358.40	9,847.9	489.5	-322.7	383,820.03	760,497.71	32° 3' 8.812 N	103° 29' 33.137 W
10,149.0	77.40	358.10	9,860.1	534.9	-324.1	383,865.40	760,496.32	32° 3' 9.261 N	103° 29' 33.149 W
10,199.0	82.90	357.00	9,868.1	581.1	-326.1	383,911.64	760,494.34	32° 3' 9.719 N	103° 29' 33.166 W
10,244.0	85.50	356.70	9,873.0	628.8	-328.7	383,959.32	760,491.71	32° 3' 10.181 N	103° 29' 33.194 W
10,338.0	86.20	355.80	9,879.8	722.4	-334.6	384,052.67	760,485.58	32° 3' 11.117 N	103° 29' 33.257 W
10,480.0	88.00	0.00	9,886.0	844.1	-339.3	384,174.60	760,481.12	32° 3' 12.322 N	103° 29' 33.298 W
10,555.0	89.20	359.60	9,888.3	939.1	-339.6	384,269.57	760,480.79	32° 3' 13.262 N	103° 29' 33.293 W
10,649.0	90.10	0.00	9,888.9	1,033.1	-339.9	384,363.57	760,480.46	32° 3' 14.192 N	103° 29' 33.286 W
10,744.0	91.10	0.70	9,887.9	1,126.1	-339.4	384,458.56	760,481.04	32° 3' 15.132 N	103° 29' 33.273 W
10,838.0	91.00	1.00	9,886.1	1,222.0	-338.0	384,552.53	760,482.44	32° 3' 16.062 N	103° 29' 33.248 W
10,933.0	90.40	1.80	9,885.0	1,317.0	-335.8	384,647.50	760,484.76	32° 3' 17.001 N	103° 29' 33.213 W
11,027.0	90.80	0.70	9,884.0	1,411.0	-333.6	384,741.47	760,486.81	32° 3' 17.931 N	103° 29' 33.180 W
11,121.0	91.70	0.30	9,881.9	1,504.9	-332.8	384,835.44	760,487.63	32° 3' 18.861 N	103° 29' 33.162 W
11,216.0	91.30	0.70	9,879.5	1,599.9	-331.9	384,930.40	760,488.46	32° 3' 19.800 N	103° 29' 33.144 W
11,310.0	91.00	0.00	9,877.6	1,693.9	-331.4	385,024.38	760,489.03	32° 3' 20.730 N	103° 29' 33.129 W
11,405.0	90.80	0.00	9,876.1	1,788.9	-331.4	385,119.37	760,489.03	32° 3' 21.670 N	103° 29' 33.120 W
11,499.0	90.40	0.00	9,875.1	1,882.9	-331.4	385,213.36	760,489.03	32° 3' 22.600 N	103° 29' 33.112 W
11,593.0	91.10	0.00	9,873.9	1,978.9	-331.4	385,307.36	760,489.03	32° 3' 23.530 N	103° 29' 33.103 W
11,688.0	91.50	0.00	9,871.7	2,071.8	-331.4	385,402.33	760,489.03	32° 3' 24.470 N	103° 29' 33.095 W
11,782.0	91.70	359.30	9,869.1	2,165.8	-331.9	385,496.29	760,488.46	32° 3' 25.400 N	103° 29' 33.093 W
11,877.0	92.60	359.30	9,865.5	2,260.7	-333.1	385,591.22	760,487.30	32° 3' 26.340 N	103° 29' 33.098 W
11,971.0	93.10	359.60	9,860.8	2,354.6	-334.0	385,685.10	760,486.39	32° 3' 27.289 N	103° 29' 33.100 W
12,066.0	91.10	359.30	9,857.4	2,449.5	-334.9	385,780.02	760,485.48	32° 3' 28.208 N	103° 29' 33.102 W
12,160.0	91.30	359.60	9,855.4	2,543.5	-335.8	385,874.00	760,484.58	32° 3' 29.138 N	103° 29' 33.104 W
12,254.0	91.10	0.00	9,853.4	2,637.5	-336.1	385,967.98	760,484.25	32° 3' 30.068 N	103° 29' 33.099 W
12,349.0	91.10	0.30	9,851.6	2,732.5	-335.9	386,062.96	760,484.50	32° 3' 31.008 N	103° 29' 33.087 W
12,443.0	90.80	0.70	9,850.0	2,826.4	-335.1	386,156.94	760,485.32	32° 3' 31.938 N	103° 29' 33.069 W
12,537.0	90.40	359.30	9,849.1	2,920.4	-335.1	386,250.93	760,485.32	32° 3' 32.868 N	103° 29' 33.061 W
12,632.0	89.60	358.60	9,849.1	3,015.4	-336.8	386,345.92	760,483.58	32° 3' 33.808 N	103° 29' 33.073 W
12,726.0	88.00	358.60	9,850.2	3,109.4	-339.1	386,439.88	760,481.28	32° 3' 34.738 N	103° 29' 33.091 W
12,821.0	90.60	0.30	9,850.5	3,204.4	-340.0	386,534.87	760,480.37	32° 3' 35.678 N	103° 29' 33.093 W
12,915.0	89.80	0.00	9,850.1	3,298.4	-339.8	386,628.87	760,480.62	32° 3' 36.608 N	103° 29' 33.081 W
13,009.0	91.10	359.60	9,849.3	3,392.4	-340.1	386,722.86	760,480.29	32° 3' 37.538 N	103° 29' 33.077 W
13,104.0	91.10	0.00	9,847.5	3,487.3	-340.4	386,817.84	760,479.96	32° 3' 38.478 N	103° 29' 33.072 W
13,188.0	91.28	0.27	9,845.7	3,571.3	-340.2	386,901.83	760,480.16	32° 3' 39.399 N	103° 29' 33.062 W
Crossed 330' Hard Line @ 13188' MD / 9846' TVD									
13,198.0	91.30	0.30	9,845.5	3,581.3	-340.2	386,911.82	760,480.21	32° 3' 39.408 N	103° 29' 33.061 W
13,292.0	91.70	1.80	9,843.1	3,675.3	-338.5	387,005.77	760,481.93	32° 3' 40.338 N	103° 29' 33.032 W
13,387.0	91.30	0.00	9,840.6	3,770.2	-337.0	387,100.72	760,483.42	32° 3' 41.277 N	103° 29' 33.008 W
13,481.0	89.60	359.60	9,839.8	3,864.2	-337.3	387,194.72	760,483.08	32° 3' 42.207 N	103° 29' 33.001 W
13,575.0	90.10	359.60	9,840.1	3,958.2	-338.0	387,288.71	760,482.43	32° 3' 43.136 N	103° 29' 33.001 W
13,670.0	90.80	358.20	9,839.3	4,053.2	-339.8	387,383.69	760,480.81	32° 3' 44.076 N	103° 29' 33.013 W
13,764.0	90.80	358.60	9,838.0	4,147.1	-342.4	387,477.64	760,477.99	32° 3' 45.008 N	103° 29' 33.035 W
13,858.0	90.80	359.00	9,836.7	4,241.1	-344.4	387,571.61	760,476.02	32° 3' 45.938 N	103° 29' 33.049 W
13,953.0	91.30	359.30	9,835.0	4,336.1	-345.8	387,666.59	760,474.61	32° 3' 46.877 N	103° 29' 33.057 W
14,047.0	90.80	359.00	9,833.4	4,430.1	-347.2	387,760.56	760,473.21	32° 3' 47.808 N	103° 29' 33.065 W
14,082.5	90.34	358.70	9,833.1	4,465.6	-347.9	387,796.05	760,472.50	32° 3' 48.159 N	103° 29' 33.070 W
Crossed 330' Hard Line @ 14083' MD / 9833' TVD									
14,141.0	89.90	358.20	9,833.0	4,524.0	-349.5	387,854.53	760,470.92	32° 3' 48.738 N	103° 29' 33.083 W
14,235.0	90.40	358.60	9,832.7	4,618.0	-352.1	387,948.50	760,468.29	32° 3' 49.668 N	103° 29' 33.105 W
14,330.0	89.70	359.30	9,832.7	4,713.0	-353.8	388,043.48	760,466.55	32° 3' 50.608 N	103° 29' 33.117 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal COM #8H
Project:	Lea County, NM	TVD Reference:	Well @ 3378.4usft (McVay 8)
Site:	Sec 8, T28S, R34E	MD Reference:	Well @ 3378.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,424.0	90.40	359.60	9,832.6	4,807.0	-354.7	388,137.47	760,465.65	32° 3' 51.538 N	103° 29' 33.119 W	
14,518.0	91.30	359.60	9,831.2	4,901.0	-355.4	388,231.46	760,464.99	32° 3' 52.468 N	103° 29' 33.118 W	
14,613.0	94.50	0.30	9,828.4	4,995.8	-355.5	388,326.33	760,464.91	32° 3' 53.407 N	103° 29' 33.110 W	
14,707.0	91.70	357.90	9,821.3	5,089.7	-357.0	388,420.16	760,463.43	32° 3' 54.335 N	103° 29' 33.119 W	
14,802.0	91.30	357.90	9,818.8	5,184.6	-360.4	388,515.08	760,459.95	32° 3' 55.275 N	103° 29' 33.151 W	
14,896.0	90.80	357.50	9,817.1	5,278.5	-384.2	388,608.97	760,456.18	32° 3' 56.204 N	103° 29' 33.186 W	
14,990.0	90.60	357.20	9,815.9	5,372.4	-368.6	388,702.86	760,451.84	32° 3' 57.134 N	103° 29' 33.228 W	
15,085.0	93.80	0.30	9,812.3	5,467.2	-370.6	388,797.75	760,449.76	32° 3' 58.073 N	103° 29' 33.244 W	
15,179.0	93.30	0.70	9,808.5	5,561.1	-389.8	388,891.56	760,450.58	32° 3' 59.001 N	103° 29' 33.228 W	
15,274.0	92.70	0.30	9,801.5	5,655.9	-389.0	388,986.43	760,451.41	32° 3' 59.940 N	103° 29' 33.207 W	
15,368.0	91.30	359.60	9,798.2	5,749.9	-389.1	389,080.37	760,451.33	32° 4' 0.869 N	103° 29' 33.200 W	
15,463.0	90.60	358.60	9,796.6	5,844.8	-370.6	389,175.34	760,449.84	32° 4' 1.809 N	103° 29' 33.209 W	
15,557.0	90.40	359.00	9,795.8	5,938.6	-372.5	389,269.32	760,447.67	32° 4' 2.739 N	103° 29' 33.223 W	
15,652.0	90.40	359.60	9,795.2	6,033.8	-373.7	389,364.31	760,446.71	32° 4' 3.680 N	103° 29' 33.226 W	
15,746.0	89.70	359.60	9,795.1	6,127.6	-374.3	389,458.30	760,446.05	32° 4' 4.610 N	103° 29' 33.227 W	
15,841.0	89.70	0.00	9,795.6	6,222.6	-374.7	389,553.30	760,445.72	32° 4' 5.550 N	103° 29' 33.222 W	
15,936.0	89.90	1.00	9,795.9	6,317.6	-373.8	389,648.30	760,446.55	32° 4' 6.490 N	103° 29' 33.204 W	
16,030.0	89.60	0.70	9,796.3	6,411.8	-372.5	389,742.29	760,447.94	32° 4' 7.420 N	103° 29' 33.179 W	
16,125.0	92.20	359.30	9,794.8	6,506.6	-372.5	389,837.26	760,447.94	32° 4' 8.380 N	103° 29' 33.171 W	
16,219.0	92.90	359.30	9,790.6	6,600.7	-373.6	389,931.16	760,446.79	32° 4' 9.289 N	103° 29' 33.175 W	
16,313.0	92.90	359.30	9,785.9	6,694.5	-374.7	390,025.03	760,445.85	32° 4' 10.218 N	103° 29' 33.180 W	
16,408.0	92.00	358.60	9,781.6	6,789.4	-376.5	390,119.93	760,443.91	32° 4' 11.157 N	103° 29' 33.192 W	
16,502.0	91.70	358.20	9,778.6	6,883.3	-379.1	390,213.84	760,441.26	32° 4' 12.087 N	103° 29' 33.214 W	
16,596.0	91.80	357.90	9,775.9	6,977.2	-382.3	390,307.75	760,438.09	32° 4' 13.016 N	103° 29' 33.242 W	
16,690.0	92.20	357.90	9,772.7	7,070.1	-385.7	390,400.63	760,434.88	32° 4' 13.935 N	103° 29' 33.274 W	
16,783.0	90.30	359.00	9,770.6	7,164.1	-388.3	390,494.56	760,432.14	32° 4' 14.865 N	103° 29' 33.295 W	
16,879.0	90.80	358.60	9,769.9	7,260.0	-390.3	390,590.54	760,430.13	32° 4' 15.815 N	103° 29' 33.309 W	
16,974.0	91.10	359.00	9,768.5	7,355.0	-392.3	390,685.51	760,428.14	32° 4' 16.755 N	103° 29' 33.324 W	
17,068.0	92.00	359.00	9,765.9	7,449.0	-393.9	390,779.46	760,426.50	32° 4' 17.685 N	103° 29' 33.334 W	
17,162.0	92.70	359.20	9,762.1	7,542.9	-395.4	390,873.37	760,425.03	32° 4' 18.614 N	103° 29' 33.343 W	
17,257.0	89.90	359.60	9,759.9	7,637.8	-398.4	390,968.33	760,424.03	32° 4' 19.554 N	103° 29' 33.346 W	
17,351.0	90.80	359.30	9,759.3	7,731.8	-397.3	391,062.32	760,423.13	32° 4' 20.484 N	103° 29' 33.348 W	
17,445.0	91.00	359.00	9,757.9	7,825.8	-398.7	391,156.30	760,421.74	32° 4' 21.414 N	103° 29' 33.356 W	
17,537.0	92.20	358.60	9,755.3	7,917.7	-400.6	391,248.24	760,419.81	32° 4' 22.324 N	103° 29' 33.370 W	
17,632.0	91.70	0.30	9,752.1	8,012.7	-401.5	391,343.18	760,418.90	32° 4' 23.284 N	103° 29' 33.372 W	
17,726.0	89.70	359.30	9,750.9	8,106.7	-401.8	391,437.16	760,418.57	32° 4' 24.194 N	103° 29' 33.367 W	
17,820.0	91.50	359.60	9,749.9	8,200.7	-402.7	391,531.15	760,417.67	32° 4' 25.124 N	103° 29' 33.369 W	
17,914.0	90.30	0.30	9,748.5	8,294.6	-402.8	391,625.14	760,417.59	32° 4' 26.054 N	103° 29' 33.361 W	
18,008.0	88.70	0.00	9,749.3	8,388.6	-402.6	391,719.13	760,417.83	32° 4' 26.984 N	103° 29' 33.350 W	
18,103.0	88.20	0.30	9,751.8	8,483.6	-402.3	391,814.09	760,416.08	32° 4' 27.924 N	103° 29' 33.339 W	
18,197.0	88.70	1.00	9,754.4	8,577.6	-401.3	391,908.05	760,419.15	32° 4' 28.853 N	103° 29' 33.318 W	
18,292.0	90.30	1.40	9,755.2	8,672.5	-399.3	392,003.03	760,421.14	32° 4' 29.793 N	103° 29' 33.286 W	
18,386.0	88.90	0.00	9,755.9	8,766.5	-398.1	392,097.01	760,422.28	32° 4' 30.723 N	103° 29' 33.264 W	
18,480.0	88.90	359.60	9,757.7	8,860.5	-398.4	392,190.99	760,421.98	32° 4' 31.653 N	103° 29' 33.259 W	
18,575.0	88.90	359.30	9,759.5	8,955.5	-399.4	392,285.97	760,421.04	32° 4' 32.593 N	103° 29' 33.261 W	
18,669.0	90.10	359.30	9,760.3	9,049.5	-400.5	392,379.96	760,419.90	32° 4' 33.523 N	103° 29' 33.266 W	
18,763.0	91.10	359.30	9,759.3	9,143.4	-401.6	392,473.95	760,418.75	32° 4' 34.453 N	103° 29' 33.271 W	
18,858.0	91.00	0.00	9,757.6	9,238.4	-402.2	392,568.93	760,418.17	32° 4' 35.393 N	103° 29' 33.269 W	
18,952.0	90.10	0.30	9,756.7	9,332.4	-402.0	392,662.92	760,418.41	32° 4' 36.323 N	103° 29' 33.258 W	
19,046.0	88.20	359.30	9,758.1	9,426.4	-402.3	392,756.91	760,418.09	32° 4' 37.253 N	103° 29' 33.253 W	
19,141.0	87.60	358.60	9,761.6	9,521.3	-404.1	392,851.82	760,416.35	32° 4' 38.193 N	103° 29' 33.265 W	
19,235.0	88.30	358.60	9,764.9	9,615.2	-406.3	392,945.74	760,414.05	32° 4' 39.122 N	103° 29' 33.283 W	
19,329.0	89.40	359.00	9,766.8	9,709.2	-408.3	393,039.69	760,412.08	32° 4' 40.052 N	103° 29' 33.297 W	
19,424.0	89.70	359.00	9,767.6	9,804.2	-410.0	393,134.66	760,410.43	32° 4' 40.992 N	103° 29' 33.308 W	
19,518.0	89.70	359.00	9,768.1	9,898.2	-411.6	393,228.66	760,408.78	32° 4' 41.922 N	103° 29' 33.318 W	



HP
Survey Report - Geographic



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Project:	Lea County, NM	TVD Reference:	Well @ 3379.4usft (McVay 8)
Site:	Sec 8, T26S, R34E	MD Reference:	Well @ 3379.4usft (McVay 8)
Well:	Gunner 8 Federal COM #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
19,840.0	89.70	359.00	9,768.7	10,020.1	-413.7	393,350.64	760,406.66	32° 4' 43.130 N	103° 29' 33.332 W
TD @ 19840' MD / 9769' TVD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
770.0	769.9	7.7	-4.7	Tie in @ 770' MD / 770' TVD
9,667.1	9,840.7	137.2	-312.4	Crossed 330' Hard Line @ 9667' MD / 9641' TVD
13,188.0	9,845.7	3,571.3	-340.2	Crossed 330' Hard Line @ 13188' MD / 9846' TVD
14,082.5	9,833.1	4,465.6	-347.9	Crossed 330' Hard Line @ 14083' MD / 9833' TVD
19,840.0	9,768.7	10,020.1	-413.7	TD @ 19840' MD / 9769' TVD

Checked By: _____ Approved By: _____ Date: _____

(entered data to be carried to each stage)

Date	5/23/2012
Pressure test	9500
Well	Guerner 8 Fed Com 86H
Well Number	
Casing 1 size	5 1/2
Capacity-bbls/lin. ft.	0.02325
Top of Casing	0
TD of casing	19,593
TVD	9810
Casing 2 size	
Capacity-bbls/lin. ft.	
Top of Casing	
TD of casing	

Fluid Database

1	Treated Water
2	7.5 % Acid
3	Slickwater
4	Water Frac G-R(13)
5	Water Frac G-R(13)
6	
7	
8	

Proppant Database

1	100 Mesh
2	40/70 White
3	
4	
5	
6	
7	
8	

Chemical Database

1	FR-66
2	Loaurf-360
3	Clay Web
4	BE-3
5	HPH Breaker
6	Scaletrol
7	Optifo H TE
8	Parasorb
9	Scalexorb 7
10	Optikleen-WF

	Stage 1	Distance Between Perfs	Shots	Stage 2	Distance Between Perfs	Shots	Stage 3	Distance Between Perfs	Shots	Stage 4	Distance Between Perfs	Shots	Stage 5	Distance Between Perfs	Shots
From Bottom to Top	10,543	50	14	10,384	50	14	10,242	50	14	10,088	55	14	10,040	51	14
	10,493	50	12	10,342	50	12	10,191	50	12	10,041	50	12	10,000	50	12
	10,443		10	10,292		10	10,141		10	10,001		10	10,040		10
	Perforated feet	100	36	Perforated feet	92	36	Perforated feet	101	36	Perforated feet	95	36	Perforated feet	100	36
	Frac Plug	10,048	Total Shots	Frac Plug	10,083	Total Shots	Frac Plug	10,278	Total Shots	Frac Plug	10,116	Total Shots	Frac Plug	10,000	Total Shots

	Stage 6	Distance Between Perfs	Shots	Stage 7	Distance Between Perfs	Shots	Stage 8	Distance Between Perfs	Shots	Stage 9	Distance Between Perfs	Shots	Stage 10	Distance Between Perfs	Shots
From Bottom to Top	10,791	49	14	10,630	50	14	10,488	51	14	10,338	50	14	10,187	50	14
	10,738	49	12	10,580	50	12	10,441	53	12	10,289	51	12	10,130	53	12
	10,680		10	10,530		10	10,388		10	10,237		10	10,080		10
	Perforated feet	102	36	Perforated feet	100	36	Perforated feet	104	36	Perforated feet	101	36	Perforated feet	103	36
	Frac Plug	10,619	Total Shots	Frac Plug	10,664	Total Shots	Frac Plug	10,812	Total Shots	Frac Plug	10,663	Total Shots	Frac Plug	10,612	Total Shots

	Stage 11	Distance Between Perfs	Shots	Stage 12	Distance Between Perfs	Shots	Stage 13	Distance Between Perfs	Shots	Stage 14	Distance Between Perfs	Shots	Stage 15	Distance Between Perfs	Shots
From Bottom to Top	10,636	50	14	10,480	50	14	10,335	48	14	10,184	51	14	10,033	52	14
	10,580	50	12	10,428	55	12	10,285	50	12	10,134	49	12	10,000	51	12
	10,530		10	10,378		10	10,235		10	10,085		10	10,033		10
	Perforated feet	100	36	Perforated feet	105	36	Perforated feet	98	36	Perforated feet	100	36	Perforated feet	103	36
	Frac Plug	10,062	Total Shots	Frac Plug	10,006	Total Shots	Frac Plug	10,760	Total Shots	Frac Plug	10,602	Total Shots	Frac Plug	10,480	Total Shots

	Stage 16	Distance Between Perfs	Shots	Stage 17	Distance Between Perfs	Shots	Stage 18	Distance Between Perfs	Shots	Stage 19	Distance Between Perfs	Shots	Stage 20	Distance Between Perfs	Shots
From Bottom to Top	10,783	50	14	10,620	54	14	10,462	50	14	10,305	48	14	10,151	50	14
	10,733	50	12	10,562	50	12	10,402	51	12	10,241	50	12	10,090	50	12
	10,683		10	10,512		10	10,351		10	10,201		10	10,050		10
	Perforated feet	100	36	Perforated feet	104	36	Perforated feet	101	36	Perforated feet	96	36	Perforated feet	100	36
	Frac Plug	10,298	Total Shots	Frac Plug	10,188	Total Shots	Frac Plug	10,613	Total Shots	Frac Plug	10,606	Total Shots	Frac Plug	10,790	Total Shots

	Stage 21	Distance Between Perfs	Shots	Stage 22	Distance Between Perfs	Shots	Stage 23	Distance Between Perfs	Shots	Stage 24	Distance Between Perfs	Shots	Stage 25	Distance Between Perfs	Shots
From Bottom to Top	10,630	50	14	10,379	50	14	10,229	50	14	10,078	46	14	10,027	51	14
	10,481	52	12	10,329	50	12	10,178	54	12	10,028	50	12	10,074	47	12
	10,420		10	10,278		10	10,124		10	10,078		10	10,027		10
	Perforated feet	102	36	Perforated feet	100	36	Perforated feet	104	36	Perforated feet	96	36	Perforated feet	98	36
	Frac Plug	10,654	Total Shots	Frac Plug	10,604	Total Shots	Frac Plug	10,392	Total Shots	Frac Plug	10,501	Total Shots	Frac Plug	10,544	Total Shots

	Stage 26	Distance Between Perfs	Shots	Stage 27	Distance Between Perfs	Shots	Stage 28	Distance Between Perfs	Shots	Stage 29	Distance Between Perfs	Shots	Stage 30	Distance Between Perfs	Shots
From Bottom to Top	10,777	50	14	10,626	49	14	10,478	50	14	10,325	50	14	10,180	55	14
	10,728	51	12	10,578	50	12	10,423	48	12	10,274	50	12	10,124	50	12
	10,675		10	10,525		10	10,375		10	10,224		10	10,074		10
	Perforated feet	101	36	Perforated feet	99	36	Perforated feet	98	36	Perforated feet	100	36	Perforated feet	105	36
	Frac Plug	10,600	Total Shots	Frac Plug	10,601	Total Shots	Frac Plug	10,600	Total Shots	Frac Plug	10,358	Total Shots	Frac Plug	10,589	Total Shots

	Stage 31	Distance Between Perfs	Shots	Stage 32	Distance Between Perfs	Shots	Stage 33	Distance Between Perfs	Shots	Stage 34	Distance Between Perfs	Shots	Stage 35	Distance Between Perfs	Shots
From Bottom to Top	10,623	51	14	10,473	50	14	10,321	55	14	10,171	51	14	10,021	50	14
	10,569	49	12	10,423	49	12	10,272	50	12	10,121	50	12	10,073	54	12
	10,523		10	10,374		10	10,222		10	10,071		10	10,021		10
	Perforated feet	97	36	Perforated feet	99	36	Perforated feet	105	36	Perforated feet	101	36	Perforated feet	104	36
	Frac Plug	10,648	Total Shots	Frac Plug	10,602	Total Shots	Frac Plug	10,747	Total Shots	Frac Plug	10,602	Total Shots	Frac Plug	10,448	Total Shots

From Bottom to Top	Stage 36	Distance Between Perfs	Shots	Stage 37	Distance Between Perfs	Shots	Stage 38	Distance Between Perfs	Shots	Stage 39	Distance Between Perfs	Shots	Stage 40	Distance Between Perfs	Shots
	14,270	49	14	14,119	51	14	13,985	54	14	13,818	50	14	13,668	50	14
	14,220	50	12	14,069	50	12	13,918	51	12	13,768	50	12	13,614	47	12
	14,170		10	14,018		10	13,869		10	13,718		10	13,567		10
	Perforated feet	89	36	Perforated feet	101	36	Perforated feet	105	36	Perforated feet	100	36	Perforated feet	97	36
	Frac Plug	14,295	Total Shots	Frac Plug	14,137	Total Shots	Frac Plug	13,994	Total Shots	Frac Plug	13,847	Total Shots	Frac Plug	13,693	Total Shots

From Bottom to Top	Stage 41	Distance Between Perfs	Shots	Stage 42	Distance Between Perfs	Shots	Stage 43	Distance Between Perfs	Shots	Stage 44	Distance Between Perfs	Shots	Stage 45	Distance Between Perfs	Shots
	13,517	50	14	13,368	50	14	13,218	48	14	13,065	50	14	12,914	53	14
	13,467	51	12	13,318	54	12	13,165	50	12	13,015	48	12	12,864	50	12
	13,418		10	13,264		10	13,115		10	12,967		10	12,814		10
	Perforated feet	101	36	Perforated feet	104	36	Perforated feet	98	36	Perforated feet	96	36	Perforated feet	103	36
	Frac Plug	13,543	Total Shots	Frac Plug	13,389	Total Shots	Frac Plug	13,241	Total Shots	Frac Plug	13,094	Total Shots	Frac Plug	12,938	Total Shots

From Bottom to Top	Stage 46	Distance Between Perfs	Shots	Stage 47	Distance Between Perfs	Shots	Stage 48	Distance Between Perfs	Shots	Stage 49	Distance Between Perfs	Shots	Stage 50	Distance Between Perfs	Shots
	12,764	50	14	12,594	70	14	12,462	50	14	12,312	50	14	12,161	50	14
	12,713	50	12	12,551	39	12	12,412	50	12	12,261	50	12	12,111	50	12
	12,663		10	12,512		10	12,362		10	12,211		10	12,061		10
	Perforated feet	100	36	Perforated feet	118	36	Perforated feet	100	36	Perforated feet	100	36	Perforated feet	100	36
	Frac Plug	12,786	Total Shots	Frac Plug	12,602	Total Shots	Frac Plug	12,482	Total Shots	Frac Plug	12,337	Total Shots	Frac Plug	12,182	Total Shots

From Bottom to Top	Stage 51	Distance Between Perfs	Shots	Stage 52	Distance Between Perfs	Shots	Stage 53	Distance Between Perfs	Shots	Stage 54	Distance Between Perfs	Shots	Stage 55	Distance Between Perfs	Shots
	12,005	56	14	11,860	50	14	11,700	54	14	11,559	51	14	11,408	54	14
	11,960	50	12	11,809	46	12	11,659	50	12	11,508	46	12	11,357	50	12
	11,910		10	11,763		10	11,609		10	11,462		10	11,307		10
	Perforated feet	106	36	Perforated feet	96	36	Perforated feet	104	36	Perforated feet	97	36	Perforated feet	104	36
	Frac Plug	12,036	Total Shots	Frac Plug	11,878	Total Shots	Frac Plug	11,734	Total Shots	Frac Plug	11,578	Total Shots	Frac Plug	11,433	Total Shots

From Bottom to Top	Stage 56	Distance Between Perfs	Shots	Stage 57	Distance Between Perfs	Shots	Stage 58	Distance Between Perfs	Shots	Stage 59	Distance Between Perfs	Shots	Stage 60	Distance Between Perfs	Shots
	11,257	50	14	11,108	51	14	10,958	53	14	10,805	50	14	10,654	51	14
	11,207	50	12	11,058	47	12	10,908	51	12	10,750	55	12	10,604	50	12
	11,157		10	11,009		10	10,855		10	10,705		10	10,554		10
	Perforated feet	100	36	Perforated feet	96	36	Perforated feet	104	36	Perforated feet	105	36	Perforated feet	101	36
	Frac Plug	11,282	Total Shots	Frac Plug	11,136	Total Shots	Frac Plug	10,981	Total Shots	Frac Plug	10,838	Total Shots	Frac Plug	10,680	Total Shots

From Bottom to Top	Stage 61	Distance Between Perfs	Shots	Stage 62	Distance Between Perfs	Shots	Stage 63	Distance Between Perfs	Shots	Stage 64	Distance Between Perfs	Shots	Stage 65	Distance Between Perfs	Shots
	10,504	50	14	10,363	49	14	10,202	51	14	10,102			0		
	10,458	54	12	10,363	50	12	10,155	53	12						
	10,402		10	10,253		10	10,102		10						
	Perforated feet	104	36	Perforated feet	99	36	Perforated feet	104	36	Perforated feet	10102	0	Perforated feet	0	0
	Frac Plug	10,528	Total Shots	Frac Plug	10,378	Total Shots	Frac Plug	10,226	Total Shots	Frac Plug		Total Shots	Frac Plug		Total Shots