

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTNM OIL CONSERVATION
ARTESIA DISTRICT
MAR 12 2018FORM APPROVED
OMB No. 1004-0137
Expires: July 31, 2010

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5. Lease Serial No.
NMNM1214741a. Type of Well ☒ Oil Well ☐ Gas Well ☐ Dry ☐ Other
b. Type of Completion ☒ New Well ☐ Work Over ☐ Deepen ☐ Plug Back ☐ Other
Other _____

6. If Indian, Allottee or Tribe Name

7. Unit or CA Agreement Name and No.
NMNM1375962. Name of Operator
COG PRODUCTION LLCContact: STORMI DAVIS
E-Mail: sdavis@concho.com3. Address 2208 W MAIN STREET
ARTESIA, NM 882103a. Phone No. (include area code)
Ph: 575-748-69464. Location of Well (Report location clearly and in accordance with Federal requirements)
Sec 30 T26S R29E Mer NMP
At surface NWNE 210FNL 1650FEL 32.020309 N Lat, 104.020523 W Lon

At top prod interval reported below

Sec 31 T26S R29E Mer NMP

At total depth Lot 6 212FSL 2002FEL 32.000637 N Lat, 104.021706 W Lon

8. Lease Name and Well No.
COPPERHEAD 31 FEDERAL COM 21H9. API Well No.
30-015-44118-00-S110. Field and Pool, or Exploratory
PURPLE SAGE-WOLFCAMP (GAS)11. Sec., T., R., M., or Block and Survey
or Area Sec 30 T26S R29E Mer NMP12. County or Parish
EDDY13. State
NM14. Date Spudded
05/05/201715. Date T.D. Reached
05/29/201716. Date Completed
☐ D & A ☒ Ready to Prod.
08/14/201717. Elevations (DF, KB, RT, GL)*
2929 GL18. Total Depth: MD 17865
TVD 1075919. Plug Back T.D.: MD 17685
TVD 1076020. Depth Bridge Plug Set: MD 17685
TVD 1076021. Type Electric & Other Mechanical Logs Run (Submit copy of each)
CNL DLL SONIC TCOM22. 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
20.000	16.000 J55	75.0	0	339		890		0	
13.500	10.750 L80	45.5	0	2689		1250		0	
6.750	5.500 P110	23.0	0	9301		1600		600	
9.875	7.625 P110	29.7	0	9848		1000		0	
6.750	5.000 P110	18.0	9301	17860					

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	9418	9410						

25. Producing Intervals

Formation	Top	Bottom	Perforated Interval	Size	No. Holes	Perf. Status
A) WOLFCAMP	10981	17660	10981 TO 17660	0.430	1980	OPEN
B)						
C)						
D)						

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

Depth Interval	Amount and Type of Material
10981 TO 17660	SEE ATTACHED

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
08/15/2017	08/20/2017	24	→	100.0	2074.0	1183.0			MAINT FLOWS FROM WELL
Choke Size	Tbg. Press. Flwg.	Csg. Press.	24 Hr. Rate	Oil BBL	Gas MCF	Water BBL	Gas:Oil Ratio	Well Status	
SI	4000		→	100	2074	1183		POV	

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 #388100 VERIFIED BY THE BLM WELL INFORMATION SYSTEM

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

INTERM Reclamation 6 months from 8/14/17

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.)
SOLD

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
LAMAR	2719	2760		BASE OF SALT	2530
BELL CANYON	2761	3604		LAMAR	2719
CHERRY CANYON	3605	4861		BELL CANYON	2761
BRUSHY CANYON	4862	6462		CHERRY CANYON	3605
BONE SPRING LIME	6463	7371		BRUSHY CANYON	4862
BONE SPRING 1ST	7372	8175		BONE SPRING LIME	6463
BONE SPRING 2ND	8176	9222		BONE SPRING 1ST	7372
BONE SPRING 3RD	9223	9571		BONE SPRING 2ND	8176
				WOLFCAMP	9572

32. Additional remarks (include plugging procedure):
Surveys & perms/stimulation are attached.

Additional Tops:
Wolfcamp 9572'
TVD = 10797'

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 #388100 Verified by the BLM Well Information System.
For COG PRODUCTION LLC, sent to the Carlsbad
Committed to AFMSS for processing by DUNCAN WHITLOCK on 11/02/2017 (18DW0004SE)

Name (please print) STORMI DAVIS

Title PREPARER

Signature (Electronic Submission)

Date 09/12/2017

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 ** REVISED ****

Revisions to Operator-Submitted EC Data for Well Completion #388100

	Operator Submitted	BLM Revised (AFMSS)
Lease:	NMNM121474	NMNM121474
Agreement:		NMNM137596 (NMNM137596)
Operator:	COG PRODUCTION LLC 2208 WEST MAIN ARTESIA, NM 88210 Ph: 575-748-6940	COG PRODUCTION LLC 2208 W MAIN STREET ARTESIA, NM 88210 Ph: 575.748.6940
Admin Contact:	STORMI DAVIS PREPARER E-Mail: sdavis@concho.com Ph: 575-748-6946	STORMI DAVIS PREPARER E-Mail: sdavis@concho.com Ph: 575-748-6946
Tech Contact:	STORMI DAVIS PREPARER E-Mail: sdavis@concho.com Ph: 575-748-6946	STORMI DAVIS PREPARER E-Mail: sdavis@concho.com Ph: 575-748-6946
Well Name: Number:	COPPERHEAD 31 FEDERAL COM 21H	COPPERHEAD 31 FEDERAL COM 21H
Location: State: County: S/T/R: Surf Loc:	NM EDDY Sec 30 T26S R29E Mer NMP NWNE 210FNL 1650FEL	NM EDDY Sec 30 T26S R29E Mer NMP NWNE 210FNL 1650FEL 32.020309 N Lat, 104.020523 W Lon
Field/Pool:	PURPLE SAGE; WOLFCAMP	PURPLE SAGE-WOLFCAMP (GAS)
Logs Run:	CNL, DLL, SONIC, TCOM	CNL DLL SONIC TCOM
Producing Intervals - Formations:	WOLFCAMP	WOLFCAMP
Porous Zones:	LAMAR BELL CANYON CHERRY CANYON BRUSHY CANYON BONE SPRING LM 1ST BONE SPRING 2ND BONE SPRING 3RD BONE SPRING	LAMAR BELL CANYON CHERRY CANYON BRUSHY CANYON BONE SPRING LIME BONE SPRING 1ST BONE SPRING 2ND BONE SPRING 3RD
Markers:	BOTTOM OF SALT LAMAR BELL CANYON CHERRY CANYON BRUSHY CANYON BONE SPRING LM 1ST BONE SPRING 2ND BONE SPRING	BASE OF SALT LAMAR BELL CANYON CHERRY CANYON BRUSHY CANYON BONE SPRING LIME BONE SPRING 1ST BONE SPRING 2ND WOLFCAMP

COPPERHEAD 31 FEDERAL COM #21H (30-015-44118)

<u>Perfs</u>	<u>7 1/2% Acid (Gal)</u>	<u>15% Acid (Gal)</u>	<u>Sand (#)</u>	<u>Fluid (Gal)</u>
1	0	798	270027	317604
2	1512	1554	215463	545328
3	0	2268	256606	600978
4	0	2394	237715	458556
5	0	3738	299337	424200
6	0	2268	299927	370398
7	0	2268	299438	374430
8	1512	798	298227	379344
9	1512	750	300212	373626
10	0	2268	300272	375732
11	0	2268	299499	366198
12	0	2262	300843	365016
13	0	3780	302740	399042
14	1512	756	302754	378966
15	0	2268	301524	375816
16	0	3234	1760	271824
17	0	2268	298123	366408
18	1512	756	300121	379722
19	1512	756	301666	388920
20	1512	756	300974	378630
21	1512	750	296701	379136
22	1512	756	34239	394884
23	1470	756	300382	453810
24	1512	756	300980	379134
25	1512	750	300541	372954
26	1512	882	301191	389046
27	1512	756	2651	169428
28	1512	756	301644	379134
29	1512	756	301639	369978
30	1512	756	300753	370944
31	750	756	299766	386526
32	1512	756	300740	372162
33	1512	756	300390	369936
34	1512	750	300052	370224
35	1512	756	302301	373134
36	1512	756	300408	366954
37	1512	756	299124	374514
38	1512	1512	300934	347382
39	1512	756	300917	399000
40	1554	756	301944	372590
41	1512	756	300977	378126
42	1512	756	2143	93282
43	1512	756	301107	356454
44	1512	756	298396	365232
45	1680	756	313492	377664
Totals	47,790	57,971	12,150,640	16,852,364

[illegible]

	Stage 21	Distance Between Pairs	Shots	Stage 22	Distance Between Pairs	Shots	Stage 23	Distance Between Pairs	Shots	Stage 24	Distance Between Pairs	Shots	Stage 25	Distance Between Pairs	Shots	Total Shots
From Bottom to Top	14,817	33	8	14,822	33	8	14,826	21	8	14,837	18	8	14,846	19	8	0
	14,868	33	8	14,868	23	8	14,878	19	8	14,878	18	8	14,886	18	8	0
	14,908	18	8	14,908	7	8	14,918	18	8	14,928	20	8	14,936	22	8	0
	14,931	32	8	14,931	18	8	14,941	18	8	14,946	18	8	14,953	18	8	0
	14,970	10	8	14,970	10	8	14,980	18	8	14,987	18	8	14,993	19	8	0
	14,988	10	8	14,988	10	8	14,998	17	8	14,998	18	8	15,005	19	8	0
	14,997	10	8	14,997	23	8	15,007	21	8	15,007	18	8	15,013	17	8	0
	14,998	10	8	15,007	23	8	15,018	21	8	15,018	18	8	15,025	18	8	0
	14,998	10	8	15,007	10	8	15,018	18	8	15,018	18	8	15,025	18	8	0
	14,998	10	8	15,007	10	8	15,018	18	8	15,018	18	8	15,025	18	8	0
From Top	14,998	10	8	15,007	10	8	15,018	18	8	15,018	18	8	15,025	18	8	0
	15,007	10	8	15,018	10	8	15,028	18	8	15,028	18	8	15,035	18	8	0
	15,018	10	8	15,028	10	8	15,038	18	8	15,038	18	8	15,045	18	8	0
	15,028	10	8	15,038	10	8	15,048	18	8	15,048	18	8	15,055	18	8	0
	15,038	10	8	15,048	10	8	15,058	18	8	15,058	18	8	15,065	18	8	0
	15,048	10	8	15,058	10	8	15,068	18	8	15,068	18	8	15,075	18	8	0
	15,058	10	8	15,068	10	8	15,078	18	8	15,078	18	8	15,085	18	8	0
	15,068	10	8	15,078	10	8	15,088	18	8	15,088	18	8	15,095	18	8	0
	15,078	10	8	15,088	10	8	15,098	18	8	15,098	18	8	15,105	18	8	0
	15,088	10	8	15,098	10	8	15,108	18	8	15,108	18	8	15,115	18	8	0
	15,098	10	8	15,108	10	8	15,118	18	8	15,118	18	8	15,125	18	8	0
	15,108	10	8	15,118	10	8	15,128	18	8	15,128	18	8	15,135	18	8	0
	15,118	10	8	15,128	10	8	15,138	18	8	15,138	18	8	15,145	18	8	0
	15,128	10	8	15,138	10	8	15,148	18	8	15,148	18	8	15,155	18	8	0
	15,138	10	8	15,148	10	8	15,158	18	8	15,158	18	8	15,165	18	8	0
	15,148	10	8	15,158	10	8	15,168	18	8	15,168	18	8	15,175	18	8	0
	15,158	10	8	15,168	10	8	15,178	18	8	15,178	18	8	15,185	18	8	0
	15,168	10	8	15,178	10	8	15,188	18	8	15,188	18	8	15,195	18	8	0
	15,178	10	8	15,188	10	8	15,198	18	8	15,198	18	8	15,205	18	8	0
	15,188	10	8	15,198	10	8	15,208	18	8	15,208	18	8	15,215	18	8	0
	15,198	10	8	15,208	10	8	15,218	18	8	15,218	18	8	15,225	18	8	0
	15,208	10	8	15,218	10	8	15,228	18	8	15,228	18	8	15,235	18	8	0
	15,218	10	8	15,228	10	8	15,238	18	8	15,238	18	8	15,245	18	8	0
	15,228	10	8	15,238	10	8	15,248	18	8	15,248	18	8	15,255	18	8	0
	15,238	10	8	15,248	10	8	15,258	18	8	15,258	18	8	15,265	18	8	0
	15,248	10	8	15,258	10	8	15,268	18	8	15,268	18	8	15,275	18	8	0
	15,258	10	8	15,268	10	8	15,278	18	8	15,278	18	8	15,285	18	8	0
	15,268	10	8	15,278	10	8	15,288	18	8	15,288	18	8	15,295	18	8	0
	15,278	10	8	15,288	10	8	15,298	18	8	15,298	18	8	15,305	18	8	0
	15,288	10	8	15,298	10	8	15,308	18	8	15,308	18	8	15,315	18	8	0
	15,298	10	8	15,308	10	8	15,318	18	8	15,318	18	8	15,325	18	8	0
	15,308	10	8	15,318	10	8	15,328	18	8	15,328	18	8	15,335	18	8	0
	15,318	10	8	15,328	10	8	15,338	18	8	15,338	18	8	15,345	18	8	0
	15,328	10	8	15,338	10	8	15,348	18	8	15,348	18	8	15,355	18	8	0
	15,338	10	8	15,348	10	8	15,358	18	8	15,358	18	8	15,365	18	8	0
	15,348	10	8	15,358	10	8	15,368	18	8	15,368	18	8	15,375	18	8	0
	15,358	10	8	15,368	10	8	15,378	18	8	15,378	18	8	15,385	18	8	0
	15,368	10	8	15,378	10	8	15,388	18	8	15,388	18	8	15,395	18	8	0
	15,378	10	8	15,388	10	8	15,398	18	8	15,398	18	8	15,405	18	8	0
	15,388	10	8	15,398	10	8	15,408	18	8	15,408	18	8	15,415	18	8	0
	15,398	10	8	15,408	10	8	15,418	18	8	15,418	18	8	15,425	18	8	0
	15,408	10	8	15,418	10	8	15,428	18	8	15,428	18	8	15,435	18	8	0
	15,418	10	8	15,428	10	8	15,438	18	8	15,438	18	8	15,445	18	8	0
	15,428	10	8	15,438	10	8	15,448	18	8	15,448	18	8	15,455	18	8	0
	15,438	10	8	15,448	10	8	15,458	18	8	15,458	18	8	15,465	18	8	0
	15,448	10	8	15,458	10	8	15,468	18	8	15,468	18	8	15,475	18	8	0
	15,458	10	8	15,468	10	8	15,478	18	8	15,478	18	8	15,485	18	8	0
	15,468	10	8	15,478	10	8	15,488	18	8	15,488	18	8	15,495	18	8	0
	15,478	10	8	15,488	10	8	15,498	18	8	15,498	18	8	15,505	18	8	0
	15,488	10	8	15,498	10	8	15,508	18	8	15,508	18	8	15,515	18	8	0
	15,498	10	8	15,508	10	8	15,518	18	8	15,518	18	8	15,525	18	8	0
	15,508	10	8	15,518	10	8	15,528	18	8	15,528	18	8	15,535	18	8	0
	15,518	10	8	15,528	10	8	15,538	18	8	15,538	18	8	15,545	18	8	0
	15,528	10	8	15,538	10	8	15,548	18	8	15,548	18	8	15,555	18	8	0
	15,538	10	8	15,548	10	8	15,558	18	8	15,558	18	8	15,565	18	8	0
	15,548	10	8	15,558	10	8	15,568	18	8	15,568	18	8	15,575	18	8	0
	15,558	10	8	15,568	10	8	15,578	18	8	15,578	18	8	15,585	18	8	0
	15,568	10	8	15,578	10	8	15,588	18	8	15,588	18	8	15,595	18	8	0
	15,578	10	8	15,588	10	8	15,598	18	8	15,598	18	8	15,605	18	8	0
	15,588	10	8	15,598	10	8	15,608	18	8	15,608	18	8	15,615	18	8	0
	15,598	10	8	15,608	10	8	15,618	18	8	15,618	18	8	15,625	18	8	0
	15,608	10	8	15,618	10	8	15,628	18	8	15,628	18	8	15,635	18	8	0
	15,618	10	8	15,628	10	8	15,638	18	8	15,638	18	8	15,645	18	8	0
	15,628	10	8	15,638	10	8	15,648	18	8	15,648	18	8	15,655	18	8	0
	15,638	10	8	15,648	10	8	15,658	18	8	15,658	18	8	15,665	18	8	0
	15,648	10	8	15,658	10	8	15,668	18	8	15,668	18	8	15,675	18	8	0
	15,658	10	8	15,668	10	8	15,678	18	8	15,678	18	8	15,685	18	8	0
	15,668	10	8	15,678	10	8	15,688	18	8	15,688	18	8	15,695	18	8	0
	15,678	10	8	15,688	10	8	15,698	18	8	15,698	18	8	15,705	18	8	0
	15,688	10	8	15,698	10	8	15,708	18	8	15,708	18	8	15,715	18	8	0
	15,698	10	8	15,708	10	8	15,718	18	8	15,718	18	8	15,725	18	8	0
	15,708	10	8	15,718	10	8	15,728	18	8	15,728	18	8	15,735	18	8	0
	15,718	10	8	15,728	10	8	15,738	18	8	15,738	18	8	15,745	18	8	0
	15,728	10	8	15,738	10	8	15,748	18	8	15,748	18	8	15,755	18	8	0
	15,738	10	8	15,748	10	8	15,758	18	8	15,758	18	8	15,765	18	8	0
	15,748	10	8	15,758	10	8	15,768	18	8	15,768	18	8	15,775	18	8	0
	15,758	10	8	15,768	10	8	15,778	18	8	15,778	18	8	15,785	18	8	0
	15,768	10	8	15,778	10	8	15,788	18	8	15,788	18	8	15,795	18	8	0
	15,778	10	8	15,788	10	8	15,798	18	8	15,798	18	8	15,805	18	8	0
	15,788	10	8	15,798	10	8	15,808	18	8	15,808	18	8	15,815	18	8	0
	15,798	10	8	15,808	10	8	15,818	18	8	15,818	18	8	15,825	18	8	0
	15,808	10	8	15,818	10	8	15,8									

7.04	7.05	7.06	7.07	7.08	7.09	7.10	7.11	7.12	7.13	7.14	7.15	7.16	7.17	7.18	7.19	7.20	7.21	7.22	7.23	7.24	7.25	7.26	7.27	7.28	7.29	7.30	7.31	7.32	7.33	7.34	7.35	7.36	7.37	7.38	7.39	7.40	7.41	7.42	7.43	7.44	7.45	7.46	7.47	7.48	7.49	7.50	7.51	7.52	7.53	7.54	7.55	7.56	7.57	7.58	7.59	7.60	7.61	7.62	7.63	7.64	7.65	7.66	7.67	7.68	7.69	7.70	7.71	7.72	7.73	7.74	7.75	7.76	7.77	7.78	7.79	7.80	7.81	7.82	7.83	7.84	7.85	7.86	7.87	7.88	7.89	7.90	7.91	7.92	7.93	7.94	7.95	7.96	7.97	7.98	7.99	8.00	8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.10	8.11	8.12	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20	8.21	8.22	8.23	8.24	8.25	8.26	8.27	8.28	8.29	8.30	8.31	8.32	8.33	8.34	8.35	8.36	8.37	8.38	8.39	8.40	8.41	8.42	8.43	8.44	8.45	8.46	8.47	8.48	8.49	8.50	8.51	8.52	8.53	8.54	8.55	8.56	8.57	8.58	8.59	8.60	8.61	8.62	8.63	8.64	8.65	8.66	8.67	8.68	8.69	8.70	8.71	8.72	8.73	8.74	8.75	8.76	8.77	8.78	8.79	8.80	8.81	8.82	8.83	8.84	8.85	8.86	8.87	8.88	8.89	8.90	8.91	8.92	8.93	8.94	8.95	8.96	8.97	8.98	8.99	9.00	9.01	9.02	9.03	9.04	9.05	9.06	9.07	9.08	9.09	9.10	9.11	9.12	9.13	9.14	9.15	9.16	9.17	9.18	9.19	9.20	9.21	9.22	9.23	9.24	9.25	9.26	9.27	9.28	9.29	9.30	9.31	9.32	9.33	9.34	9.35	9.36	9.37	9.38	9.39	9.40	9.41	9.42	9.43	9.44	9.45	9.46	9.47	9.48	9.49	9.50	9.51	9.52	9.53	9.54	9.55	9.56	9.57	9.58	9.59	9.60	9.61	9.62	9.63	9.64	9.65	9.66	9.67	9.68	9.69	9.70	9.71	9.72	9.73	9.74	9.75	9.76	9.77	9.78	9.79	9.80	9.81	9.82	9.83	9.84	9.85	9.86	9.87	9.88	9.89	9.90	9.91	9.92	9.93	9.94	9.95	9.96	9.97	9.98	9.99	10.00	10.01	10.02	10.03	10.04	10.05	10.06	10.07	10.08	10.09	10.10	10.11	10.12	10.13	10.14	10.15	10.16	10.17	10.18	10.19	10.20	10.21	10.22	10.23	10.24	10.25	10.26	10.27	10.28	10.29	10.30	10.31	10.32	10.33	10.34	10.35	10.36	10.37	10.38	10.39	10.40	10.41	10.42	10.43	10.44	10.45	10.46	10.47	10.48	10.49	10.50	10.51	10.52	10.53	10.54	10.55	10.56	10.57	10.58	10.59	10.60	10.61	10.62	10.63	10.64	10.65	10.66	10.67	10.68	10.69	10.70	10.71	10.72	10.73	10.74	10.75	10.76	10.77	10.78	10.79	10.80	10.81	10.82	10.83	10.84	10.85	10.86	10.87	10.88	10.89	10.90	10.91	10.92	10.93	10.94	10.95	10.96	10.97	10.98	10.99	11.00	11.01	11.02	11.03	11.04	11.05	11.06	11.07	11.08	11.09	11.10	11.11	11.12	11.13	11.14	11.15	11.16	11.17	11.18	11.19	11.20	11.21	11.22	11.23	11.24	11.25	11.26	11.27	11.28	11.29	11.30	11.31	11.32	11.33	11.34	11.35	11.36	11.37	11.38	11.39	11.40	11.41	11.42	11.43	11.44	11.45	11.46	11.47	11.48	11.49	11.50	11.51	11.52	11.53	11.54	11.55	11.56	11.57	11.58	11.59	11.60	11.61	11.62	11.63	11.64	11.65	11.66	11.67	11.68	11.69	11.70	11.71	11.72	11.73	11.74	11.75	11.76	11.77	11.78	11.79	11.80	11.81	11.82	11.83	11.84	11.85	11.86	11.87	11.88	11.89	11.90	11.91	11.92	11.93	11.94	11.95	11.96	11.97	11.98	11.99	12.00
7.04	7.05	7.06	7.07	7.08	7.09	7.10	7.11	7.12	7.13	7.14	7.15	7.16	7.17	7.18	7.19	7.20	7.21	7.22	7.23	7.24	7.25	7.26	7.27	7.28	7.29	7.30	7.31	7.32	7.33	7.34	7.35	7.36	7.37	7.38	7.39	7.40	7.41	7.42	7.43	7.44	7.45	7.46	7.47	7.48	7.49	7.50	7.51	7.52	7.53	7.54	7.55	7.56	7.57	7.58	7.59	7.60	7.61	7.62	7.63	7.64	7.65	7.66	7.67	7.68	7.69	7.70	7.71	7.72	7.73	7.74	7.75	7.76	7.77	7.78	7.79	7.80	7.81	7.82	7.83	7.84	7.85	7.86	7.87	7.88	7.89	7.90	7.91	7.92	7.93	7.94	7.95	7.96	7.97	7.98	7.99	8.00	8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.10	8.11	8.12	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20	8.21	8.22	8.23	8.24	8.25	8.26	8.27	8.28	8.29	8.30	8.31	8.32	8.33	8.34	8.35	8.36	8.37	8.38	8.39	8.40	8.41	8.42	8.43	8.44	8.45	8.46	8.47	8.48	8.49	8.50	8.51	8.52	8.53	8.54	8.55	8.56	8.57	8.58	8.59	8.60	8.61	8.62	8.63	8.64	8.65	8.66	8.67	8.68	8.69	8.70	8.71	8.72	8.73	8.74	8.75	8.76	8.77	8.78	8.79	8.80	8.81	8.82	8.83	8.84	8.85	8.86	8.87	8.88	8.89	8.90	8.91	8.92	8.93	8.94	8.95	8.96	8.97	8.98	8.99	9.00	9.01	9.02	9.03	9.04	9.05	9.06	9.07	9.08	9.09	9.10	9.11	9.12	9.13	9.14	9.15	9.16	9.17	9.18	9.19	9.20	9.21	9.22	9.23	9.24	9.25	9.26	9.27	9.28	9.29	9.30	9.31	9.32	9.33	9.34	9.35	9.36	9.37	9.38	9.39	9.40	9.41	9.42	9.43	9.44	9.45	9.46	9.47	9.48	9.49	9.50	9.51	9.52	9.53	9.54	9.55	9.56	9.57	9.58	9.59	9.60	9.61	9.62	9.63	9.64	9.65	9.66	9.67	9.68	9.69	9.70	9.71	9.72	9.73	9.74	9.75	9.76	9.77	9.78	9.79	9.80	9.81	9.82	9.83	9.84	9.85	9.86	9.87	9.88	9.89	9.90	9.91	9.92	9.93	9.94	9.95	9.96	9.97	9.98	9.99	10.00	10.01	10.02	10.03	10.04	10.05	10.06	10.07	10.08	10.09	10.10	10.11	10.12	10.13	10.14	10.15	10.16	10.17	10.18	10.19	10.20	10.21	10.22	10.23	10.24	10.25	10.26	10.27	10.28	10.29	10.30	10.31	10.32	10.33	10.34	10.35	10.36	10.37	10.38	10.39	10.40	10.41	10.42	10.43	10.44	10.45	10.46	10.47	10.48	10.49	10.50	10.51	10.52	10.53	10.54	10.55	10.56	10.57	10.58	10.59	10.60	10.61	10.62	10.63	10.64	10.65	10.66	10.67	10.68	10.69	10.70	10.71	10.72	10.73	10.74	10.75	10.76	10.77	10.78	10.79	10.80	10.81	10.82	10.83	10.84	10.85	10.86	10.87	10.88	10.89	10.90	10.91	10.92	10.93	10.94	10.95	10.96	10.97	10.98	10.99	11.00	11.01	11.02	11.03	11.04	11.05	11.06	11.07	11.08	11.09	11.10	11.11	11.12	11.13	11.14	11.15	11.16	11.17	11.18	11.19	11.20	11.21	11.22	11.23	11.24	11.25	11.26	11.27	11.28	11.29	11.30	11.31	11.32	11.33	11.34	11.35	11.36	11.37	11.38	11.39	11.40	11.41	11.42	11.43	11.44	11.45	11.46	11.47	11.48	11.49	11.50	11.51	11.52	11.53	11.54	11.55	11.56	11.57	11.58	11.59	11.60	11.61	11.62	11.63	11.64	11.65	11.66	11.67	11.68	11.69	11.70	11.71	11.72	11.73	11.74	11.75	11.76	11.77	11.78	11.79	11.80	11.81	11.82	11.83	11.84	11.85	11.86	11.87	11.88	11.89	11.90	11.91	11.92	11.93	11.94	11.95	11.96	11.97	11.98	11.99	12.00
7.04	7.05	7.06	7.07	7.08	7.09	7.10	7.11	7.12	7.13	7.14	7.15	7.16	7.17	7.18	7.19	7.20	7.21	7.22	7.23	7.24	7.25	7.26	7.27	7.28	7.29	7.30	7.31	7.32	7.33	7.34	7.35	7.36	7.37	7.38	7.39	7.40	7.41	7.42	7.43	7.44	7.45	7.46	7.47	7.48	7.49	7.50	7.51	7.52	7.53	7.54	7.55	7.56	7.57	7.58	7.59	7.60	7.61	7.62	7.63	7.64	7.65	7.66	7.67	7.68	7.69	7.70	7.71	7.72	7.73	7.74	7.75	7.76	7.77	7.78	7.79	7.80	7.81	7.82	7.83	7.84	7.85	7.86	7.87	7.88	7.89	7.90	7.91	7.92	7.93	7.94	7.95	7.96	7.97	7.98	7.99	8.00	8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.10	8.11	8.12	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20	8.21	8.22	8.23	8.24	8.25	8.26	8.27	8.28	8.29	8.30	8.31	8.32	8.33	8.34	8.35	8.36	8.37	8.38	8.39	8.40	8.41	8.42	8.43	8.44	8.45	8.46	8.47	8.48	8.49	8.50	8.51	8.52	8.53	8.54	8.55	8.56	8.57	8.58	8.59	8.60	8.61	8.62	8.63	8.64	8.65	8.66	8.67	8.68	8.69	8.70	8.71	8.72	8.73	8.74	8.75	8.76	8.77	8.78	8.79	8.80	8.81	8.82	8.83	8.84	8.85	8.86	8.87	8.88	8.89	8.90	8.91	8.92	8.93	8.94	8.95	8.96	8.97	8.98	8.99	9.00	9.01	9.02	9.03	9.04	9.05	9.06	9.07	9.08	9.09	9.10	9.11	9.12	9.13	9.14	9.15	9.16	9.17	9.18	9.19	9.20	9.21	9.22	9.23	9.24	9.25	9.26	9.27	9.28	9.29	9.30	9.31	9.32	9.33	9.34	9.35	9.36	9.37	9.38	9.39	9.40	9.41	9.42	9.43	9.44	9.45	9.46	9.47	9.48	9.49	9.50	9.51	9.52	9.53	9.54	9.55	9.56	9.57	9.58	9.59	9.60	9.61	9.62	9.63	9.64	9.65	9.66	9.67	9.68	9.69	9.70	9.71	9.72	9.73	9.74	9.75	9.76	9.77	9.78	9.79	9.80	9.81	9.82	9.83	9.84	9.85	9.86	9.87	9.88	9.89	9.90	9.91	9.92	9.93	9.94	9.95	9.96	9.97	9.98	9.99	10.00	10.01	10.02	10.03	10.04	10.05	10.06	10.07	10.08	10.09	10.10	10.11	10.12	10.13	10.14	10.15	10.16	10.17	10.18	10.19	10.20	10.21	10.22	10.23	10.24	10.25	10.26	10.27	10.28	10.29	10.30	10.31	10.32	10.33	10.34	10.35																																																																																																																																																																					

[illegible]



NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 12 2018

RECEIVED

May 23, 2017

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: Copperhead 31 Federal Com No. 021H

Please find enclosed a copy of the survey from 0' to 9750' ran on the above referenced well.

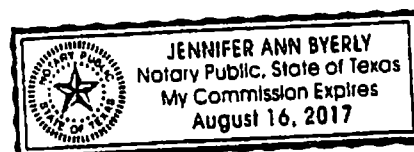
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 23rd day of May, A.D., 2017, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas



VES Survey International
P.O. Box 261021, Corpus Christi, Texas 78426
T (361) 767-0602 F (361) 767-0612
www.vessurvey.com



Company: COG OPERATING
Lease/Well: COPPERHEAD 31 FEDERAL COM No. /21H



Rig Name: LATSHAW 44
State/County: NEW MEXICO/EDDY
VS-Azi: 182.77 Degrees
Latitude: 32.02031, Longitude: -104.02052
Grid North = True North -0.17 degs (NAD 27)
Grid Correction Applied = -0.17 degs

Depth Reference : RKB=25 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: a-line gyro-de_01.ut
Minimum Curvature Method
Report Date/Time: 5/23/2017 / 13:33

VES Survey International
Midland, Texas
432-563-5444

Surveyor: Michael Cook
Copperhead 31 Federal Com No. 21H / API 30-015-44118

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----
100.00	0.28	291.36	100.00	0.09	-0.23	-0.08	0.24	291.36	0.28
200.00	0.31	315.71	200.00	0.37	-0.64	-0.34	0.74	299.89	0.13
300.00	0.13	349.84	300.00	0.67	-0.85	-0.63	1.08	308.46	0.21
400.00	0.18	60.52	400.00	0.89	-0.75	-0.85	1.16	320.07	0.17
500.00	0.13	51.29	500.00	1.06	-0.53	-1.04	1.19	333.35	0.05
600.00	0.25	68.35	600.00	1.21	-0.25	-1.20	1.24	348.55	0.13
700.00	0.34	40.75	700.00	1.52	0.15	-1.52	1.52	5.58	0.17
800.00	0.76	116.77	799.99	1.44	0.93	-1.49	1.72	32.85	0.75
900.00	1.04	94.36	899.98	1.08	2.43	-1.19	2.66	66.07	0.45
1000.00	1.09	25.35	999.97	1.87	3.74	-2.05	4.19	63.43	1.21
1100.00	1.03	333.80	1099.98	3.54	3.75	-3.72	5.16	46.64	0.93
1200.00	0.99	271.41	1199.94	4.38	2.50	-4.49	5.04	29.70	1.05
1300.00	0.95	233.80	1299.92	3.91	0.97	-3.95	4.02	13.94	0.63
1400.00	1.03	232.05	1399.91	2.86	-0.41	-2.84	2.89	351.94	0.09
1500.00	1.17	226.56	1499.89	1.61	-1.85	-1.52	2.45	311.00	0.17
1600.00	0.94	212.72	1599.87	0.22	-3.03	-0.07	3.04	274.15	0.34

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1700.00	0.83	214.69	1699.86	-1.07	-3.89	1.25	4.03	254.66	0.11
1800.00	0.38	228.07	1799.86	-1.89	-4.55	2.10	4.93	247.49	0.47
1900.00	0.69	170.21	1899.85	-2.62	-4.71	2.84	5.39	240.93	0.61
2000.00	0.82	102.44	1999.85	-3.28	-3.92	3.47	5.11	230.08	0.81
2100.00	2.65	67.71	2099.80	-2.56	-1.09	2.61	2.78	203.01	2.03
2200.00	3.28	69.62	2199.67	-0.69	3.73	0.61	3.79	100.47	0.64
2300.00	3.26	48.58	2299.51	2.19	8.54	-2.60	8.82	75.64	1.19
2400.00	2.76	44.67	2399.37	5.79	12.38	-6.38	13.67	64.92	0.52
2500.00	1.62	32.17	2499.30	8.64	14.79	-9.35	17.13	59.71	1.33
2600.00	1.36	298.89	2599.27	10.34	14.46	-11.02	17.76	54.44	2.09
2700.00	1.55	293.22	2699.24	11.44	12.19	-12.02	16.72	46.81	0.24
2800.00	1.71	290.25	2799.20	12.49	9.56	-12.93	15.72	37.40	0.18
2900.00	1.60	288.78	2899.16	13.46	6.83	-13.77	15.09	26.91	0.12
3000.00	1.54	290.74	2999.12	14.38	4.25	-14.57	14.99	16.48	0.08
3100.00	1.88	292.49	3099.08	15.48	1.48	-15.53	15.56	5.48	0.34
3200.00	2.72	298.82	3199.00	17.25	-2.11	-17.13	17.38	353.03	0.88
3300.00	2.53	295.35	3298.89	19.34	-6.18	-19.02	20.30	342.27	0.26
3400.00	2.50	293.53	3398.80	21.16	-10.18	-20.64	23.48	334.31	0.09
3500.00	2.43	295.61	3498.70	22.94	-14.09	-22.23	26.92	328.45	0.11
3600.00	2.50	296.43	3598.61	24.83	-17.95	-23.93	30.63	324.14	0.08
3700.00	2.51	289.48	3698.52	26.53	-21.96	-25.43	34.44	320.37	0.30
3800.00	2.83	291.02	3798.41	28.14	-26.34	-26.84	38.54	316.80	0.33
3900.00	2.74	288.81	3898.29	29.84	-30.89	-28.31	42.95	314.01	0.11
4000.00	3.63	289.50	3998.13	31.71	-36.12	-29.92	48.06	311.27	0.89
4100.00	3.59	292.68	4097.94	33.97	-42.00	-31.90	54.02	308.97	0.20
4200.00	3.21	289.22	4197.76	36.10	-47.53	-33.76	59.69	307.22	0.43
4300.00	3.22	286.72	4297.60	37.83	-52.87	-35.23	65.01	305.59	0.14
4400.00	2.80	282.57	4397.46	39.17	-57.94	-36.32	69.94	304.06	0.47
4500.00	3.21	279.73	4497.33	40.18	-63.08	-37.08	74.79	302.49	0.44
4600.00	3.54	276.19	4597.15	40.98	-68.92	-37.60	80.18	300.74	0.39
4700.00	2.99	273.93	4696.99	41.49	-74.60	-37.84	85.36	299.09	0.57
4800.00	3.54	283.00	4796.83	42.37	-80.20	-38.44	90.71	297.84	0.75
4900.00	3.59	285.54	4896.63	43.90	-86.23	-39.68	96.76	296.98	0.17
5000.00	3.45	284.39	4996.44	45.49	-92.16	-40.98	102.77	296.27	0.16
5100.00	3.40	282.26	5096.27	46.86	-97.97	-42.07	108.80	295.56	0.14
5200.00	3.35	280.58	5196.09	48.03	-103.74	-42.96	114.32	294.84	0.11
5300.00	3.24	279.54	5295.93	49.03	-109.40	-43.69	119.88	294.14	0.13
5400.00	3.36	274.68	5395.76	49.74	-115.10	-44.12	125.39	293.37	0.31
5500.00	3.18	275.55	5495.60	50.25	-120.78	-44.35	130.82	292.59	0.19

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5600.00	3.46	281.81	5595.43	51.14	-126.50	-44.98	136.44	292.01	0.46
5700.00	3.31	279.11	5695.26	52.21	-132.30	-45.76	142.23	291.54	0.22
5800.00	3.26	289.99	5795.09	53.64	-137.83	-46.92	147.90	291.27	0.62
5900.00	2.61	285.44	5894.96	55.22	-142.69	-48.26	153.00	291.16	0.69
6000.00	2.64	280.30	5994.86	56.23	-147.14	-49.06	157.52	290.92	0.24
6100.00	3.02	284.42	6094.74	57.30	-151.98	-49.89	162.40	290.66	0.44
6200.00	3.41	290.38	6194.58	58.99	-157.30	-51.32	168.00	290.56	0.51
6300.00	3.60	290.01	6294.39	61.10	-163.04	-53.15	174.11	290.55	0.19
6400.00	3.35	293.90	6394.21	63.36	-168.66	-55.14	180.17	290.59	0.34
6500.00	3.31	294.25	6494.04	65.73	-173.97	-57.25	185.97	290.70	0.05
6600.00	2.80	296.07	6593.90	67.99	-178.79	-59.27	191.29	290.82	0.52
6700.00	2.65	297.77	6693.78	70.14	-183.03	-61.21	196.01	290.97	0.17
6800.00	2.68	290.85	6793.68	72.05	-187.26	-62.92	200.65	291.04	0.32
6900.00	2.59	289.61	6893.57	73.64	-191.58	-64.30	205.25	291.03	0.11
7000.00	2.42	275.30	6993.47	74.60	-195.81	-65.05	209.54	290.85	0.65
7100.00	2.18	269.04	7093.39	74.76	-199.81	-65.02	213.34	290.51	0.35
7200.00	1.98	262.06	7193.33	74.49	-203.42	-64.57	216.63	290.11	0.32
7300.00	2.07	276.88	7293.27	74.47	-206.92	-64.38	219.91	289.79	0.53
7400.00	2.85	298.32	7393.18	75.86	-210.91	-65.58	224.13	289.78	1.19
7500.00	2.73	297.38	7493.06	78.14	-215.21	-67.65	228.95	289.95	0.13
7600.00	3.27	309.20	7592.92	81.03	-219.53	-70.33	234.01	290.26	0.82
7700.00	3.26	313.78	7692.76	84.80	-223.79	-73.89	239.32	290.75	0.26
7800.00	3.97	318.59	7792.66	89.37	-228.14	-78.24	245.02	291.39	0.77
7900.00	4.22	305.68	7892.31	94.11	-233.42	-82.72	251.68	291.96	0.95
8000.00	3.97	298.46	7992.05	97.91	-239.45	-86.22	258.70	292.24	0.57
8100.00	3.67	296.08	8091.83	100.97	-245.37	-88.99	265.34	292.37	0.34
8200.00	3.74	296.35	8191.62	103.82	-251.17	-91.56	271.78	292.46	0.07
8300.00	3.47	284.45	8291.42	106.03	-257.02	-93.48	278.03	292.42	0.79
8400.00	2.77	301.21	8391.28	108.03	-262.02	-95.25	283.42	292.41	1.14
8500.00	2.98	305.00	8491.15	110.78	-266.22	-97.79	288.35	292.59	0.28
8600.00	3.12	312.41	8591.01	114.11	-270.36	-100.91	293.46	292.88	0.42
8700.00	3.23	306.73	8690.86	117.63	-274.63	-104.22	298.76	293.19	0.33
8800.00	2.95	299.71	8790.71	120.59	-279.13	-106.96	304.06	293.37	0.47
8900.00	2.91	286.16	8890.58	122.99	-283.65	-109.14	309.16	293.44	0.19
9000.00	2.98	292.71	8990.45	125.12	-288.33	-111.04	314.30	293.46	0.19
9100.00	3.11	292.01	9090.31	127.14	-293.24	-112.82	319.61	293.44	0.13
9200.00	3.10	296.26	9190.16	129.35	-298.18	-114.79	325.03	293.45	0.23
9300.00	3.11	293.19	9290.01	131.61	-303.09	-116.81	330.43	293.47	0.17
9400.00	3.42	294.86	9389.85	133.93	-308.29	-118.88	336.13	293.48	0.33

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9500.00	3.34	291.97	9489.68	138.28	-313.70	-120.96	342.03	293.48	0.19
9600.00	2.70	280.87	9589.54	137.81	-318.72	-122.25	347.23	293.38	0.86
9700.00	2.62	280.11	9689.43	138.64	-323.19	-122.86	351.68	293.22	0.18
9750.00	2.38	278.48	9739.39	138.99	-326.30	-123.11	353.75	293.14	0.32



VES Survey International

Midland, Texas

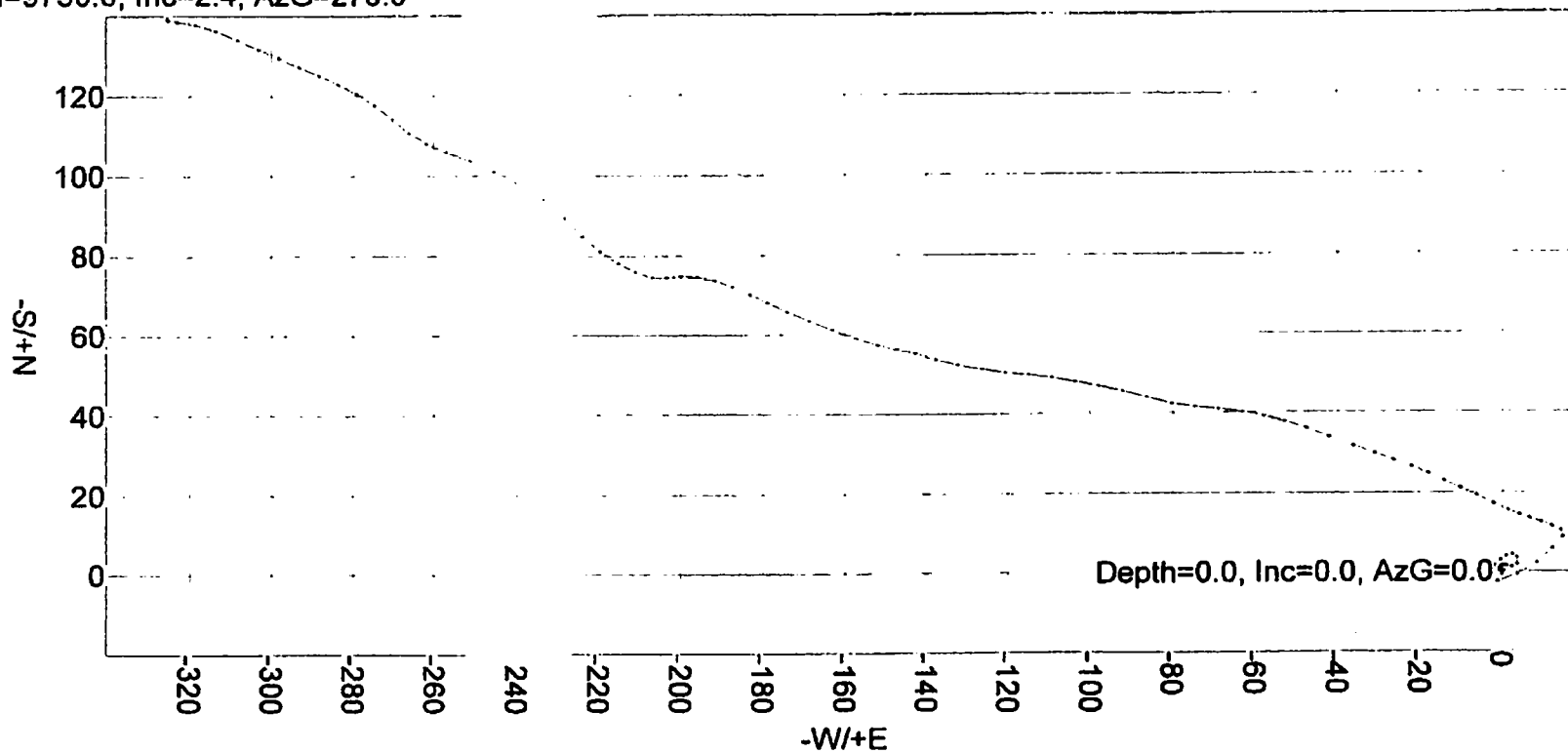
432-563-5444

Surveyor: Michael Cook

Copperhead 31 Federal Com No. 21H / API 30-015-44118



Depth=9750.0, Inc=2.4, AzG=278.5



V.E.S. Survey Date: 5/16/2017



NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 12 2018

RECEIVED

I Michael Cook certify that I am employed by VES Survey International. That I did on the day(s) of 05/17/17 through 05/17/17 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 9,750.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating for the Copperhead 31 Federal Com Well # 21H API # 30-015-44118 in Eddy County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by VES Survey International.

A handwritten signature in cursive script, appearing to read "M. Cook", is written over a horizontal line.

Michael Cook
Service Technician
VES Survey International



CONCHO

NM OIL CONSERVATION

ARTESIA DISTRICT

MAR 12 2018

RECEIVED

COG Production, LLC

Lea County, NM (NAD 27)

Sec. 30, T 26 S. , R 29 E

Copperhead 31 Fed Com 21H

Wellbore #1

Survey: IDS MWD Surveys

Survey Report - Geographic

31 May, 2017



Company:	COG Production, LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	TVD Reference:	KB=25' @ 2953.8usft (Latslaw 44)
Site:	Sec. 30, T 26 S., R 29 E	MD Reference:	KB=25' @ 2953.8usft (Latslaw 44)
Well:	Copperhead 31 Fed Com 21H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Project	Lea County, NM (NAD 27)		
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. 30, T 26 S., R 29 E		
Site Position:		Northing:	371,210.69 usft
From:	Map	Easting:	597,099.30 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 1' 12.667 N
		Longitude:	104° 1' 12.131 W
		Grid Convergence:	0.17 "

Well	Copperhead 31 Fed Com 21H, ACTIVE		
Well Position	+N-S	0.0 usft	Northing: 371,210.69 usft
	+E-W	0.0 usft	Easting: 597,099.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 1' 12.667 N
		Longitude:	104° 1' 12.131 W
		Ground Level:	2,928.8 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	4/27/2017	7.10
			Dip Angle (°)
			59.73
			Field Strength (nT)
			48,029

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)
	0.0	0.0	0.0
			Direction (°)
			182.77

Survey Program Date 5/31/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	9,750.0	VES Gyros (Wellbore #1)	VESSI_GYROFLEX	VESSI Gyroflex Gyro
9,925.0	17,860.0	IDS MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Measured Depth (usft)	Declination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,750.0	2.38	278.48	9,739.4	139.0	-325.3	371,349.65	596,773.99	32° 1' 14.052 N	104° 1' 15.905 W
21H Drilling Window 50' East & 50' West									
9,925.0	2.36	270.32	9,914.2	139.5	-332.5	371,350.21	596,766.79	32° 1' 14.058 N	104° 1' 15.989 W
1st IDS Survey 9925' MD/9914.2 TVD									
10,018.0	0.50	40.47	10,007.2	139.8	-334.2	371,350.53	596,765.14	32° 1' 14.061 N	104° 1' 16.008 W
10,112.0	0.56	318.51	10,101.2	140.5	-334.2	371,351.19	596,765.10	32° 1' 14.067 N	104° 1' 16.008 W
10,206.0	2.21	221.60	10,195.2	139.5	-335.7	371,350.18	596,763.60	32° 1' 14.057 N	104° 1' 16.026 W
10,253.0	3.42	214.33	10,242.1	137.6	-337.1	371,348.34	596,762.20	32° 1' 14.039 N	104° 1' 16.042 W
10,299.0	7.10	219.00	10,287.9	134.3	-339.7	371,345.00	596,759.64	32° 1' 14.006 N	104° 1' 16.072 W
10,346.0	12.18	217.20	10,334.3	128.1	-344.5	371,338.79	596,754.81	32° 1' 13.945 N	104° 1' 16.128 W
10,393.0	16.20	207.88	10,379.8	118.3	-350.6	371,329.04	596,748.74	32° 1' 13.849 N	104° 1' 16.199 W

Company:	COG Production, LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	TVD Reference:	KB=25' @ 2953.8usft (Latshaw 44)
Site:	Sec. 30, T 26 S., R 29 E	MD Reference:	KB=25' @ 2953.8usft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,440.0	21.24	202.36	10,424.3	104.7	-356.9	371,315.36	596,742.44	32° 1' 13.713 N	104° 1' 16.273 W
10,487.0	25.41	195.14	10,467.5	87.0	-362.7	371,297.74	596,736.56	32° 1' 13.539 N	104° 1' 16.342 W
10,534.0	27.87	194.72	10,509.5	66.7	-368.2	371,277.38	596,731.13	32° 1' 13.338 N	104° 1' 16.405 W
10,581.0	29.93	190.89	10,550.6	44.5	-373.2	371,255.23	596,726.13	32° 1' 13.119 N	104° 1' 16.464 W
10,612.0	32.59	184.45	10,577.1	28.6	-375.3	371,239.31	596,724.02	32° 1' 12.961 N	104° 1' 16.489 W
10,643.0	36.38	181.13	10,602.7	11.1	-376.1	371,221.79	596,723.19	32° 1' 12.788 N	104° 1' 16.500 W
10,675.0	41.06	180.61	10,627.6	-8.9	-376.4	371,201.78	596,722.89	32° 1' 12.590 N	104° 1' 16.504 W
10,706.0	46.90	181.79	10,649.9	-30.4	-376.9	371,180.27	596,722.43	32° 1' 12.377 N	104° 1' 16.510 W
10,737.0	52.40	182.00	10,670.0	-54.0	-377.7	371,156.66	596,721.64	32° 1' 12.143 N	104° 1' 16.520 W
10,769.0	55.87	180.68	10,688.8	-80.0	-378.3	371,130.74	596,721.04	32° 1' 11.887 N	104° 1' 16.528 W
10,800.0	61.89	178.42	10,704.8	-106.5	-378.0	371,104.22	596,721.27	32° 1' 11.624 N	104° 1' 16.526 W
10,813.5	64.56	176.65	10,710.8	-118.5	-377.5	371,092.18	596,721.79	32° 1' 11.505 N	104° 1' 16.520 W
Cross Hardline 10813.5 MD/10710.8 TVD 135.6 VS									
10,826.0	67.06	175.08	10,716.0	-129.9	-376.7	371,080.81	596,722.61	32° 1' 11.393 N	104° 1' 16.511 W
10,857.0	70.07	173.74	10,727.3	-158.6	-373.9	371,052.09	596,725.43	32° 1' 11.108 N	104° 1' 16.479 W
10,888.0	71.97	173.09	10,737.4	-187.7	-370.5	371,022.97	596,728.79	32° 1' 10.820 N	104° 1' 16.441 W
10,919.0	73.31	173.34	10,746.6	-217.1	-367.0	370,993.59	596,732.28	32° 1' 10.529 N	104° 1' 16.402 W
10,950.0	74.58	173.09	10,755.2	-246.7	-363.5	370,964.01	596,735.80	32° 1' 10.236 N	104° 1' 16.362 W
10,981.0	75.60	174.26	10,763.2	-276.5	-360.2	370,934.24	596,739.10	32° 1' 9.942 N	104° 1' 16.324 W
11,028.0	77.94	175.85	10,773.9	-322.0	-356.3	370,888.66	596,743.04	32° 1' 9.490 N	104° 1' 16.280 W
11,075.0	81.50	176.44	10,782.3	-368.2	-353.2	370,842.53	596,746.15	32° 1' 9.034 N	104° 1' 16.246 W
11,122.0	81.80	176.58	10,789.1	-414.6	-350.3	370,796.11	596,748.98	32° 1' 8.574 N	104° 1' 16.214 W
11,169.0	84.50	177.15	10,794.8	-461.2	-347.8	370,749.52	596,751.53	32° 1' 8.113 N	104° 1' 16.186 W
11,264.0	92.60	177.72	10,797.2	-556.0	-343.5	370,654.73	596,755.78	32° 1' 7.175 N	104° 1' 16.140 W
11,358.0	88.50	176.97	10,796.3	-649.8	-339.2	370,560.85	596,760.13	32° 1' 6.246 N	104° 1' 16.093 W
11,452.0	90.15	178.59	10,797.4	-743.8	-335.5	370,466.94	596,763.77	32° 1' 5.316 N	104° 1' 16.054 W
11,547.0	90.58	178.42	10,796.8	-838.7	-333.1	370,371.97	596,766.25	32° 1' 4.376 N	104° 1' 16.028 W
11,641.0	91.00	178.32	10,795.5	-932.7	-330.4	370,278.02	596,768.92	32° 1' 3.446 N	104° 1' 16.000 W
11,735.0	89.48	178.17	10,795.1	-1,026.6	-327.5	370,184.07	596,771.80	32° 1' 2.517 N	104° 1' 15.970 W
11,829.0	89.20	174.35	10,796.1	-1,120.4	-321.4	370,090.29	596,777.93	32° 1' 1.588 N	104° 1' 15.902 W
11,923.0	89.90	174.80	10,796.9	-1,214.0	-312.5	369,996.71	596,786.82	32° 1' 0.662 N	104° 1' 15.802 W
12,017.0	90.15	175.63	10,796.8	-1,307.6	-304.6	369,903.04	596,794.66	32° 0' 59.735 N	104° 1' 15.714 W
12,049.0	90.60	177.00	10,796.6	-1,339.6	-302.6	369,871.11	596,796.72	32° 0' 59.419 N	104° 1' 15.691 W
12,112.0	91.31	179.73	10,795.6	-1,402.5	-300.8	369,808.15	596,798.51	32° 0' 58.796 N	104° 1' 15.672 W
12,206.0	90.58	181.02	10,794.0	-1,496.5	-301.4	369,714.17	596,797.90	32° 0' 57.865 N	104° 1' 15.682 W
12,299.0	88.41	178.88	10,794.9	-1,589.5	-301.3	369,621.18	596,797.98	32° 0' 56.945 N	104° 1' 15.685 W
12,394.0	88.92	183.91	10,797.1	-1,684.4	-303.6	369,526.27	596,795.67	32° 0' 56.008 N	104° 1' 15.715 W
12,487.0	91.42	186.35	10,796.8	-1,777.0	-311.9	369,433.66	596,787.35	32° 0' 55.090 N	104° 1' 15.814 W
12,627.0	89.54	183.53	10,795.6	-1,916.5	-324.0	369,294.20	596,775.30	32° 0' 53.710 N	104° 1' 15.959 W
12,676.0	90.91	185.88	10,795.4	-1,965.3	-328.0	369,245.37	596,771.28	32° 0' 53.227 N	104° 1' 16.007 W
12,770.0	91.44	184.04	10,793.5	-2,058.9	-336.1	369,151.75	596,763.16	32° 0' 52.300 N	104° 1' 16.105 W
12,864.0	89.50	178.00	10,792.7	-2,152.9	-337.8	369,057.81	596,761.48	32° 0' 51.371 N	104° 1' 16.127 W
12,958.0	91.53	180.96	10,791.9	-2,246.9	-337.0	368,963.84	596,762.34	32° 0' 50.441 N	104° 1' 16.121 W
13,052.0	90.58	181.02	10,790.2	-2,340.8	-338.6	368,869.87	596,760.71	32° 0' 49.511 N	104° 1' 16.143 W
13,145.0	90.21	180.78	10,789.5	-2,433.8	-340.0	368,776.88	596,759.25	32° 0' 48.591 N	104° 1' 16.163 W
13,239.0	89.12	182.26	10,790.1	-2,527.8	-342.5	368,682.92	596,756.76	32° 0' 47.661 N	104° 1' 16.195 W
13,333.0	92.48	184.33	10,788.7	-2,621.6	-347.9	368,589.10	596,751.36	32° 0' 46.733 N	104° 1' 16.261 W
13,427.0	90.97	180.19	10,785.9	-2,715.5	-351.6	368,495.24	596,747.66	32° 0' 45.804 N	104° 1' 16.307 W
13,521.0	90.88	175.91	10,784.4	-2,809.4	-348.4	368,401.33	596,750.85	32° 0' 44.874 N	104° 1' 16.273 W
13,614.0	89.90	176.38	10,783.8	-2,902.1	-342.2	368,308.54	596,757.11	32° 0' 43.956 N	104° 1' 16.203 W
13,708.0	90.01	178.20	10,783.8	-2,996.0	-337.8	368,214.65	596,761.55	32° 0' 43.026 N	104° 1' 16.155 W
13,802.0	91.53	180.71	10,782.6	-3,090.0	-336.9	368,120.68	596,762.45	32° 0' 42.096 N	104° 1' 16.148 W
13,895.0	89.73	179.62	10,781.6	-3,183.0	-337.1	368,027.69	596,762.18	32° 0' 41.176 N	104° 1' 16.154 W
13,989.0	89.28	178.95	10,782.4	-3,277.0	-336.0	367,933.70	596,763.35	32° 0' 40.246 N	104° 1' 16.143 W
14,083.0	89.28	181.33	10,783.5	-3,371.0	-336.2	367,839.71	596,763.12	32° 0' 39.316 N	104° 1' 16.149 W

Company:	COG Production, LLC	Local/Co-ordinate Reference:	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	TVD Reference:	KB=25' @ 2953.8usft (Latshaw 44)
Site:	Sec. 30, T 26 S., R 29 E	MD Reference:	KB=25' @ 2953.8usft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db.

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
14,177.0	89.68	181.56	10,784.4	-3,464.9	-338.6	367,745.75	596,760.75	32° 0' 38.386 N	104° 1' 16.180 W	
14,271.0	89.59	180.91	10,785.0	-3,558.9	-340.6	367,651.77	596,758.72	32° 0' 37.456 N	104° 1' 16.207 W	
14,366.0	90.94	181.83	10,784.6	-3,653.9	-342.8	367,556.80	596,756.45	32° 0' 36.516 N	104° 1' 16.236 W	
14,460.0	90.38	182.15	10,783.5	-3,747.8	-346.1	367,462.87	596,753.19	32° 0' 35.587 N	104° 1' 16.277 W	
14,554.0	89.28	182.79	10,783.8	-3,841.7	-350.2	367,368.96	596,749.14	32° 0' 34.657 N	104° 1' 16.327 W	
14,648.0	89.28	180.89	10,784.9	-3,935.7	-353.2	367,275.02	596,746.12	32° 0' 33.728 N	104° 1' 16.366 W	
14,742.0	91.44	183.12	10,784.3	-4,029.6	-356.5	367,181.09	596,742.83	32° 0' 32.798 N	104° 1' 16.407 W	
14,837.0	92.01	184.69	10,781.5	-4,124.3	-362.9	367,086.35	596,736.37	32° 0' 31.861 N	104° 1' 16.485 W	
14,931.0	90.38	182.80	10,779.5	-4,218.1	-369.1	366,992.58	596,730.23	32° 0' 30.933 N	104° 1' 16.560 W	
15,025.0	89.06	179.03	10,780.0	-4,312.1	-370.6	366,898.61	596,728.73	32° 0' 30.003 N	104° 1' 16.580 W	
15,118.0	89.17	179.14	10,781.4	-4,405.1	-369.1	366,805.64	596,730.21	32° 0' 29.083 N	104° 1' 16.566 W	
15,213.0	92.01	180.12	10,780.4	-4,500.0	-368.5	366,710.66	596,730.83	32° 0' 28.143 N	104° 1' 16.562 W	
15,307.0	89.85	178.88	10,778.9	-4,594.0	-367.7	366,616.68	596,731.65	32° 0' 27.213 N	104° 1' 16.556 W	
15,401.0	90.04	178.26	10,779.0	-4,688.0	-365.3	366,522.71	596,733.99	32° 0' 26.283 N	104° 1' 16.532 W	
15,495.0	89.03	177.45	10,779.8	-4,781.9	-361.8	366,428.78	596,737.51	32° 0' 25.353 N	104° 1' 16.494 W	
15,589.0	89.85	178.51	10,780.7	-4,875.8	-358.5	366,334.84	596,740.82	32° 0' 24.423 N	104° 1' 16.459 W	
15,683.0	91.39	181.18	10,779.7	-4,969.8	-358.2	366,240.86	596,741.08	32° 0' 23.493 N	104° 1' 16.459 W	
15,777.0	90.55	180.13	10,778.1	-5,063.8	-359.3	366,146.88	596,740.00	32° 0' 22.563 N	104° 1' 16.474 W	
15,871.0	90.41	180.05	10,777.3	-5,157.8	-359.4	366,052.89	596,739.86	32° 0' 21.633 N	104° 1' 16.479 W	
15,965.0	90.63	180.40	10,776.4	-5,251.8	-359.8	365,958.89	596,739.49	32° 0' 20.703 N	104° 1' 16.487 W	
16,058.0	90.60	180.53	10,775.4	-5,344.8	-360.6	365,865.90	596,738.73	32° 0' 19.783 N	104° 1' 16.499 W	
16,153.0	90.13	179.83	10,774.8	-5,439.8	-360.9	365,770.90	596,738.43	32° 0' 18.842 N	104° 1' 16.505 W	
16,246.0	91.72	182.01	10,773.3	-5,532.8	-362.4	365,677.94	596,736.94	32° 0' 17.922 N	104° 1' 16.526 W	
16,341.0	89.93	180.01	10,772.0	-5,627.7	-364.0	365,582.97	596,735.27	32° 0' 16.983 N	104° 1' 16.548 W	
16,435.0	91.05	184.10	10,771.2	-5,721.6	-367.4	365,489.05	596,731.90	32° 0' 16.053 N	104° 1' 16.591 W	
16,528.0	90.01	181.92	10,770.3	-5,814.5	-372.3	365,396.19	596,727.02	32° 0' 15.134 N	104° 1' 16.650 W	
16,622.0	89.85	180.68	10,770.4	-5,908.5	-374.4	365,302.22	596,724.88	32° 0' 14.204 N	104° 1' 16.678 W	
16,716.0	90.13	180.89	10,770.4	-6,002.5	-375.7	365,208.23	596,723.60	32° 0' 13.274 N	104° 1' 16.697 W	
16,810.0	90.32	181.40	10,770.1	-6,096.4	-377.6	365,114.25	596,721.72	32° 0' 12.344 N	104° 1' 16.721 W	
16,905.0	90.86	183.14	10,769.1	-6,191.4	-381.3	365,019.33	596,717.95	32° 0' 11.405 N	104° 1' 16.768 W	
16,999.0	90.21	182.01	10,768.2	-6,285.3	-385.6	364,925.43	596,713.73	32° 0' 10.476 N	104° 1' 16.821 W	
17,092.0	90.91	180.03	10,767.3	-6,378.2	-387.2	364,832.46	596,712.08	32° 0' 9.556 N	104° 1' 16.843 W	
17,186.0	89.99	177.45	10,766.6	-6,472.2	-385.2	364,738.49	596,714.14	32° 0' 8.626 N	104° 1' 16.822 W	
17,280.0	91.44	177.97	10,765.4	-6,566.1	-381.4	364,644.58	596,717.90	32° 0' 7.696 N	104° 1' 16.782 W	
17,374.0	90.32	178.46	10,763.9	-6,660.0	-376.8	364,550.70	596,722.47	32° 0' 6.767 N	104° 1' 16.732 W	
17,467.0	89.37	176.13	10,764.2	-6,752.8	-370.8	364,457.90	596,728.47	32° 0' 5.848 N	104° 1' 16.665 W	
17,561.0	91.81	179.82	10,763.2	-6,846.7	-367.5	364,363.99	596,731.80	32° 0' 4.919 N	104° 1' 16.630 W	
17,656.0	91.39	180.27	10,760.6	-6,941.7	-367.6	364,269.02	596,731.72	32° 0' 3.979 N	104° 1' 16.634 W	
17,741.5	89.99	179.62	10,759.5	-7,027.2	-367.5	364,183.50	596,731.81	32° 0' 3.133 N	104° 1' 16.635 W	
Copperhead 31 Fed Com 21H LTP										
17,741.8	89.99	179.61	10,759.5	-7,027.5	-367.5	364,183.23	596,731.81	32° 0' 3.130 N	104° 1' 16.635 W	
Cross Hardline 17741.8 MD/10759.5 TVD 7037 VS										
17,749.0	89.87	179.56	10,759.6	-7,034.7	-367.4	364,176.03	596,731.86	32° 0' 3.059 N	104° 1' 16.635 W	
17,814.0	90.49	180.14	10,759.4	-7,099.7	-367.3	364,111.03	596,732.03	32° 0' 2.416 N	104° 1' 16.635 W	
Last IDS Survey 17814 MD/10759.4 TVD										
17,860.0	90.49	180.14	10,759.0	-7,145.7	-367.4	364,065.04	596,731.92	32° 0' 1.960 N	104° 1' 16.638 W	
PTB 17860 MD/10759 TVD - Copperhead 31 Fed Com 21H BHL										

Company:	COG Production, LLC	Local Co-ordinate Reference:	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	TVD Reference:	KB=25' @ 2953.8usft (Latshaw 44)
Site:	Sec. 30, T 26 S., R 29 E	MD Reference:	KB=25' @ 2953.8usft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
9,925.0	9,914.2	139.5	-332.5	1st IDS Survey 9925' MD/9914.2 TVD
10,813.5	10,710.8	-118.5	-377.5	Cross Hardline 10813.5 MD/10710.8 TVD 136.6 VS
17,741.8	10,759.5	-7,027.5	-367.5	Cross Hardline 17741.8 MD/10759.5 TVD 7037 VS
17,814.0	10,759.4	-7,099.7	-367.3	Last IDS Survey 17814 MD/10759.4 TVD
17,860.0	10,759.0	-7,145.7	-367.4	PTB 17860 MD/10759 TVD

Checked By: _____ Approved By: _____ Date: _____