Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

Carlsbad Field Office
OCD Artesia

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on page 2.

RECEIVED
NM OIL CONSERVATION
ARTESIA DISTRICT
MAY 11 2017
RECEIVED

5. Lease Serial No.
NMNM121474

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
COPPERHEAD 31 FEDERAL COM 21H

2. Name of Operator
COG PRODUCTION LLC
Contact: MAYTE X REYES
E-Mail: mreyes1@concho.com

9. API Well No.
30-015-44118-00-X1

3a. Address
2208 W MAIN STREET
ARTESIA, NM 88210

3b. Phone No. (include area code)
Ph: 575-748-6945

10. Field and Pool or Exploratory Area
PURPLE SAGE WOLFCAMP 98220

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 30 T26S R29E NWNE 210FNL 1650FEL
32.020309 N Lat, 104.020523 W Lon

11. County or Parish, State
EDDY COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other Change to Original APD
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Accepted for record - NMOCD
5-12-17
PC

COG Production LLC, respectfully requests approval for the following changes to the original approved APD.

Operator will drill 20? surface to 285? with 8.4 ? 8.6# fresh water spud mud. Run 16? 75# J55 BTC to TD and cement with 500 sx Class + 2%CC (14.8 ppg, 1.34 yd) to surface.
Operator will drill 13.5? hole to 2,750? w/ 10 ppg brine water. Run 10-3/4? 45.5# N80 BTC casing to TD and cement with 1000 sx Class C + 4% Gel lead (13.5 ppg, 1.75 yd) and 250 sx Class C tail (14.8 ppg, 1.34 yd) to surface.
Operator will drill 9-7/8? to 9,841? as original APD. Run 7-5/8? 29.7 HCP110 BTC to TD and cement with 725 sx Tuned Light lead (10.3 ppg, 3.48 yd) and 275 sx Class H tail (16.4 ppg, 1.1 yd) to surface
Operator will drill 6-3/4? hole to TD at 17,847? MD/ 10,680 TVD. Well plan attached.

SEE ATTACHED FOR CONDITIONS OF APPROVAL

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #374248 verified by the BLM Well Information System
For COG PRODUCTION LLC, sent to the Carlsbad
Committed to AFMSS for processing by DEBORAH MCKINNEY on 05/01/2017 (17DLM1533SE)

Name *(Printed/Typed)* MAYTE X REYES — Title REGULATORY ANALYST

Signature (Electronic Submission) — Date 04/27/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By MUSTAFA HAQUE — Title PETROLEUM ENGINEER — Date 05/02/2017

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office Carlsbad

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.

(Instructions on page 2)

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

Additional data for EC transaction #374248 that would not fit on the form

32. Additional remarks, continued

Anti-collision report attached.
Directional plan attached.

PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating, LLC
LEASE NO.:	NMNM121474
WELL NAME & NO.:	21H-Copperhead Federal Com
SURFACE HOLE FOOTAGE:	210'/N & 1650'/E
BOTTOM HOLE FOOTAGE	200'/S & 1980'/E
LOCATION:	Section 30, T.26 S., R.29 E., NMPM
COUNTY:	Eddy County, New Mexico

All previous COAs still apply except for the following:

If cement does not circulate to surface on the 10 3/4 inch first intermediate casing, the cement on the 7 5/8 inch second intermediate casing must come to surface.

1. The minimum required fill of cement behind the **10 3/4** inch first intermediate casing is:

   ☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office.

Formation below the 10-3/4 inch shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe (not the mud weight required to prevent dissolving the salt formation) and the mud weight for the bottom of the hole. Report results to BLM office.

MHH 05022017

COG Production, LLC
Project: Lea County, NM (NAD 27)
Site: Sec. 30, T 26 S. , R 29 E
Well: Copperhead 31 Fed Com 21H
Wellbore: Wellbore #1
Plan: Plan #3 (Copperhead 31 Fed Com 21H/Wellbore #1)
Latshaw 44

INTEGRITY Directional Services

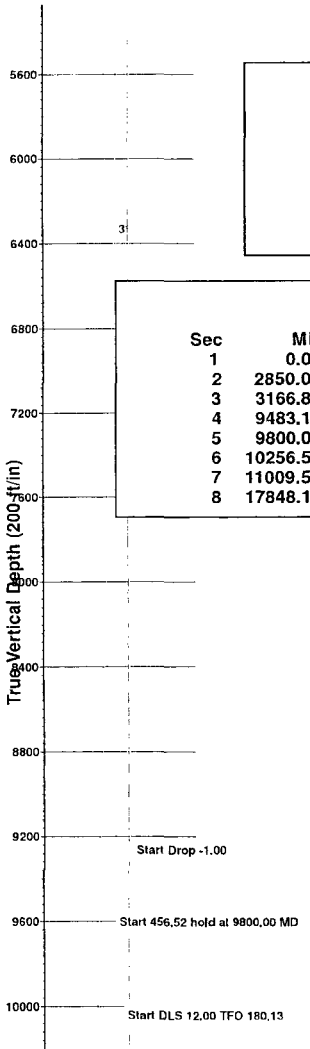
WELL DETAILS: Copperhead 31 Fed Com 21H

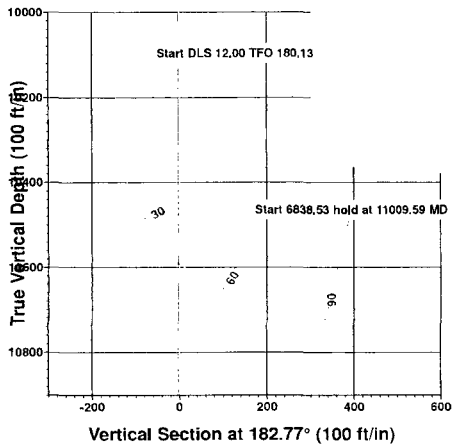
Ground Elevation:: 2988.80
RKB Elevation: KB=25' @ 3013.80ft (Latshaw 44)
Rig Name: Latshaw 44

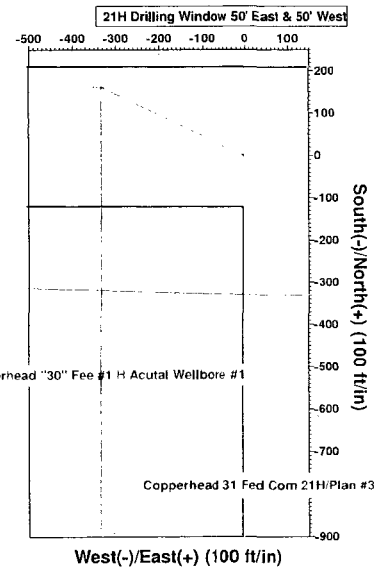
Northing	Easting	Latittude	Longitude
371210.6930	597099.3000	32° 1' 12.667 N	104° 1' 12.131 W

Planned Section Details

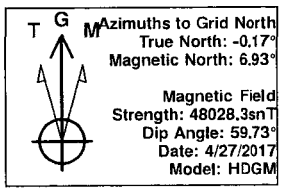
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2850.01	0.00	0.00	2850.01	0.00	0.00	0.00	0.00	0.00
3	3166.82	3.17	296.17	3166.65	3.86	-7.86	1.00	296.17	-3.48
4	9483.19	3.17	296.17	9473.37	157.84	-321.14	0.00	0.00	-142.15
5	9800.00	0.00	0.00	9790.02	161.70	-329.00	1.00	180.00	-145.63
6	10256.52	0.00	0.00	10246.54	161.70	-329.00	0.00	0.00	-145.63
7	11009.59	90.37	180.13	10724.00	-318.84	-330.11	12.00	180.13	334.40
8	17848.12	90.37	180.13	10680.00	-7157.21	-345.90	0.00	0.00	7165.56

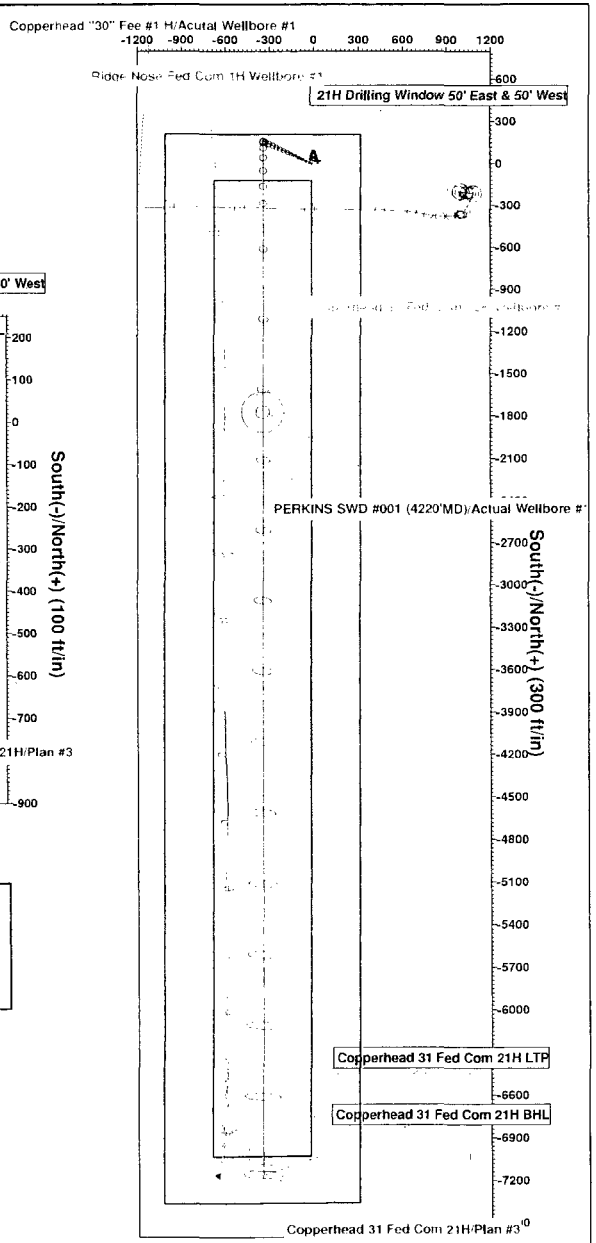


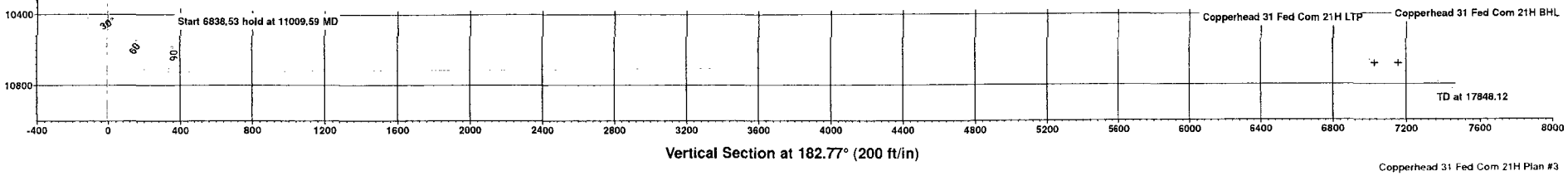




PROJECT DETAILS: Lea County, NM (NAD 27)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid







COG Production, LLC

Lea County, NM (NAD 27)
Sec. 30, T 26 S. , R 29 E
Copperhead 31 Fed Com 21H

Wellbore #1

Plan: Plan #3

Standard Survey Report

27 April, 2017

INTEGRITY
Directional Services

Integrity Directional Services, LLC

Survey Report

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #3	**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:**	371,210.6929 usft	**Latitude:**	32° 1' 12.667 N
From:	Map	**Easting:**	597,099.3000 usft	**Longitude:**	104° 1' 12.131 W
Position Uncertainty:	0.00 ft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.17 °

Well Copperhead 31 Fed Com 21H

Well Position	**+N/-S**	0.00 ft	**Northing:**	371,210.6929 usft	**Latitude:**	32° 1' 12.667 N
	+E/-W	0.00 ft	**Easting:**	597,099.3000 usft	**Longitude:**	104° 1' 12.131 W
Position Uncertainty		0.00 ft	**Wellhead Elevation:**	0.00 ft	**Ground Level:**	2,988.80 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/27/2017	7.10	59.73	48,028

Design Plan #3

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (ft)**	**+N/-S (ft)**	**+E/-W (ft)**	**Direction (°)**	
	0.00	0.00	0.00	182.77	

Survey Tool Program **Date** 4/27/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,848.10	Plan #3 (Wellbore #1)	MWD	MWD - Standard

Planned Survey

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

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Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #3	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,850.01	0.00	0.00	2,850.01	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 1.00									
2,900.00	0.50	296.17	2,900.00	0.10	-0.20	-0.09	1.00	1.00	0.00
3,000.00	1.50	296.17	2,999.98	0.87	-1.76	-0.78	1.00	1.00	0.00
3,100.00	2.50	296.17	3,099.92	2.41	-4.89	-2.17	1.00	1.00	0.00
3,166.82	3.17	296.17	3,166.65	3.86	-7.86	-3.48	1.00	1.00	0.00
Start 6316.37 hold at 3166.82 MD									
3,200.00	3.17	296.17	3,199.79	4.67	-9.50	-4.21	0.00	0.00	0.00
3,300.00	3.17	296.17	3,299.64	7.11	-14.46	-6.40	0.00	0.00	0.00
3,400.00	3.17	296.17	3,399.48	9.55	-19.42	-8.60	0.00	0.00	0.00
3,500.00	3.17	296.17	3,499.33	11.98	-24.38	-10.79	0.00	0.00	0.00
3,600.00	3.17	296.17	3,599.18	14.42	-29.34	-12.99	0.00	0.00	0.00
3,700.00	3.17	296.17	3,699.02	16.86	-34.30	-15.18	0.00	0.00	0.00
3,800.00	3.17	296.17	3,798.87	19.30	-39.26	-17.38	0.00	0.00	0.00
3,900.00	3.17	296.17	3,898.72	21.74	-44.22	-19.58	0.00	0.00	0.00
4,000.00	3.17	296.17	3,998.57	24.17	-49.18	-21.77	0.00	0.00	0.00
4,100.00	3.17	296.17	4,098.41	26.61	-54.14	-23.97	0.00	0.00	0.00
4,200.00	3.17	296.17	4,198.26	29.05	-59.10	-26.16	0.00	0.00	0.00
4,300.00	3.17	296.17	4,298.11	31.49	-64.06	-28.36	0.00	0.00	0.00
4,400.00	3.17	296.17	4,397.95	33.92	-69.02	-30.55	0.00	0.00	0.00
4,500.00	3.17	296.17	4,497.80	36.36	-73.98	-32.75	0.00	0.00	0.00
4,600.00	3.17	296.17	4,597.65	38.80	-78.94	-34.94	0.00	0.00	0.00
4,700.00	3.17	296.17	4,697.50	41.24	-83.90	-37.14	0.00	0.00	0.00
4,800.00	3.17	296.17	4,797.34	43.67	-88.86	-39.33	0.00	0.00	0.00
4,900.00	3.17	296.17	4,897.19	46.11	-93.82	-41.53	0.00	0.00	0.00

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
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Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #3	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,000.00	3.17	296.17	4,997.04	48.55	-98.78	-43.73	0.00	0.00	0.00
5,100.00	3.17	296.17	5,096.88	50.99	-103.74	-45.92	0.00	0.00	0.00
5,200.00	3.17	296.17	5,196.73	53.43	-108.70	-48.12	0.00	0.00	0.00
5,300.00	3.17	296.17	5,296.58	55.86	-113.66	-50.31	0.00	0.00	0.00
5,400.00	3.17	296.17	5,396.43	58.30	-118.62	-52.51	0.00	0.00	0.00
5,500.00	3.17	296.17	5,496.27	60.74	-123.58	-54.70	0.00	0.00	0.00
5,600.00	3.17	296.17	5,596.12	63.18	-128.54	-56.90	0.00	0.00	0.00
5,700.00	3.17	296.17	5,695.97	65.61	-133.50	-59.09	0.00	0.00	0.00
5,800.00	3.17	296.17	5,795.81	68.05	-138.46	-61.29	0.00	0.00	0.00
5,900.00	3.17	296.17	5,895.66	70.49	-143.42	-63.48	0.00	0.00	0.00
6,000.00	3.17	296.17	5,995.51	72.93	-148.38	-65.68	0.00	0.00	0.00
6,100.00	3.17	296.17	6,095.36	75.37	-153.34	-67.88	0.00	0.00	0.00
6,200.00	3.17	296.17	6,195.20	77.80	-158.30	-70.07	0.00	0.00	0.00
6,300.00	3.17	296.17	6,295.05	80.24	-163.26	-72.27	0.00	0.00	0.00
6,400.00	3.17	296.17	6,394.90	82.68	-168.22	-74.46	0.00	0.00	0.00
6,500.00	3.17	296.17	6,494.74	85.12	-173.18	-76.66	0.00	0.00	0.00
6,600.00	3.17	296.17	6,594.59	87.55	-178.14	-78.85	0.00	0.00	0.00
6,700.00	3.17	296.17	6,694.44	89.99	-183.10	-81.05	0.00	0.00	0.00
6,800.00	3.17	296.17	6,794.29	92.43	-188.06	-83.24	0.00	0.00	0.00
6,900.00	3.17	296.17	6,894.13	94.87	-193.02	-85.44	0.00	0.00	0.00
7,000.00	3.17	296.17	6,993.98	97.30	-197.98	-87.63	0.00	0.00	0.00
7,100.00	3.17	296.17	7,093.83	99.74	-202.94	-89.83	0.00	0.00	0.00
7,200.00	3.17	296.17	7,193.67	102.18	-207.90	-92.03	0.00	0.00	0.00
7,300.00	3.17	296.17	7,293.52	104.62	-212.86	-94.22	0.00	0.00	0.00
7,400.00	3.17	296.17	7,393.37	107.06	-217.82	-96.42	0.00	0.00	0.00
7,500.00	3.17	296.17	7,493.22	109.49	-222.78	-98.61	0.00	0.00	0.00
7,600.00	3.17	296.17	7,593.06	111.93	-227.74	-100.81	0.00	0.00	0.00
7,700.00	3.17	296.17	7,692.91	114.37	-232.70	-103.00	0.00	0.00	0.00
7,800.00	3.17	296.17	7,792.76	116.81	-237.66	-105.20	0.00	0.00	0.00
7,900.00	3.17	296.17	7,892.61	119.24	-242.62	-107.39	0.00	0.00	0.00
8,000.00	3.17	296.17	7,992.45	121.68	-247.58	-109.59	0.00	0.00	0.00
8,100.00	3.17	296.17	8,092.30	124.12	-252.54	-111.78	0.00	0.00	0.00
8,200.00	3.17	296.17	8,192.15	126.56	-257.50	-113.98	0.00	0.00	0.00
8,300.00	3.17	296.17	8,291.99	129.00	-262.46	-116.18	0.00	0.00	0.00
8,400.00	3.17	296.17	8,391.84	131.43	-267.42	-118.37	0.00	0.00	0.00
8,500.00	3.17	296.17	8,491.69	133.87	-272.38	-120.57	0.00	0.00	0.00
8,600.00	3.17	296.17	8,591.54	136.31	-277.34	-122.76	0.00	0.00	0.00
8,700.00	3.17	296.17	8,691.38	138.75	-282.30	-124.96	0.00	0.00	0.00
8,800.00	3.17	296.17	8,791.23	141.18	-287.26	-127.15	0.00	0.00	0.00
8,900.00	3.17	296.17	8,891.08	143.62	-292.22	-129.35	0.00	0.00	0.00
9,000.00	3.17	296.17	8,990.92	146.06	-297.18	-131.54	0.00	0.00	0.00
9,100.00	3.17	296.17	9,090.77	148.50	-302.14	-133.74	0.00	0.00	0.00
9,200.00	3.17	296.17	9,190.62	150.93	-307.10	-135.93	0.00	0.00	0.00

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #3	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,300.00	3.17	296.17	9,290.47	153.37	-312.06	-138.13	0.00	0.00	0.00
9,400.00	3.17	296.17	9,390.31	155.81	-317.02	-140.33	0.00	0.00	0.00
9,483.19	3.17	296.17	9,473.37	157.84	-321.14	-142.15	0.00	0.00	0.00
Start Drop -1.00									
9,500.00	3.00	296.17	9,490.16	158.24	-321.95	-142.51	1.00	-1.00	0.00
9,600.00	2.00	296.17	9,590.06	160.16	-325.87	-144.24	1.00	-1.00	0.00
9,700.00	1.00	296.17	9,690.03	161.32	-328.22	-145.28	1.00	-1.00	0.00
9,800.00	0.00	0.00	9,790.02	161.70	-329.00	-145.63	1.00	-1.00	0.00
Start 456.52 hold at 9800.00 MD									
9,900.00	0.00	0.00	9,890.02	161.70	-329.00	-145.63	0.00	0.00	0.00
10,000.00	0.00	0.00	9,990.02	161.70	-329.00	-145.63	0.00	0.00	0.00
10,100.00	0.00	0.00	10,090.02	161.70	-329.00	-145.63	0.00	0.00	0.00
10,200.00	0.00	0.00	10,190.02	161.70	-329.00	-145.63	0.00	0.00	0.00
10,256.52	0.00	0.00	10,246.54	161.70	-329.00	-145.63	0.00	0.00	0.00
Start DLS 12.00 TFO 180.13									
10,300.00	5.22	180.13	10,289.96	159.72	-329.01	-143.65	12.00	12.00	0.00
10,400.00	17.22	180.13	10,387.87	140.30	-329.05	-124.26	12.00	12.00	0.00
10,500.00	29.22	180.13	10,479.61	100.95	-329.14	-84.95	12.00	12.00	0.00
10,600.00	41.22	180.13	10,561.15	43.39	-329.27	-27.44	12.00	12.00	0.00
10,700.00	53.22	180.13	10,628.95	-29.87	-329.44	45.74	12.00	12.00	0.00
10,800.00	65.22	180.13	10,680.04	-115.63	-329.64	131.40	12.00	12.00	0.00
10,900.00	77.22	180.13	10,712.17	-210.13	-329.86	225.81	12.00	12.00	0.00
11,000.00	89.22	180.13	10,723.96	-309.25	-330.09	324.82	12.00	12.00	0.00
11,009.59	90.37	180.13	10,724.00	-318.84	-330.11	334.40	12.00	12.00	0.00
Start 6838.53 hold at 11009.59 MD									
11,100.00	90.37	180.13	10,723.41	-409.24	-330.32	424.71	0.00	0.00	0.00
11,200.00	90.37	180.13	10,722.77	-509.24	-330.55	524.61	0.00	0.00	0.00
11,300.00	90.37	180.13	10,722.13	-609.24	-330.78	624.50	0.00	0.00	0.00
11,400.00	90.37	180.13	10,721.48	-709.24	-331.01	724.39	0.00	0.00	0.00
11,500.00	90.37	180.13	10,720.84	-809.24	-331.24	824.28	0.00	0.00	0.00
11,600.00	90.37	180.13	10,720.20	-909.23	-331.47	924.17	0.00	0.00	0.00
11,700.00	90.37	180.13	10,719.55	-1,009.23	-331.70	1,024.07	0.00	0.00	0.00
11,800.00	90.37	180.13	10,718.91	-1,109.23	-331.94	1,123.96	0.00	0.00	0.00
11,900.00	90.37	180.13	10,718.27	-1,209.23	-332.17	1,223.85	0.00	0.00	0.00
12,000.00	90.37	180.13	10,717.62	-1,309.22	-332.40	1,323.74	0.00	0.00	0.00
12,100.00	90.37	180.13	10,716.98	-1,409.22	-332.63	1,423.64	0.00	0.00	0.00
12,200.00	90.37	180.13	10,716.34	-1,509.22	-332.86	1,523.53	0.00	0.00	0.00
12,300.00	90.37	180.13	10,715.69	-1,609.22	-333.09	1,623.42	0.00	0.00	0.00
12,400.00	90.37	180.13	10,715.05	-1,709.21	-333.32	1,723.31	0.00	0.00	0.00
12,500.00	90.37	180.13	10,714.41	-1,809.21	-333.55	1,823.20	0.00	0.00	0.00
12,600.00	90.37	180.13	10,713.76	-1,909.21	-333.78	1,923.10	0.00	0.00	0.00
12,700.00	90.37	180.13	10,713.12	-2,009.21	-334.01	2,022.99	0.00	0.00	0.00
12,800.00	90.37	180.13	10,712.48	-2,109.21	-334.24	2,122.88	0.00	0.00	0.00
12,900.00	90.37	180.13	10,711.83	-2,209.20	-334.48	2,222.77	0.00	0.00	0.00

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #3	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,000.00	90.37	180.13	10,711.19	-2,309.20	-334.71	2,322.67	0.00	0.00	0.00
13,100.00	90.37	180.13	10,710.55	-2,409.20	-334.94	2,422.56	0.00	0.00	0.00
13,200.00	90.37	180.13	10,709.90	-2,509.20	-335.17	2,522.45	0.00	0.00	0.00
13,300.00	90.37	180.13	10,709.26	-2,609.19	-335.40	2,622.34	0.00	0.00	0.00
13,400.00	90.37	180.13	10,708.62	-2,709.19	-335.63	2,722.23	0.00	0.00	0.00
13,500.00	90.37	180.13	10,707.97	-2,809.19	-335.86	2,822.13	0.00	0.00	0.00
13,600.00	90.37	180.13	10,707.33	-2,909.19	-336.09	2,922.02	0.00	0.00	0.00
13,700.00	90.37	180.13	10,706.69	-3,009.18	-336.32	3,021.91	0.00	0.00	0.00
13,800.00	90.37	180.13	10,706.04	-3,109.18	-336.55	3,121.80	0.00	0.00	0.00
13,900.00	90.37	180.13	10,705.40	-3,209.18	-336.78	3,221.70	0.00	0.00	0.00
14,000.00	90.37	180.13	10,704.76	-3,309.18	-337.02	3,321.59	0.00	0.00	0.00
14,100.00	90.37	180.13	10,704.11	-3,409.17	-337.25	3,421.48	0.00	0.00	0.00
14,200.00	90.37	180.13	10,703.47	-3,509.17	-337.48	3,521.37	0.00	0.00	0.00
14,300.00	90.37	180.13	10,702.83	-3,609.17	-337.71	3,621.26	0.00	0.00	0.00
14,400.00	90.37	180.13	10,702.18	-3,709.17	-337.94	3,721.16	0.00	0.00	0.00
14,500.00	90.37	180.13	10,701.54	-3,809.17	-338.17	3,821.05	0.00	0.00	0.00
14,600.00	90.37	180.13	10,700.90	-3,909.16	-338.40	3,920.94	0.00	0.00	0.00
14,700.00	90.37	180.13	10,700.25	-4,009.16	-338.63	4,020.83	0.00	0.00	0.00
14,800.00	90.37	180.13	10,699.61	-4,109.16	-338.86	4,120.73	0.00	0.00	0.00
14,900.00	90.37	180.13	10,698.97	-4,209.16	-339.09	4,220.62	0.00	0.00	0.00
15,000.00	90.37	180.13	10,698.32	-4,309.15	-339.32	4,320.51	0.00	0.00	0.00
15,100.00	90.37	180.13	10,697.68	-4,409.15	-339.56	4,420.40	0.00	0.00	0.00
15,200.00	90.37	180.13	10,697.04	-4,509.15	-339.79	4,520.29	0.00	0.00	0.00
15,300.00	90.37	180.13	10,696.39	-4,609.15	-340.02	4,620.19	0.00	0.00	0.00
15,400.00	90.37	180.13	10,695.75	-4,709.14	-340.25	4,720.08	0.00	0.00	0.00
15,500.00	90.37	180.13	10,695.11	-4,809.14	-340.48	4,819.97	0.00	0.00	0.00
15,600.00	90.37	180.13	10,694.46	-4,909.14	-340.71	4,919.86	0.00	0.00	0.00
15,700.00	90.37	180.13	10,693.82	-5,009.14	-340.94	5,019.76	0.00	0.00	0.00
15,800.00	90.37	180.13	10,693.18	-5,109.14	-341.17	5,119.65	0.00	0.00	0.00
15,900.00	90.37	180.13	10,692.53	-5,209.13	-341.40	5,219.54	0.00	0.00	0.00
16,000.00	90.37	180.13	10,691.89	-5,309.13	-341.63	5,319.43	0.00	0.00	0.00
16,100.00	90.37	180.13	10,691.25	-5,409.13	-341.86	5,419.32	0.00	0.00	0.00
16,200.00	90.37	180.13	10,690.60	-5,509.13	-342.10	5,519.22	0.00	0.00	0.00
16,300.00	90.37	180.13	10,689.96	-5,609.12	-342.33	5,619.11	0.00	0.00	0.00
16,400.00	90.37	180.13	10,689.32	-5,709.12	-342.56	5,719.00	0.00	0.00	0.00
16,500.00	90.37	180.13	10,688.67	-5,809.12	-342.79	5,818.89	0.00	0.00	0.00
16,600.00	90.37	180.13	10,688.03	-5,909.12	-343.02	5,918.79	0.00	0.00	0.00
16,700.00	90.37	180.13	10,687.39	-6,009.11	-343.25	6,018.68	0.00	0.00	0.00
16,800.00	90.37	180.13	10,686.74	-6,109.11	-343.48	6,118.57	0.00	0.00	0.00
16,900.00	90.37	180.13	10,686.10	-6,209.11	-343.71	6,218.46	0.00	0.00	0.00
17,000.00	90.37	180.13	10,685.46	-6,309.11	-343.94	6,318.35	0.00	0.00	0.00
17,100.00	90.37	180.13	10,684.81	-6,409.10	-344.17	6,418.25	0.00	0.00	0.00
17,200.00	90.37	180.13	10,684.17	-6,509.10	-344.40	6,518.14	0.00	0.00	0.00
17,300.00	90.37	180.13	10,683.53	-6,609.10	-344.64	6,618.03	0.00	0.00	0.00

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Well:	Copperhead 31 Fed Com 21H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #3	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
17,400.00	90.37	180.13	10,682.88	-6,709.10	-344.87	6,717.92	0.00	0.00	0.00
17,500.00	90.37	180.13	10,682.24	-6,809.10	-345.10	6,817.82	0.00	0.00	0.00
17,600.00	90.37	180.13	10,681.60	-6,909.09	-345.33	6,917.71	0.00	0.00	0.00
17,700.00	90.37	180.13	10,680.95	-7,009.09	-345.56	7,017.60	0.00	0.00	0.00
17,800.00	90.37	180.13	10,680.31	-7,109.09	-345.79	7,117.49	0.00	0.00	0.00
17,848.12	90.37	180.13	10,680.00	-7,157.21	-345.90	7,165.56	0.00	0.00	0.00
TD at 17848.12									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
21H Drilling Window	0.00	180.13	-1.00	161.70	-329.00	371,372.3929	596,770.3000	32° 1' 14.277 N	104° 1' 15.947 W
- plan misses target center by 366.59ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Rectangle (sides W100.00 H7,318.91 D0.00)									
Copperhead 31 Fed C	0.00	0.00	10,680.00	-7,157.21	-345.90	364,053.5000	596,753.4000	32° 0' 1.845 N	104° 1' 16.389 W
- plan hits target center									
- Point									
Copperhead 31 Fed C	0.00	0.00	10,680.85	-7,027.19	-339.71	364,183.5126	596,759.5900	32° 0' 3.132 N	104° 1' 16.313 W
- plan misses target center by 5.89ft at 17718.09ft MD (10680.84 TVD, -7027.18 N, -345.60 E)									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
2850	2850	0	0	Start Build 1.00
3167	3167	4	-8	Start 6316.37 hold at 3166.82 MD
9483	9473	158	-321	Start Drop -1.00
9800	9790	162	-329	Start 456.52 hold at 9800.00 MD
10,257	10,247	162	-329	Start DLS 12.00 TFO 180.13
11,010	10,724	-319	-330	Start 6838.53 hold at 11009.59 MD
17,848	10,680	-7157	-346	TD at 17848.12

Checked By: _____ Approved By: _____ Date: _____

COG Production, LLC

Lea County, NM (NAD 27)
Sec. 30, T 26 S. , R 29 E
Copperhead 31 Fed Com 21H

Wellbore #1
Plan #3

Anticollision Report

27 April, 2017

INTEGRITY
Directional Services

Integrity Directional Services, LLC

Anticollision Report

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Reference	Plan #3		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations Interval 100.00ft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.02 ft	**Error Surface:**	Elliptical Conic
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 4/27/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,848.10	Plan #3 (Wellbore #1)	MWD	MWD - Standard

Summary

Site Name / Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Sec. 30, T 26 S. , R 29 E						
Copperhead "30" Fee #1 H - Wellbore #1 - Acutal Wellbc	7,037.44	8,161.30	420.59	363.48	7.364	CC, ES, SF
Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #	8,375.37	13,306.00	1,746.96	1,704.07	40.733	CC, ES
Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #	17,800.00	8,452.16	2,455.16	2,392.48	39.169	SF
PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual V	2,850.01	2,779.52	1,799.96	1,720.95	22.781	CC
PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual V	4,300.00	4,220.00	1,820.42	1,666.38	11.818	ES, SF
Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1	6,495.12	13,030.00	537.04	414.16	4.370	CC, ES
Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1	6,500.00	13,030.00	537.06	414.17	4.370	SF

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead "30" Fee #1 H - Wellbore #1 - Acutal Wellbore #1 — **Offset Site Error:** 0.00 ft

Survey Program: 100-Gyro, 6496-MWD — **Offset Well Error:** 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	102.68	-229.16	1,018.73	1,045.19				
100.00	100.00	56.67	56.67	0.08	0.91	102.68	-229.14	1,018.67	1,044.13	1,043.13	0.99	1,053.610	
200.00	200.00	158.19	158.19	0.31	3.58	102.67	-228.92	1,018.33	1,043.76	1,039.87	3.89	268.536	
300.00	300.00	264.81	264.80	0.53	7.30	102.61	-227.77	1,017.98	1,043.20	1,035.37	7.83	133.225	
400.00	400.00	366.48	366.43	0.76	11.03	102.47	-224.94	1,017.31	1,041.95	1,030.17	11.78	88.452	
500.00	500.00	465.21	465.11	0.98	14.76	102.30	-221.70	1,016.93	1,040.87	1,025.16	15.71	66.242	
600.00	600.00	565.36	565.20	1.21	18.61	102.12	-218.33	1,016.59	1,039.83	1,020.05	19.78	52.582	
700.00	700.00	665.83	665.62	1.43	22.56	101.95	-215.14	1,016.16	1,038.75	1,014.82	23.93	43.407	
800.00	800.00	771.23	770.97	1.66	26.73	101.80	-212.16	1,015.41	1,037.47	1,009.16	28.31	36.642	
900.00	900.00	876.63	876.33	1.88	30.78	101.68	-209.66	1,013.88	1,035.56	1,002.98	32.58	31.782	
1,000.00	1,000.00	978.74	978.40	2.11	34.49	101.60	-207.74	1,011.91	1,033.30	996.79	36.51	28.304	
1,100.00	1,100.00	1,078.26	1,077.89	2.33	37.87	101.55	-206.31	1,009.83	1,030.96	990.86	40.10	25.711	
1,200.00	1,200.00	1,175.52	1,175.12	2.56	40.79	101.52	-205.47	1,007.83	1,028.78	985.53	43.25	23.788	
1,300.00	1,300.00	1,271.87	1,271.46	2.78	42.88	101.54	-205.32	1,006.03	1,026.91	981.35	45.56	22.538	
1,400.00	1,400.00	1,370.85	1,370.42	3.01	44.41	101.58	-205.81	1,004.32	1,025.32	978.00	47.32	21.667	
1,500.00	1,500.00	1,475.62	1,475.17	3.23	46.70	101.62	-206.06	1,002.40	1,023.57	973.74	49.84	20.539	
1,600.00	1,600.00	1,582.87	1,582.39	3.46	50.30	101.60	-205.23	999.94	1,021.17	967.52	53.66	19.032	
1,700.00	1,700.00	1,681.66	1,681.14	3.68	54.12	101.54	-203.75	997.45	1,018.40	960.71	57.69	17.653	
1,800.00	1,800.00	1,778.99	1,778.44	3.91	57.91	101.49	-202.38	995.23	1,015.89	954.18	61.71	16.464	
1,900.00	1,900.00	1,875.17	1,874.59	4.13	61.61	101.46	-201.42	993.26	1,013.68	948.05	65.62	15.447	
2,000.00	2,000.00	1,971.35	1,970.75	4.35	65.28	101.44	-200.70	991.62	1,011.86	942.34	69.52	14.556	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead "30" Fee #1 H - Wellbore #1 - Acutal Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-Gyro, 6496-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
2,088.32	2,088.32	2,043.12	2,042.52	4.55	66.83	101.42	-200.23	990.91	1,010.94	939.67	71.27	14.185	
2,100.00	2,100.00	2,051.72	2,051.12	4.58	66.92	101.42	-200.16	990.94	1,010.96	939.57	71.39	14.162	
2,200.00	2,200.00	2,127.24	2,126.62	4.80	66.84	101.37	-199.46	992.31	1,012.53	941.01	71.52	14.156	
2,300.00	2,300.00	2,207.66	2,206.98	5.03	65.02	101.31	-199.13	995.46	1,016.28	946.35	69.93	14.533	
2,400.00	2,400.00	2,300.00	2,299.20	5.25	62.43	101.26	-199.13	1,000.01	1,021.13	953.56	67.56	15.113	
2,500.00	2,500.00	2,380.70	2,379.75	5.48	60.20	101.21	-199.27	1,005.03	1,027.29	961.72	65.57	15.667	
2,600.00	2,600.00	2,461.27	2,460.04	5.70	57.98	101.16	-199.66	1,011.70	1,035.50	971.91	63.59	16.285	
2,700.00	2,700.00	2,559.18	2,557.49	5.93	55.29	101.13	-200.78	1,021.01	1,045.05	983.93	61.12	17.098	
2,800.00	2,800.00	2,671.01	2,668.90	6.15	52.28	101.10	-202.23	1,030.59	1,053.70	995.36	58.35	18.059	
2,850.01	2,850.01	2,726.79	2,724.52	6.27	50.82	101.10	-202.99	1,034.89	1,057.61	1,000.61	57.00	18.553	
2,900.00	2,900.00	2,782.74	2,780.32	6.37	49.38	164.92	-203.77	1,038.87	1,061.45	1,005.70	55.74	19.042	
3,000.00	2,999.98	2,885.39	2,882.73	6.58	46.85	164.93	-205.23	1,045.64	1,069.88	1,016.46	53.42	20.028	
3,100.00	3,099.92	2,989.80	2,986.92	6.80	44.54	164.96	-206.64	1,052.26	1,079.71	1,028.43	51.28	21.054	
3,166.82	3,166.65	3,059.46	3,056.45	6.94	43.24	164.98	-207.43	1,056.41	1,086.95	1,036.87	50.08	21.706	
3,200.00	3,199.79	3,094.02	3,090.95	7.01	42.61	165.01	-207.78	1,058.40	1,090.66	1,041.16	49.50	22.035	
3,300.00	3,299.64	3,196.43	3,193.21	7.23	41.08	165.08	-208.79	1,064.09	1,101.62	1,053.52	48.10	22.904	
3,400.00	3,399.48	3,301.04	3,297.66	7.44	39.84	165.15	-209.83	1,069.51	1,112.22	1,065.25	46.97	23.678	
3,500.00	3,499.33	3,406.03	3,402.53	7.66	38.95	165.23	-210.86	1,074.42	1,122.33	1,076.13	46.20	24.294	
3,600.00	3,599.18	3,507.90	3,504.30	7.89	38.50	165.31	-211.81	1,078.87	1,132.13	1,086.28	45.85	24.692	
3,700.00	3,699.02	3,616.97	3,613.29	8.11	38.61	165.38	-212.61	1,083.05	1,141.37	1,095.31	46.06	24.779	
3,800.00	3,798.87	3,723.12	3,719.39	8.33	39.40	165.44	-213.03	1,086.39	1,149.88	1,102.90	46.98	24.478	
3,900.00	3,898.72	3,824.73	3,820.96	8.56	40.71	165.50	-213.30	1,089.32	1,158.09	1,109.67	48.43	23.913	
4,000.00	3,998.57	3,929.13	3,925.32	8.78	42.59	165.55	-213.40	1,092.02	1,165.99	1,115.52	50.47	23.103	
4,100.00	4,098.41	4,032.61	4,028.78	9.01	44.93	165.59	-213.34	1,094.34	1,173.52	1,120.53	52.99	22.146	
4,200.00	4,198.26	4,136.21	4,132.35	9.24	47.56	165.64	-213.30	1,096.34	1,180.76	1,124.96	55.80	21.159	
4,300.00	4,298.11	4,239.75	4,235.89	9.47	50.43	165.69	-213.22	1,097.95	1,187.61	1,128.74	58.88	20.171	
4,400.00	4,397.95	4,342.73	4,338.85	9.70	53.51	165.74	-213.14	1,099.33	1,194.26	1,132.10	62.17	19.210	
4,500.00	4,497.80	4,448.00	4,444.12	9.93	56.89	165.79	-213.03	1,100.29	1,200.49	1,134.73	65.76	18.255	
4,600.00	4,597.65	4,551.11	4,547.23	10.16	60.18	165.85	-212.97	1,100.82	1,206.34	1,137.05	69.28	17.412	
4,700.00	4,697.50	4,651.90	4,648.02	10.39	62.14	165.91	-213.06	1,101.14	1,212.03	1,140.57	71.46	16.962	
4,800.00	4,797.34	4,753.27	4,749.38	10.62	61.67	166.00	-213.56	1,101.31	1,217.65	1,146.47	71.18	17.106	
4,900.00	4,897.19	4,854.34	4,850.45	10.85	59.60	166.10	-214.36	1,101.24	1,223.12	1,153.81	69.30	17.649	
5,000.00	4,997.04	5,300.00	5,183.87	11.09	53.81	173.01	-345.09	1,036.73	1,224.12	1,164.48	59.64	20.526	
5,100.00	5,096.88	5,300.00	5,183.87	11.32	53.81	173.01	-345.09	1,036.73	1,214.58	1,154.72	59.86	20.290	
5,166.36	5,163.14	5,300.00	5,183.87	11.48	53.81	173.01	-345.09	1,036.73	1,212.76	1,152.76	60.01	20.210	
5,200.00	5,196.73	5,300.00	5,183.87	11.56	53.81	173.01	-345.09	1,036.73	1,213.23	1,153.15	60.08	20.193	
5,300.00	5,296.58	5,373.59	5,257.44	11.79	51.64	173.10	-346.35	1,035.93	1,217.95	1,159.73	58.21	20.923	
5,400.00	5,396.43	5,474.50	5,358.33	12.03	48.65	173.22	-347.98	1,034.71	1,222.83	1,167.27	55.55	22.012	
5,500.00	5,496.27	5,574.43	5,458.24	12.26	45.83	173.35	-349.66	1,033.44	1,227.68	1,174.59	53.09	23.124	
5,600.00	5,596.12	5,676.02	5,559.80	12.50	43.13	173.48	-351.52	1,032.05	1,232.49	1,181.71	50.78	24.271	
5,700.00	5,695.97	5,777.38	5,661.13	12.73	40.55	173.62	-353.37	1,030.48	1,237.15	1,188.53	48.61	25.449	
5,800.00	5,795.81	5,877.31	5,761.03	12.97	38.25	173.75	-355.26	1,028.85	1,241.74	1,194.99	46.76	26.558	
5,900.00	5,895.66	8,151.87	6,995.40	13.21	41.31	-115.24	-322.30	-206.97	1,212.68	1,158.52	54.16	22.392	
6,000.00	5,995.51	8,152.77	6,995.36	13.44	41.32	-115.11	-322.27	-207.87	1,119.42	1,065.01	54.42	20.571	
6,100.00	6,095.36	8,153.65	6,995.32	13.68	41.34	-114.99	-322.23	-208.75	1,027.44	972.76	54.68	18.790	
6,200.00	6,195.20	8,154.52	6,995.29	13.92	41.36	-114.87	-322.20	-209.61	937.10	882.16	54.94	17.057	
6,300.00	6,295.05	8,155.38	6,995.25	14.16	41.38	-114.76	-322.17	-210.47	848.93	793.73	55.20	15.379	
6,400.00	6,394.90	8,156.22	6,995.22	14.40	41.40	-114.64	-322.14	-211.31	763.68	708.22	55.46	13.770	
6,500.00	6,494.74	8,157.05	6,995.18	14.63	41.41	-114.53	-322.10	-212.14	682.44	626.72	55.72	12.248	
6,600.00	6,594.59	8,157.87	6,995.15	14.87	41.43	-114.42	-322.07	-212.96	606.83	550.85	55.98	10.840	
6,700.00	6,694.44	8,158.67	6,995.11	15.11	41.45	-114.31	-322.04	-213.76	539.22	482.98	56.24	9.588	
6,800.00	6,794.29	8,159.46	6,995.08	15.35	41.46	-114.20	-322.01	-214.55	482.98	426.48	56.50	8.548	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	***MD Reference:***	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	***Offset TVD Reference:***	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead "30" Fee #1 H - Wellbore #1 - Acutal Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-Gyro, 6496-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
6,900.00	6,894.13	8,160.24	6,995.04	15.59	41.48	-114.09	-321.98	-215.33	442.48	385.72	56.76	7.796	
7,000.00	6,993.98	8,161.01	6,995.01	15.83	41.49	-113.99	-321.95	-216.10	422.25	365.24	57.02	7.406	
7,037.44	7,031.36	8,161.30	6,995.00	15.92	41.50	-113.95	-321.94	-216.38	420.59	363.48	57.11	7.364	CC, ES, SF
7,100.00	7,093.83	8,161.77	6,994.98	16.07	41.51	-113.89	-321.92	-216.86	425.22	367.94	57.28	7.424	
7,200.00	7,193.67	8,162.52	6,994.95	16.31	41.53	-113.78	-321.89	-217.60	450.91	393.38	57.54	7.837	
7,300.00	7,293.52	8,163.26	6,994.91	16.55	41.54	-113.68	-321.87	-218.34	495.81	438.02	57.79	8.579	
7,400.00	7,393.37	8,163.98	6,994.88	16.79	41.56	-113.59	-321.84	-219.06	555.28	497.23	58.05	9.565	
7,500.00	7,493.22	8,164.70	6,994.85	17.03	41.57	-113.49	-321.81	-219.78	625.18	566.87	58.31	10.722	
7,600.00	7,593.06	8,165.40	6,994.82	17.27	41.59	-113.39	-321.78	-220.48	702.39	643.82	58.57	11.993	
7,700.00	7,692.91	8,166.10	6,994.79	17.51	41.60	-113.30	-321.76	-221.17	784.77	725.94	58.83	13.340	
7,800.00	7,792.76	8,166.79	6,994.76	17.75	41.61	-113.20	-321.73	-221.86	870.84	811.76	59.08	14.739	
7,900.00	7,892.61	8,167.46	6,994.73	17.99	41.63	-113.11	-321.71	-222.53	959.62	900.28	59.34	16.171	
8,000.00	7,992.45	8,168.13	6,994.70	18.23	41.64	-113.02	-321.68	-223.20	1,050.41	990.81	59.60	17.625	
8,100.00	8,092.30	8,168.79	6,994.68	18.47	41.66	-112.93	-321.65	-223.86	1,142.75	1,082.89	59.86	19.091	
8,200.00	8,192.15	8,169.44	6,994.65	18.71	41.67	-112.84	-321.63	-224.51	1,236.27	1,176.16	60.11	20.566	
8,300.00	8,291.99	8,170.08	6,994.62	18.95	41.68	-112.76	-321.61	-225.14	1,330.74	1,270.37	60.37	22.043	
8,400.00	8,391.84	8,170.71	6,994.59	19.20	41.70	-112.67	-321.58	-225.78	1,425.96	1,365.34	60.63	23.520	
8,500.00	8,491.69	8,171.33	6,994.56	19.44	41.71	-112.58	-321.56	-226.40	1,521.80	1,460.91	60.88	24.995	
8,600.00	8,591.54	8,171.95	6,994.54	19.68	41.72	-112.50	-321.53	-227.01	1,618.14	1,557.00	61.14	26.466	
8,700.00	8,691.38	8,172.55	6,994.51	19.92	41.73	-112.42	-321.51	-227.62	1,714.89	1,653.50	61.40	27.931	
8,800.00	8,791.23	8,173.15	6,994.48	20.16	41.75	-112.34	-321.49	-228.22	1,812.00	1,750.35	61.65	29.390	
8,900.00	8,891.08	8,173.74	6,994.46	20.40	41.76	-112.26	-321.46	-228.81	1,909.41	1,847.50	61.91	30.842	
9,000.00	8,990.92	8,174.33	6,994.43	20.64	41.77	-112.18	-321.44	-229.39	2,007.07	1,944.91	62.17	32.286	
9,100.00	9,090.77	8,174.91	6,994.41	20.89	41.78	-112.10	-321.42	-229.97	2,104.96	2,042.53	62.42	33.722	
9,200.00	9,190.62	8,175.47	6,994.38	21.13	41.79	-112.02	-321.40	-230.53	2,203.03	2,140.35	62.68	35.149	
9,300.00	9,290.47	8,176.04	6,994.36	21.37	41.81	-111.94	-321.38	-231.09	2,301.27	2,238.33	62.93	36.567	
9,400.00	9,390.31	8,176.59	6,994.33	21.61	41.82	-111.87	-321.36	-231.65	2,399.65	2,336.46	63.19	37.976	
9,483.19	9,473.37	8,177.05	6,994.31	21.81	41.83	-111.81	-321.34	-232.10	2,481.59	2,418.19	63.40	39.141	
9,500.00	9,490.16	8,177.12	6,994.31	21.85	41.83	-112.70	-321.33	-232.18	2,498.16	2,434.75	63.41	39.399	
9,600.00	9,590.06	8,176.76	6,994.33	22.03	41.82	-117.99	-321.35	-231.82	2,596.71	2,533.38	63.33	41.004	
9,700.00	9,690.03	8,175.08	6,994.40	22.21	41.79	-123.15	-321.41	-230.14	2,695.23	2,632.11	63.12	42.702	
9,800.00	9,790.02	8,172.09	6,994.53	22.39	41.72	168.10	-321.53	-227.15	2,793.68	2,730.89	62.80	44.488	
9,900.00	9,890.02	8,168.47	6,994.69	22.58	41.65	167.69	-321.67	-223.54	2,892.16	2,829.29	62.87	46.001	
10,000.00	9,990.02	8,164.90	6,994.84	22.79	41.57	167.29	-321.80	-219.98	2,990.74	2,927.77	62.97	47.496	
10,100.00	10,090.02	8,161.37	6,995.00	23.00	41.50	166.90	-321.94	-216.46	3,089.40	3,026.33	63.07	48.987	
10,200.00	10,190.02	8,157.89	6,995.14	23.20	41.43	166.51	-322.07	-212.98	3,188.13	3,124.97	63.16	50.474	
10,256.52	10,246.54	8,147.00	6,995.61	23.32	41.20	165.31	-322.49	-202.11	3,243.98	3,181.05	62.93	51.547	
10,275.00	10,265.02	8,147.00	6,995.61	23.36	41.20	-11.89	-322.49	-202.11	3,262.19	3,198.70	63.49	51.383	
10,300.00	10,289.96	8,147.00	6,995.61	23.40	41.20	-9.37	-322.49	-202.11	3,286.60	3,222.71	63.89	51.441	
10,325.00	10,314.79	8,147.00	6,995.61	23.44	41.20	-7.74	-322.49	-202.11	3,310.72	3,246.69	64.03	51.703	
10,350.00	10,339.43	8,147.00	6,995.61	23.48	41.20	-6.59	-322.49	-202.11	3,334.48	3,270.51	63.97	52.127	
10,375.00	10,363.81	8,147.00	6,995.61	23.51	41.20	-5.75	-322.49	-202.11	3,357.82	3,294.11	63.72	52.697	
10,400.00	10,387.87	8,147.00	6,995.61	23.54	41.20	-5.11	-322.49	-202.11	3,380.70	3,317.40	63.30	53.407	
10,425.00	10,411.55	8,147.00	6,995.61	23.57	41.20	-4.60	-322.49	-202.11	3,403.06	3,340.34	62.72	54.257	
10,450.00	10,434.77	8,147.00	6,995.61	23.60	41.20	-4.19	-322.49	-202.11	3,424.84	3,362.86	61.99	55.250	
10,475.00	10,457.48	8,147.00	6,995.61	23.63	41.20	-3.86	-322.49	-202.11	3,446.01	3,384.90	61.11	56.391	
10,500.00	10,479.61	8,145.74	6,995.66	23.66	41.18	-3.61	-322.54	-200.85	3,466.51	3,406.44	60.07	57.711	
10,525.00	10,501.10	8,143.85	6,995.74	23.68	41.14	-3.42	-322.61	-198.96	3,486.30	3,427.41	58.88	59.208	
10,550.00	10,521.89	8,141.93	6,995.82	23.71	41.10	-3.27	-322.68	-197.05	3,505.33	3,447.76	57.57	60.886	
10,575.00	10,541.93	7,868.69	7,017.68	23.73	36.20	-9.36	-330.07	75.09	3,523.45	3,470.74	52.71	66.851	
10,600.00	10,561.15	7,865.76	7,018.02	23.76	36.16	-8.97	-330.09	78.00	3,540.72	3,489.31	51.41	68.871	
10,625.00	10,579.52	7,862.96	7,018.35	23.78	36.12	-8.63	-330.11	80.77	3,557.12	3,507.10	50.02	71.109	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead "30" Fee #1 H - Wellbore #1 - Acutal Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-Gyro, 6496-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,650.00	10,596.97	7,861.00	7,018.58	23.81	36.09	-8.32	-330.13	82.72	3,572.63	3,524.08	48.56	73.573	
10,675.00	10,613.46	7,861.00	7,018.58	23.83	36.09	-8.02	-330.13	82.72	3,587.22	3,540.19	47.03	76.268	
10,700.00	10,628.95	7,856.86	7,019.06	23.86	36.04	-7.83	-330.16	86.84	3,600.86	3,555.44	45.42	79.281	
10,725.00	10,643.39	7,855.20	7,019.26	23.89	36.01	-7.62	-330.17	88.48	3,613.52	3,569.75	43.77	82.558	
10,750.00	10,656.74	7,853.66	7,019.44	23.92	35.99	-7.44	-330.18	90.01	3,625.18	3,583.09	42.08	86.139	
10,775.00	10,668.97	7,852.24	7,019.60	23.96	35.97	-7.28	-330.19	91.43	3,635.81	3,595.43	40.38	90.038	
10,800.00	10,680.04	7,850.93	7,019.75	24.00	35.96	-7.15	-330.20	92.72	3,645.40	3,606.72	38.67	94.258	
10,825.00	10,689.92	7,849.76	7,019.89	24.05	35.94	-7.03	-330.21	93.89	3,653.92	3,616.94	36.99	98.790	
10,850.00	10,698.58	7,848.70	7,020.01	24.10	35.93	-6.94	-330.22	94.93	3,661.37	3,626.03	35.34	103.607	
10,875.00	10,706.01	7,847.79	7,020.12	24.16	35.92	-6.86	-330.22	95.85	3,667.73	3,633.97	33.76	108.655	
10,900.00	10,712.17	7,847.00	7,020.21	24.23	35.91	-6.79	-330.23	96.63	3,672.98	3,640.72	32.26	113.840	
10,925.00	10,717.06	7,846.35	7,020.29	24.31	35.90	-6.74	-330.23	97.27	3,677.13	3,646.23	30.89	119.027	
10,950.00	10,720.66	7,845.84	7,020.35	24.39	35.89	-6.71	-330.24	97.78	3,680.15	3,650.48	29.67	124.023	
10,975.00	10,722.97	7,845.47	7,020.39	24.48	35.89	-6.69	-330.24	98.15	3,682.05	3,653.41	28.64	128.581	
11,000.00	10,723.96	7,845.24	7,020.42	24.59	35.88	-6.68	-330.24	98.38	3,682.81	3,655.00	27.81	132.414	
11,009.59	10,724.00	7,845.19	7,020.42	24.63	35.88	-6.68	-330.24	98.43	3,682.81	3,655.25	27.56	133.628	
11,043.54	10,723.78	7,845.04	7,020.44	24.78	35.88	-6.69	-330.24	98.57	3,682.65	3,655.03	27.63	133.307	
11,100.00	10,723.41	7,844.81	7,020.47	25.07	35.88	-6.69	-330.25	98.81	3,683.09	3,655.35	27.73	132.802	
11,200.00	10,722.77	7,844.38	7,020.52	25.68	35.87	-6.70	-330.25	99.22	3,685.97	3,658.01	27.97	131.797	
11,300.00	10,722.13	7,843.96	7,020.57	26.40	35.87	-6.70	-330.25	99.65	3,691.57	3,663.33	28.24	130.714	
11,400.00	10,721.48	7,843.53	7,020.61	27.23	35.86	-6.71	-330.26	100.07	3,699.86	3,671.31	28.55	129.571	
11,500.00	10,720.84	7,843.10	7,020.67	28.15	35.86	-6.72	-330.26	100.50	3,710.83	3,681.93	28.90	128.386	
11,600.00	10,720.20	7,842.66	7,020.72	29.16	35.85	-6.72	-330.26	100.93	3,724.46	3,695.17	29.29	127.175	
11,700.00	10,719.55	7,842.23	7,020.77	30.24	35.84	-6.73	-330.26	101.37	3,740.70	3,711.00	29.70	125.954	
11,800.00	10,718.91	7,841.79	7,020.82	31.39	35.84	-6.74	-330.27	101.80	3,759.54	3,729.40	30.14	124.736	
11,900.00	10,718.27	7,841.34	7,020.87	32.60	35.83	-6.74	-330.27	102.25	3,780.93	3,750.33	30.61	123.534	
12,000.00	10,717.62	7,840.90	7,020.92	33.87	35.83	-6.75	-330.28	102.69	3,804.83	3,773.73	31.10	122.357	
12,100.00	10,716.98	7,840.45	7,020.97	35.18	35.82	-6.76	-330.28	103.14	3,831.19	3,799.58	31.61	121.213	
12,200.00	10,716.34	7,839.99	7,021.03	36.54	35.82	-6.76	-330.28	103.59	3,859.96	3,827.82	32.14	120.109	
12,300.00	10,715.69	7,839.54	7,021.08	37.94	35.81	-6.77	-330.29	104.04	3,891.09	3,858.41	32.68	119.049	
12,400.00	10,715.05	7,839.08	7,021.13	39.37	35.80	-6.78	-330.29	104.50	3,924.52	3,891.27	33.25	118.036	
12,500.00	10,714.41	7,838.61	7,021.19	40.84	35.80	-6.79	-330.29	104.96	3,960.20	3,926.37	33.83	117.074	
12,600.00	10,713.76	7,838.15	7,021.24	42.33	35.79	-6.79	-330.30	105.42	3,998.06	3,963.64	34.42	116.163	
12,700.00	10,713.12	7,837.68	7,021.30	43.85	35.79	-6.80	-330.30	105.89	4,038.04	4,003.02	35.02	115.304	
12,800.00	10,712.48	7,837.20	7,021.35	45.39	35.78	-6.81	-330.30	106.36	4,080.08	4,044.44	35.63	114.497	
12,900.00	10,711.83	7,836.73	7,021.41	46.95	35.77	-6.81	-330.31	106.83	4,124.11	4,087.85	36.26	113.742	
13,000.00	10,711.19	7,836.25	7,021.46	48.52	35.77	-6.82	-330.31	107.31	4,170.08	4,133.19	36.89	113.036	
13,100.00	10,710.55	7,835.76	7,021.52	50.12	35.76	-6.83	-330.32	107.79	4,217.92	4,180.39	37.53	112.379	
13,200.00	10,709.90	7,835.28	7,021.57	51.73	35.76	-6.84	-330.32	108.27	4,267.57	4,229.39	38.18	111.770	
13,300.00	10,709.26	7,834.79	7,021.63	53.35	35.75	-6.84	-330.32	108.76	4,318.96	4,280.13	38.84	111.205	
13,400.00	10,708.62	7,834.29	7,021.69	54.99	35.74	-6.85	-330.33	109.25	4,372.04	4,332.54	39.50	110.684	
13,500.00	10,707.97	7,833.79	7,021.75	56.63	35.74	-6.86	-330.33	109.75	4,426.74	4,386.57	40.17	110.204	
13,600.00	10,707.33	7,833.29	7,021.81	58.29	35.73	-6.87	-330.33	110.24	4,483.00	4,442.16	40.84	109.763	
13,700.00	10,706.69	7,832.78	7,021.86	59.96	35.72	-6.88	-330.34	110.75	4,540.77	4,499.25	41.52	109.360	
13,800.00	10,706.04	7,832.27	7,021.92	61.63	35.72	-6.88	-330.34	111.25	4,599.98	4,557.78	42.20	108.991	
13,900.00	10,705.40	7,831.76	7,021.98	63.32	35.71	-6.89	-330.35	111.76	4,660.59	4,617.70	42.89	108.656	
14,000.00	10,704.76	7,831.24	7,022.04	65.01	35.71	-6.90	-330.35	112.28	4,722.54	4,678.96	43.59	108.352	
14,100.00	10,704.11	7,830.72	7,022.10	66.71	35.70	-6.91	-330.36	112.79	4,785.78	4,741.50	44.28	108.078	
14,200.00	10,703.47	7,830.20	7,022.16	68.41	35.69	-6.92	-330.36	113.32	4,850.25	4,805.27	44.98	107.831	
14,300.00	10,702.83	7,829.67	7,022.23	70.12	35.69	-6.92	-330.36	113.84	4,915.92	4,870.23	45.68	107.610	
14,400.00	10,702.18	7,829.13	7,022.29	71.84	35.68	-6.93	-330.37	114.37	4,982.72	4,936.33	46.39	107.413	
14,500.00	10,701.54	7,828.59	7,022.35	73.56	35.67	-6.94	-330.37	114.91	5,050.62	5,003.53	47.10	107.238	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead "30" Fee #1 H - Wellbore #1 - Acutal Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-Gyro, 6496-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
14,600.00	10,700.90	7,828.05	7,022.41	75.29	35.67	-6.95	-330.38	115.45	5,119.58	5,071.77	47.81	107.085	
14,700.00	10,700.25	7,827.51	7,022.48	77.02	35.66	-6.96	-330.38	115.99	5,189.54	5,141.02	48.52	106.952	
14,800.00	10,699.61	7,826.96	7,022.54	78.75	35.65	-6.97	-330.39	116.54	5,260.48	5,211.24	49.24	106.836	
14,900.00	10,698.97	7,826.40	7,022.61	80.49	35.65	-6.98	-330.39	117.09	5,332.34	5,282.39	49.96	106.738	
15,000.00	10,698.32	7,825.84	7,022.67	82.24	35.64	-6.98	-330.39	117.64	5,405.11	5,354.43	50.68	106.656	
15,100.00	10,697.68	7,825.28	7,022.74	83.98	35.63	-6.99	-330.40	118.20	5,478.73	5,427.33	51.40	106.589	
15,200.00	10,697.04	7,824.71	7,022.80	85.73	35.62	-7.00	-330.40	118.77	5,553.17	5,501.05	52.13	106.535	
15,300.00	10,696.39	7,824.14	7,022.87	87.48	35.62	-7.01	-330.41	119.34	5,628.41	5,575.56	52.85	106.495	
15,400.00	10,695.75	7,823.56	7,022.94	89.24	35.61	-7.02	-330.41	119.91	5,704.41	5,650.83	53.58	106.466	
15,500.00	10,695.11	7,822.98	7,023.00	90.99	35.60	-7.03	-330.42	120.49	5,781.14	5,726.83	54.31	106.448	
15,600.00	10,694.46	7,822.39	7,023.07	92.75	35.60	-7.04	-330.42	121.07	5,858.57	5,803.53	55.04	106.440	
15,700.00	10,693.82	7,821.80	7,023.14	94.52	35.59	-7.05	-330.43	121.66	5,936.67	5,880.90	55.77	106.442	
15,800.00	10,693.18	7,821.20	7,023.21	96.28	35.58	-7.06	-330.43	122.25	6,015.43	5,958.92	56.51	106.453	
15,900.00	10,692.53	7,820.60	7,023.28	98.05	35.58	-7.07	-330.44	122.85	6,094.80	6,037.56	57.24	106.471	
16,000.00	10,691.89	7,819.99	7,023.35	99.82	35.57	-7.07	-330.44	123.45	6,174.78	6,116.80	57.98	106.497	
16,100.00	10,691.25	7,819.38	7,023.42	101.59	35.56	-7.08	-330.45	124.06	6,255.33	6,196.61	58.72	106.530	
16,200.00	10,690.60	7,818.76	7,023.49	103.36	35.55	-7.09	-330.45	124.67	6,336.44	6,276.98	59.46	106.569	
16,300.00	10,689.96	7,818.14	7,023.56	105.13	35.55	-7.10	-330.46	125.29	6,418.07	6,357.88	60.20	106.614	
16,400.00	10,689.32	7,817.51	7,023.64	106.91	35.54	-7.11	-330.46	125.91	6,500.23	6,439.29	60.94	106.665	
16,500.00	10,688.67	7,816.88	7,023.71	108.69	35.53	-7.12	-330.47	126.54	6,582.87	6,521.19	61.68	106.720	
16,600.00	10,688.03	7,816.24	7,023.78	110.47	35.52	-7.13	-330.48	127.17	6,665.99	6,603.57	62.43	106.780	
16,700.00	10,687.39	7,815.60	7,023.86	112.25	35.52	-7.14	-330.48	127.81	6,749.57	6,686.40	63.17	106.844	
16,800.00	10,686.74	7,814.95	7,023.93	114.03	35.51	-7.15	-330.49	128.46	6,833.59	6,769.68	63.92	106.912	
16,900.00	10,686.10	7,814.30	7,024.01	115.81	35.50	-7.16	-330.49	129.11	6,918.04	6,853.37	64.66	106.984	
17,000.00	10,685.46	7,813.64	7,024.08	117.60	35.49	-7.17	-330.50	129.76	7,002.89	6,937.48	65.41	107.058	
17,100.00	10,684.81	7,812.97	7,024.16	119.38	35.49	-7.18	-330.50	130.42	7,088.14	7,021.98	66.16	107.135	
17,200.00	10,684.17	7,812.30	7,024.24	121.17	35.48	-7.19	-330.51	131.09	7,173.77	7,106.86	66.91	107.215	
17,300.00	10,683.53	7,811.62	7,024.32	122.95	35.47	-7.21	-330.52	131.76	7,259.77	7,192.11	67.66	107.298	
17,400.00	10,682.88	7,810.94	7,024.40	124.74	35.46	-7.22	-330.52	132.44	7,346.13	7,277.71	68.41	107.382	
17,500.00	10,682.24	7,810.25	7,024.48	126.53	35.45	-7.23	-330.53	133.13	7,432.82	7,363.66	69.16	107.468	
17,600.00	10,681.60	7,809.56	7,024.56	128.32	35.45	-7.24	-330.53	133.82	7,519.85	7,449.93	69.92	107.556	
17,700.00	10,680.95	7,808.85	7,024.64	130.11	35.44	-7.25	-330.54	134.51	7,607.19	7,536.52	70.67	107.645	
17,800.00	10,680.31	7,808.15	7,024.72	131.91	35.43	-7.26	-330.55	135.22	7,694.84	7,623.42	71.42	107.736	
17,848.12	10,680.00	7,807.80	7,024.76	132.77	35.43	-7.26	-330.55	135.56	7,737.13	7,665.34	71.79	107.780	

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-175.78	-6,878.21	-507.00	6,897.49				
100.00	100.00	23.50	23.50	0.08	0.02	-175.78	-6,878.18	-507.04	6,896.86	6,896.75	0.11	N/A	
200.00	200.00	314.74	314.64	0.31	0.58	-175.74	-6,872.96	-511.54	6,895.10	6,894.21	0.89	7,750.542	
300.00	300.00	421.79	421.59	0.53	0.83	-175.72	-6,869.36	-514.59	6,891.95	6,890.59	1.36	5,073.391	
400.00	400.00	500.00	499.73	0.76	0.99	-175.70	-6,866.97	-516.70	6,889.08	6,887.33	1.75	3,944.557	
500.00	500.00	552.13	551.83	0.98	1.09	-175.69	-6,865.66	-517.97	6,886.68	6,884.61	2.07	3,321.391	
600.00	600.00	619.87	619.54	1.21	1.23	-175.67	-6,864.30	-519.58	6,884.86	6,882.42	2.43	2,830.249	
700.00	700.00	700.00	699.64	1.43	1.39	-175.66	-6,862.90	-521.41	6,883.30	6,880.48	2.82	2,440.227	
800.00	800.00	783.01	782.61	1.66	1.57	-175.64	-6,861.67	-523.24	6,882.01	6,878.79	3.22	2,138.033	
900.00	900.00	863.24	862.83	1.88	1.74	-175.62	-6,860.79	-524.92	6,881.06	6,877.45	3.61	1,904.907	
1,000.00	1,000.00	958.01	957.57	2.11	1.94	-175.61	-6,859.97	-526.56	6,880.34	6,876.30	4.04	1,704.781	
1,100.00	1,100.00	1,056.54	1,056.09	2.33	2.14	-175.60	-6,859.12	-528.09	6,879.59	6,875.13	4.47	1,539.667	
1,200.00	1,200.00	1,145.01	1,144.55	2.56	2.33	-175.59	-6,858.45	-529.34	6,878.95	6,874.07	4.88	1,409.245	
1,300.00	1,300.00	1,233.27	1,232.80	2.78	2.52	-175.58	-6,857.98	-530.49	6,878.51	6,873.22	5.30	1,299.052	
1,400.00	1,400.00	1,324.58	1,324.10	3.01	2.72	-175.57	-6,857.59	-531.41	6,878.17	6,872.46	5.72	1,203.507	
1,477.51	1,477.51	1,385.19	1,384.71	3.18	2.85	-175.57	-6,857.52	-531.42	6,878.08	6,872.06	6.02	1,142.802	
1,500.00	1,500.00	1,400.00	1,399.52	3.23	2.88	-175.57	-6,857.53	-531.33	6,878.09	6,871.99	6.10	1,127.416	
1,600.00	1,600.00	1,489.90	1,489.42	3.46	3.07	-175.58	-6,857.75	-530.32	6,878.25	6,871.73	6.52	1,055.438	
1,700.00	1,700.00	1,620.93	1,620.44	3.68	3.33	-175.59	-6,858.01	-528.82	6,878.38	6,871.38	7.01	981.540	
1,800.00	1,800.00	13,306.00	8,302.87	3.91	92.90	-161.23	-1,594.03	-541.70	6,807.15	6,711.02	96.13	70.813	
1,900.00	1,900.00	13,306.00	8,302.87	4.13	92.90	-161.23	-1,594.03	-541.70	6,710.30	6,613.95	96.35	69.643	
2,000.00	2,000.00	13,306.00	8,302.87	4.35	92.90	-161.23	-1,594.03	-541.70	6,613.54	6,516.97	96.58	68.479	
2,100.00	2,100.00	13,306.00	8,302.87	4.58	92.90	-161.23	-1,594.03	-541.70	6,516.89	6,420.09	96.80	67.321	
2,200.00	2,200.00	13,306.00	8,302.87	4.80	92.90	-161.23	-1,594.03	-541.70	6,420.33	6,323.31	97.03	66.170	
2,300.00	2,300.00	13,306.00	8,302.87	5.03	92.90	-161.23	-1,594.03	-541.70	6,323.89	6,226.64	97.25	65.026	
2,400.00	2,400.00	13,306.00	8,302.87	5.25	92.90	-161.23	-1,594.03	-541.70	6,227.55	6,130.08	97.48	63.887	
2,500.00	2,500.00	13,306.00	8,302.87	5.48	92.90	-161.23	-1,594.03	-541.70	6,131.34	6,033.64	97.70	62.756	
2,600.00	2,600.00	13,306.00	8,302.87	5.70	92.90	-161.23	-1,594.03	-541.70	6,035.24	5,937.32	97.93	61.630	
2,700.00	2,700.00	13,306.00	8,302.87	5.93	92.90	-161.23	-1,594.03	-541.70	5,939.28	5,841.13	98.15	60.511	
2,800.00	2,800.00	13,306.00	8,302.87	6.15	92.90	-161.23	-1,594.03	-541.70	5,843.45	5,745.07	98.38	59.399	
2,850.01	2,850.01	13,306.00	8,302.87	6.27	92.90	-161.23	-1,594.03	-541.70	5,795.58	5,697.09	98.49	58.845	
2,900.00	2,900.00	13,306.00	8,302.87	6.37	92.90	-99.02	-1,594.03	-541.70	5,747.77	5,708.37	39.40	145.870	
3,000.00	2,999.98	13,306.00	8,302.87	6.58	92.90	-102.17	-1,594.03	-541.70	5,652.32	5,616.55	35.76	158.056	
3,100.00	3,099.92	13,306.00	8,302.87	6.80	92.90	-105.19	-1,594.03	-541.70	5,557.13	5,524.58	32.55	170.711	
3,166.82	3,166.65	13,306.00	8,302.87	6.94	92.90	-107.12	-1,594.03	-541.70	5,493.71	5,463.00	30.71	178.865	
3,200.00	3,199.79	13,306.00	8,302.87	7.01	92.90	-107.12	-1,594.03	-541.70	5,462.26	5,431.47	30.79	177.428	
3,300.00	3,299.64	13,306.00	8,302.87	7.23	92.90	-107.12	-1,594.03	-541.70	5,367.61	5,336.60	31.00	173.136	
3,400.00	3,399.48	13,306.00	8,302.87	7.44	92.90	-107.12	-1,594.03	-541.70	5,273.15	5,241.93	31.22	168.901	
3,500.00	3,499.33	13,306.00	8,302.87	7.66	92.90	-107.12	-1,594.03	-541.70	5,178.90	5,147.46	31.44	164.723	
3,600.00	3,599.18	13,306.00	8,302.87	7.89	92.90	-107.12	-1,594.03	-541.70	5,084.88	5,053.22	31.66	160.603	
3,700.00	3,699.02	13,306.00	8,302.87	8.11	92.90	-107.12	-1,594.03	-541.70	4,991.08	4,959.20	31.88	156.540	
3,800.00	3,798.87	13,306.00	8,302.87	8.33	92.90	-107.12	-1,594.03	-541.70	4,897.53	4,865.43	32.11	152.536	
3,900.00	3,898.72	13,306.00	8,302.87	8.56	92.90	-107.12	-1,594.03	-541.70	4,804.24	4,771.91	32.33	148.590	
4,000.00	3,998.57	13,306.00	8,302.87	8.78	92.90	-107.12	-1,594.03	-541.70	4,711.23	4,678.67	32.56	144.702	
4,100.00	4,098.41	13,306.00	8,302.87	9.01	92.90	-107.12	-1,594.03	-541.70	4,618.51	4,585.72	32.78	140.873	
4,200.00	4,198.26	13,306.00	8,302.87	9.24	92.90	-107.12	-1,594.03	-541.70	4,526.10	4,493.08	33.01	137.102	
4,300.00	4,298.11	13,306.00	8,302.87	9.47	92.90	-107.12	-1,594.03	-541.70	4,434.01	4,400.77	33.24	133.389	
4,400.00	4,397.95	13,306.00	8,302.87	9.70	92.90	-107.12	-1,594.03	-541.70	4,342.28	4,308.81	33.47	129.735	
4,500.00	4,497.80	13,306.00	8,302.87	9.93	92.90	-107.12	-1,594.03	-541.70	4,250.92	4,217.22	33.70	126.138	
4,600.00	4,597.65	13,306.00	8,302.87	10.16	92.90	-107.12	-1,594.03	-541.70	4,159.96	4,126.03	33.93	122.600	
4,700.00	4,697.50	13,306.00	8,302.87	10.39	92.90	-107.12	-1,594.03	-541.70	4,069.42	4,035.26	34.16	119.120	
4,800.00	4,797.34	13,306.00	8,302.87	10.62	92.90	-107.12	-1,594.03	-541.70	3,979.33	3,944.94	34.39	115.697	

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #1 — **Offset Site Error:** 0.00 ft

Survey Program: 100-MWD — **Offset Well Error:** 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,900.00	4,897.19	13,306.00	8,302.87	10.85	92.90	-107.12	-1,594.03	-541.70	3,889.73	3,855.11	34.63	112.333	
5,000.00	4,997.04	13,306.00	8,302.87	11.09	92.90	-107.12	-1,594.03	-541.70	3,800.65	3,765.79	34.86	109.027	
5,100.00	5,096.88	13,306.00	8,302.87	11.32	92.90	-107.12	-1,594.03	-541.70	3,712.13	3,677.03	35.09	105.779	
5,200.00	5,196.73	13,306.00	8,302.87	11.56	92.90	-107.12	-1,594.03	-541.70	3,624.20	3,588.87	35.33	102.590	
5,300.00	5,296.58	13,306.00	8,302.87	11.79	92.90	-107.12	-1,594.03	-541.70	3,536.91	3,501.35	35.56	99.460	
5,400.00	5,396.43	13,306.00	8,302.87	12.03	92.90	-107.12	-1,594.03	-541.70	3,450.31	3,414.52	35.80	96.389	
5,500.00	5,496.27	13,306.00	8,302.87	12.26	92.90	-107.12	-1,594.03	-541.70	3,364.46	3,328.43	36.03	93.377	
5,600.00	5,596.12	13,306.00	8,302.87	12.50	92.90	-107.12	-1,594.03	-541.70	3,279.41	3,243.14	36.27	90.426	
5,700.00	5,695.97	13,306.00	8,302.87	12.73	92.90	-107.12	-1,594.03	-541.70	3,195.22	3,158.72	36.50	87.536	
5,800.00	5,795.81	13,306.00	8,302.87	12.97	92.90	-107.12	-1,594.03	-541.70	3,111.97	3,075.23	36.74	84.707	
5,900.00	5,895.66	13,306.00	8,302.87	13.21	92.90	-107.12	-1,594.03	-541.70	3,029.73	2,992.76	36.97	81.942	
6,000.00	5,995.51	13,306.00	8,302.87	13.44	92.90	-107.12	-1,594.03	-541.70	2,948.60	2,911.39	37.21	79.240	
6,100.00	6,095.36	13,306.00	8,302.87	13.68	92.90	-107.12	-1,594.03	-541.70	2,868.65	2,831.20	37.45	76.604	
6,200.00	6,195.20	13,306.00	8,302.87	13.92	92.90	-107.12	-1,594.03	-541.70	2,790.00	2,752.31	37.68	74.035	
6,300.00	6,295.05	13,306.00	8,302.87	14.16	92.90	-107.12	-1,594.03	-541.70	2,712.75	2,674.83	37.92	71.534	
6,400.00	6,394.90	13,306.00	8,302.87	14.40	92.90	-107.12	-1,594.03	-541.70	2,637.03	2,598.87	38.16	69.105	
6,500.00	6,494.74	13,306.00	8,302.87	14.63	92.90	-107.12	-1,594.03	-541.70	2,562.98	2,524.58	38.40	66.748	
6,600.00	6,594.59	13,306.00	8,302.87	14.87	92.90	-107.12	-1,594.03	-541.70	2,490.74	2,452.10	38.64	64.467	
6,700.00	6,694.44	13,306.00	8,302.87	15.11	92.90	-107.12	-1,594.03	-541.70	2,420.48	2,381.60	38.87	62.265	
6,800.00	6,794.29	13,306.00	8,302.87	15.35	92.90	-107.12	-1,594.03	-541.70	2,352.37	2,313.26	39.11	60.144	
6,900.00	6,894.13	13,306.00	8,302.87	15.59	92.90	-107.12	-1,594.03	-541.70	2,286.60	2,247.25	39.35	58.108	
7,000.00	6,993.98	13,306.00	8,302.87	15.83	92.90	-107.12	-1,594.03	-541.70	2,223.40	2,183.81	39.59	56.161	
7,100.00	7,093.83	13,306.00	8,302.87	16.07	92.90	-107.12	-1,594.03	-541.70	2,162.96	2,123.14	39.83	54.307	
7,200.00	7,193.67	13,306.00	8,302.87	16.31	92.90	-107.12	-1,594.03	-541.70	2,105.55	2,065.48	40.07	52.550	
7,300.00	7,293.52	13,306.00	8,302.87	16.55	92.90	-107.12	-1,594.03	-541.70	2,051.41	2,011.10	40.31	50.895	
7,400.00	7,393.37	13,306.00	8,302.87	16.79	92.90	-107.12	-1,594.03	-541.70	2,000.80	1,960.25	40.55	49.346	
7,500.00	7,493.22	13,306.00	8,302.87	17.03	92.90	-107.12	-1,594.03	-541.70	1,954.00	1,913.22	40.79	47.909	
7,600.00	7,593.06	13,306.00	8,302.87	17.27	92.90	-107.12	-1,594.03	-541.70	1,911.29	1,870.27	41.03	46.588	
7,700.00	7,692.91	13,306.00	8,302.87	17.51	92.90	-107.12	-1,594.03	-541.70	1,872.96	1,831.69	41.27	45.388	
7,800.00	7,792.76	13,306.00	8,302.87	17.75	92.90	-107.12	-1,594.03	-541.70	1,839.27	1,797.76	41.51	44.314	
7,900.00	7,892.61	13,306.00	8,302.87	17.99	92.90	-107.12	-1,594.03	-541.70	1,810.48	1,768.73	41.75	43.370	
8,000.00	7,992.45	13,306.00	8,302.87	18.23	92.90	-107.12	-1,594.03	-541.70	1,786.83	1,744.84	41.99	42.558	
8,100.00	8,092.30	13,306.00	8,302.87	18.47	92.90	-107.12	-1,594.03	-541.70	1,768.53	1,726.30	42.23	41.883	
8,200.00	8,192.15	13,306.00	8,302.87	18.71	92.90	-107.12	-1,594.03	-541.70	1,755.74	1,713.27	42.47	41.345	
8,300.00	8,291.99	13,306.00	8,302.87	18.95	92.90	-107.12	-1,594.03	-541.70	1,748.58	1,705.87	42.71	40.944	
8,375.37	8,367.24	13,306.00	8,302.87	19.14	92.90	-107.12	-1,594.03	-541.70	1,746.96	1,704.07	42.89	40.733	CC, ES
8,400.00	8,391.84	13,306.00	8,302.87	19.20	92.90	-107.12	-1,594.03	-541.70	1,747.13	1,704.18	42.95	40.681	
8,500.00	8,491.69	13,306.00	8,302.87	19.44	92.90	-107.12	-1,594.03	-541.70	1,751.40	1,708.21	43.19	40.553	
8,600.00	8,591.54	13,306.00	8,302.87	19.68	92.90	-107.12	-1,594.03	-541.70	1,761.34	1,717.91	43.43	40.557	
8,700.00	8,691.38	13,306.00	8,302.87	19.92	92.90	-107.12	-1,594.03	-541.70	1,776.86	1,733.19	43.67	40.689	
8,800.00	8,791.23	13,306.00	8,302.87	20.16	92.90	-107.12	-1,594.03	-541.70	1,797.82	1,753.91	43.91	40.943	
8,900.00	8,891.08	13,306.00	8,302.87	20.40	92.90	-107.12	-1,594.03	-541.70	1,824.03	1,779.88	44.15	41.314	
9,000.00	8,990.92	13,306.00	8,302.87	20.64	92.90	-107.12	-1,594.03	-541.70	1,855.27	1,810.88	44.39	41.793	
9,100.00	9,090.77	13,306.00	8,302.87	20.89	92.90	-107.12	-1,594.03	-541.70	1,891.28	1,846.65	44.63	42.374	
9,200.00	9,190.62	13,306.00	8,302.87	21.13	92.90	-107.12	-1,594.03	-541.70	1,931.81	1,886.93	44.87	43.049	
9,300.00	9,290.47	13,306.00	8,302.87	21.37	92.90	-107.12	-1,594.03	-541.70	1,976.56	1,931.45	45.12	43.811	
9,400.00	9,390.31	13,306.00	8,302.87	21.61	92.90	-107.12	-1,594.03	-541.70	2,025.27	1,979.92	45.36	44.652	
9,483.19	9,473.37	13,306.00	8,302.87	21.81	92.90	-107.12	-1,594.03	-541.70	2,068.60	2,023.05	45.56	45.406	
9,500.00	9,490.16	13,306.00	8,302.87	21.85	92.90	-107.23	-1,594.03	-541.70	2,077.65	2,032.16	45.49	45.675	
9,600.00	9,590.06	13,306.00	8,302.87	22.03	92.90	-107.86	-1,594.03	-541.70	2,133.15	2,088.12	45.03	47.370	
9,700.00	9,690.03	13,306.00	8,302.87	22.21	92.90	-108.54	-1,594.03	-541.70	2,191.39	2,146.83	44.56	49.179	
9,800.00	9,790.02	13,306.00	8,302.87	22.39	92.90	-173.09	-1,594.03	-541.70	2,252.12	2,208.14	43.97	51.214	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #1 — **Offset Site Error:** 0.00 ft

Survey Program: 100-MWD — **Offset Well Error:** 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,900.00	9,890.02	13,306.00	8,302.87	22.58	92.90	-173.09	-1,594.03	-541.70	2,315.37	2,271.20	44.17	52.424	
10,000.00	9,990.02	13,306.00	8,302.87	22.79	92.90	-173.09	-1,594.03	-541.70	2,381.13	2,336.76	44.38	53.659	
10,100.00	10,090.02	13,306.00	8,302.87	23.00	92.90	-173.09	-1,594.03	-541.70	2,449.22	2,404.63	44.59	54.934	
10,200.00	10,190.02	13,306.00	8,302.87	23.20	92.90	-173.09	-1,594.03	-541.70	2,519.43	2,474.64	44.80	56.243	
10,256.52	10,246.54	13,306.00	8,302.87	23.32	92.90	-173.09	-1,594.03	-541.70	2,559.99	2,515.07	44.91	56.998	
10,275.00	10,265.02	13,306.00	8,302.87	23.36	92.90	6.52	-1,594.03	-541.70	2,573.14	2,528.38	44.75	57.497	
10,300.00	10,289.96	13,306.00	8,302.87	23.40	92.90	6.20	-1,594.03	-541.70	2,590.22	2,545.72	44.50	58.207	
10,325.00	10,314.79	13,306.00	8,302.87	23.44	92.90	5.93	-1,594.03	-541.70	2,606.46	2,562.08	44.38	58.729	
10,350.00	10,339.43	13,306.00	8,302.87	23.48	92.90	5.70	-1,594.03	-541.70	2,621.84	2,577.45	44.39	59.064	
10,375.00	10,363.81	13,306.00	8,302.87	23.51	92.90	5.49	-1,594.03	-541.70	2,636.33	2,591.82	44.51	59.227	
10,400.00	10,387.87	13,306.00	8,302.87	23.54	92.90	5.31	-1,594.03	-541.70	2,649.91	2,605.17	44.73	59.236	
10,425.00	10,411.55	13,306.00	8,302.87	23.57	92.90	5.15	-1,594.03	-541.70	2,662.54	2,617.50	45.04	59.115	
10,450.00	10,434.77	13,306.00	8,302.87	23.60	92.90	5.01	-1,594.03	-541.70	2,674.22	2,628.81	45.41	58.889	
10,475.00	10,457.48	13,306.00	8,302.87	23.63	92.90	4.88	-1,594.03	-541.70	2,684.91	2,639.08	45.83	58.586	
10,500.00	10,479.61	13,306.00	8,302.87	23.66	92.90	4.78	-1,594.03	-541.70	2,694.61	2,648.33	46.28	58.227	
10,525.00	10,501.10	13,306.00	8,302.87	23.68	92.90	4.68	-1,594.03	-541.70	2,703.30	2,656.56	46.74	57.835	
10,550.00	10,521.89	13,306.00	8,302.87	23.71	92.90	4.61	-1,594.03	-541.70	2,710.96	2,663.75	47.21	57.427	
10,575.00	10,541.93	13,306.00	8,302.87	23.73	92.90	4.54	-1,594.03	-541.70	2,717.58	2,669.92	47.66	57.015	
10,600.00	10,561.15	13,306.00	8,302.87	23.76	92.90	4.49	-1,594.03	-541.70	2,723.16	2,675.05	48.10	56.613	
10,625.00	10,579.52	13,306.00	8,302.87	23.78	92.90	4.44	-1,594.03	-541.70	2,727.67	2,679.16	48.51	56.226	
10,650.00	10,596.97	13,306.00	8,302.87	23.81	92.90	4.41	-1,594.03	-541.70	2,731.12	2,682.23	48.89	55.862	
10,675.00	10,613.46	13,306.00	8,302.87	23.83	92.90	4.39	-1,594.03	-541.70	2,733.50	2,684.27	49.23	55.522	
10,700.00	10,628.95	13,306.00	8,302.87	23.86	92.90	4.38	-1,594.03	-541.70	2,734.81	2,685.27	49.54	55.208	
10,725.00	10,643.39	13,306.00	8,302.87	23.89	92.90	4.38	-1,594.03	-541.70	2,735.04	2,685.24	49.80	54.920	
10,750.00	10,656.74	13,306.00	8,302.87	23.92	92.90	4.38	-1,594.03	-541.70	2,734.19	2,684.17	50.03	54.654	
10,775.00	10,668.97	13,306.00	8,302.87	23.96	92.90	4.40	-1,594.03	-541.70	2,732.27	2,682.05	50.22	54.407	
10,800.00	10,680.04	13,306.00	8,302.87	24.00	92.90	4.43	-1,594.03	-541.70	2,729.28	2,678.90	50.38	54.173	
10,825.00	10,689.92	13,306.00	8,302.87	24.05	92.90	4.47	-1,594.03	-541.70	2,725.22	2,674.70	50.52	53.946	
10,850.00	10,698.58	13,306.00	8,302.87	24.10	92.90	4.52	-1,594.03	-541.70	2,720.10	2,669.46	50.64	53.717	
10,875.00	10,706.01	13,306.00	8,302.87	24.16	92.90	4.58	-1,594.03	-541.70	2,713.92	2,663.17	50.75	53.477	
10,900.00	10,712.17	13,306.00	8,302.87	24.23	92.90	4.65	-1,594.03	-541.70	2,706.70	2,655.84	50.86	53.216	
10,925.00	10,717.06	13,306.00	8,302.87	24.31	92.90	4.74	-1,594.03	-541.70	2,698.45	2,647.47	50.98	52.927	
10,950.00	10,720.66	13,306.00	8,302.87	24.39	92.90	4.84	-1,594.03	-541.70	2,689.18	2,638.06	51.12	52.602	
10,975.00	10,722.97	13,306.00	8,302.87	24.48	92.90	4.95	-1,594.03	-541.70	2,678.91	2,627.63	51.29	52.234	
11,000.00	10,723.96	13,306.00	8,302.87	24.59	92.90	5.08	-1,594.03	-541.70	2,667.65	2,616.18	51.48	51.821	
11,009.59	10,724.00	13,306.00	8,302.87	24.63	92.90	5.14	-1,594.03	-541.70	2,663.08	2,611.52	51.56	51.651	
11,100.00	10,723.41	13,306.00	8,302.87	25.07	92.90	5.14	-1,594.03	-541.70	2,620.45	2,568.70	51.75	50.636	
11,200.00	10,722.77	13,306.00	8,302.87	25.68	92.90	5.14	-1,594.03	-541.70	2,576.19	2,524.19	52.00	49.541	
11,300.00	10,722.13	13,306.00	8,302.87	26.40	92.90	5.14	-1,594.03	-541.70	2,535.09	2,482.80	52.29	48.481	
11,400.00	10,721.48	13,306.00	8,302.87	27.23	92.90	5.14	-1,594.03	-541.70	2,497.33	2,444.71	52.62	47.464	
11,500.00	10,720.84	13,306.00	8,302.87	28.15	92.90	5.14	-1,594.03	-541.70	2,463.05	2,410.07	52.97	46.496	
11,600.00	10,720.20	13,306.00	8,302.87	29.16	92.90	5.14	-1,594.03	-541.70	2,432.40	2,379.04	53.36	45.582	
11,700.00	10,719.55	13,306.00	8,302.87	30.24	92.90	5.14	-1,594.03	-541.70	2,405.52	2,351.74	53.78	44.729	
11,800.00	10,718.91	13,306.00	8,302.87	31.39	92.90	5.14	-1,594.03	-541.70	2,382.54	2,328.31	54.22	43.940	
11,900.00	10,718.27	13,306.00	8,302.87	32.60	92.90	5.14	-1,594.03	-541.70	2,363.56	2,308.87	54.69	43.218	
12,000.00	10,717.62	13,306.00	8,302.87	33.87	92.90	5.14	-1,594.03	-541.70	2,348.70	2,293.52	55.18	42.565	
12,100.00	10,716.98	13,306.00	8,302.87	35.18	92.90	5.14	-1,594.03	-541.70	2,338.02	2,282.34	55.69	41.986	
12,200.00	10,716.34	13,306.00	8,302.87	36.54	92.90	5.14	-1,594.03	-541.70	2,331.59	2,275.38	56.21	41.479	
12,300.00	10,715.69	13,293.93	8,302.86	37.94	92.69	5.14	-1,606.10	-541.73	2,329.40	2,272.73	56.66	41.108	
12,400.00	10,715.05	13,200.96	8,302.61	39.37	91.10	5.14	-1,699.07	-541.96	2,329.02	2,272.48	56.54	41.194	
12,472.75	10,714.58	13,133.16	8,302.21	40.44	89.94	5.13	-1,766.87	-541.59	2,328.94	2,272.49	56.45	41.258	
12,500.00	10,714.41	13,116.00	8,302.07	40.84	89.65	5.12	-1,784.02	-541.36	2,328.96	2,272.48	56.47	41.239	

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
12,600.00	10,713.76	13,041.68	8,300.83	42.33	88.39	5.07	-1,858.31	-539.52	2,329.79	2,273.30	56.49	41.243	
12,700.00	10,713.12	12,928.56	8,297.84	43.85	86.49	4.91	-1,971.22	-533.49	2,331.34	2,275.16	56.18	41.494	
12,800.00	10,712.48	12,798.29	8,296.53	45.39	84.26	4.69	-2,101.19	-524.81	2,330.96	2,275.22	55.74	41.817	
12,819.96	10,712.35	12,785.68	8,296.41	45.70	84.05	4.67	-2,113.78	-524.16	2,330.93	2,275.17	55.76	41.799	
12,900.00	10,711.83	12,734.00	8,295.56	46.95	83.16	4.62	-2,165.41	-521.99	2,331.44	2,275.59	55.85	41.743	
13,000.00	10,711.19	12,602.77	8,294.47	48.52	80.94	4.58	-2,296.62	-520.79	2,331.39	2,275.89	55.50	42.008	
13,010.44	10,711.12	12,595.13	8,294.43	48.69	80.81	4.58	-2,304.25	-520.88	2,331.38	2,275.87	55.51	42.000	
13,100.00	10,710.55	12,529.57	8,293.76	50.12	79.69	4.61	-2,369.79	-522.13	2,331.85	2,276.24	55.60	41.938	
13,200.00	10,709.90	12,463.40	8,292.38	51.73	78.58	4.65	-2,435.92	-524.32	2,333.56	2,277.79	55.77	41.840	
13,300.00	10,709.26	12,390.55	8,289.79	53.35	77.36	4.73	-2,508.63	-527.81	2,336.77	2,280.86	55.91	41.792	
13,400.00	10,708.62	12,279.87	8,285.54	54.99	75.56	4.83	-2,619.13	-532.50	2,340.31	2,284.51	55.80	41.942	
13,500.00	10,707.97	12,101.05	8,281.92	56.63	72.67	4.97	-2,797.80	-538.65	2,342.08	2,286.87	55.21	42.422	
13,600.00	10,707.33	11,939.00	8,283.54	58.29	70.01	5.03	-2,959.81	-541.22	2,340.55	2,285.83	54.72	42.775	
13,700.00	10,706.69	11,866.16	8,285.08	59.96	68.79	5.06	-3,032.62	-542.76	2,338.05	2,283.19	54.87	42.611	
13,800.00	10,706.04	11,775.79	8,285.88	61.63	67.29	5.14	-3,122.91	-546.11	2,336.81	2,281.90	54.92	42.551	
13,900.00	10,705.40	11,695.47	8,286.57	63.32	65.94	5.25	-3,203.11	-550.56	2,335.84	2,280.79	55.06	42.426	
13,932.33	10,705.19	11,672.49	8,286.59	63.87	65.56	5.29	-3,226.05	-552.01	2,335.78	2,280.65	55.13	42.372	
14,000.00	10,704.76	11,629.56	8,286.38	65.01	64.84	5.35	-3,268.88	-554.85	2,336.11	2,280.80	55.30	42.241	
14,100.00	10,704.11	11,558.00	8,284.80	66.71	63.65	5.46	-3,340.26	-559.63	2,338.13	2,282.61	55.52	42.115	
14,200.00	10,703.47	11,481.72	8,282.24	68.41	62.43	5.57	-3,416.35	-564.35	2,341.30	2,285.60	55.70	42.032	
14,300.00	10,702.83	11,329.57	8,279.22	70.12	59.95	5.75	-3,568.26	-572.31	2,342.95	2,287.56	55.38	42.306	
14,400.00	10,702.18	11,253.26	8,277.87	71.84	58.69	5.84	-3,644.44	-576.45	2,344.58	2,289.01	55.57	42.192	
14,500.00	10,701.54	11,138.96	8,275.07	73.56	56.86	5.97	-3,758.57	-581.98	2,346.92	2,291.41	55.51	42.283	
14,600.00	10,700.90	10,901.78	8,280.16	75.29	53.14	6.24	-3,995.40	-592.87	2,343.39	2,288.74	54.65	42.882	
14,700.00	10,700.25	10,792.00	8,286.24	77.02	51.38	6.27	-4,104.98	-593.94	2,337.18	2,282.59	54.59	42.812	
14,800.00	10,699.61	10,728.22	8,289.27	78.75	50.31	6.23	-4,168.64	-591.87	2,332.07	2,277.25	54.82	42.541	
14,900.00	10,698.97	10,697.00	8,289.51	80.49	49.78	6.19	-4,199.82	-590.31	2,330.25	2,274.97	55.29	42.150	
14,930.16	10,698.77	10,672.95	8,289.30	81.02	49.38	6.16	-4,223.84	-589.01	2,330.16	2,274.85	55.31	42.128	
15,000.00	10,698.32	10,631.95	8,288.55	82.24	48.70	6.10	-4,264.78	-586.98	2,330.59	2,275.10	55.49	42.002	
15,100.00	10,697.68	10,564.35	8,286.39	83.98	47.59	6.03	-4,332.29	-584.15	2,332.63	2,276.95	55.68	41.895	
15,200.00	10,697.04	10,473.67	8,282.68	85.73	46.13	5.94	-4,422.84	-581.21	2,335.67	2,279.97	55.71	41.928	
15,300.00	10,696.39	10,329.07	8,278.39	87.48	43.89	5.88	-4,567.37	-579.41	2,337.86	2,282.48	55.38	42.216	
15,400.00	10,695.75	10,219.00	8,277.34	89.24	42.15	5.88	-4,677.42	-579.86	2,338.14	2,282.81	55.33	42.258	
15,500.00	10,695.11	10,150.66	8,276.42	90.99	41.04	5.90	-4,745.75	-580.72	2,339.12	2,283.54	55.58	42.083	
15,600.00	10,694.46	10,085.68	8,274.11	92.75	40.03	5.91	-4,810.69	-581.36	2,342.03	2,286.17	55.86	41.928	
15,700.00	10,693.82	9,838.00	8,270.81	94.52	36.36	6.12	-5,058.03	-590.85	2,344.09	2,289.07	55.02	42.607	
15,800.00	10,693.18	9,771.50	8,272.44	96.28	35.32	6.21	-5,124.40	-594.45	2,341.72	2,286.38	55.34	42.313	
15,859.31	10,692.80	9,743.00	8,272.62	97.33	34.88	6.24	-5,152.88	-595.73	2,341.29	2,285.69	55.60	42.110	
15,900.00	10,692.53	9,743.00	8,272.62	98.05	34.88	6.24	-5,152.88	-595.73	2,341.64	2,285.75	55.89	41.895	
16,000.00	10,691.89	9,647.00	8,270.55	99.82	33.42	6.30	-5,248.81	-598.46	2,343.43	2,287.42	56.02	41.833	
16,100.00	10,691.25	9,596.71	8,268.29	101.59	32.71	6.30	-5,299.05	-599.06	2,346.89	2,290.47	56.42	41.595	
16,200.00	10,690.60	9,361.00	8,266.56	103.36	29.37	6.28	-5,534.65	-598.64	2,345.46	2,289.81	55.65	42.147	
16,300.00	10,689.96	9,289.25	8,266.61	105.13	28.39	6.23	-5,606.38	-596.81	2,344.40	2,288.48	55.92	41.926	
16,400.00	10,689.32	9,148.12	8,267.35	106.91	26.53	6.17	-5,747.48	-594.39	2,343.06	2,287.27	55.79	42.001	
16,500.00	10,688.67	9,066.88	8,268.22	108.69	25.48	6.14	-5,828.70	-593.17	2,341.17	2,285.12	56.04	41.776	
16,600.00	10,688.03	8,978.00	8,268.40	110.47	24.39	6.07	-5,917.53	-590.28	2,339.95	2,283.70	56.25	41.597	
16,700.00	10,687.39	8,887.32	8,268.12	112.25	23.32	5.98	-6,008.15	-586.78	2,339.18	2,282.70	56.47	41.421	
16,800.00	10,686.74	8,788.11	8,267.81	114.03	22.19	5.91	-6,107.33	-584.46	2,338.58	2,281.88	56.70	41.246	
16,900.00	10,686.10	8,698.88	8,267.42	115.81	21.21	5.88	-6,196.55	-583.29	2,338.22	2,281.20	57.02	41.005	
16,910.83	10,686.03	8,691.00	8,267.37	116.00	21.12	5.88	-6,204.43	-583.20	2,338.21	2,281.14	57.07	40.973	
17,000.00	10,685.46	8,659.00	8,266.78	117.60	20.79	5.87	-6,236.42	-582.79	2,339.24	2,281.66	57.58	40.625	
17,100.00	10,684.81	8,628.00	8,265.14	119.38	20.47	5.85	-6,267.37	-582.39	2,343.33	2,285.14	58.18	40.274	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Copperhead 31 Fed Com #2H - Wellbore #1 - Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
17,200.00	10,684.17	8,596.00	8,262.32	121.17	20.16	5.83	-6,299.24	-582.05	2,350.53	2,291.74	58.79	39.984	
17,300.00	10,683.53	8,564.00	8,258.72	122.95	19.86	5.82	-6,331.04	-581.83	2,360.48	2,301.08	59.40	39.741	
17,400.00	10,682.88	8,532.00	8,254.21	124.74	19.57	5.81	-6,362.72	-581.76	2,373.26	2,313.25	60.01	39.545	
17,500.00	10,682.24	8,514.51	8,251.27	126.53	19.41	5.80	-6,379.96	-581.75	2,388.98	2,328.29	60.69	39.364	
17,600.00	10,681.60	8,501.00	8,248.70	128.32	19.30	5.79	-6,393.22	-581.74	2,407.92	2,346.54	61.38	39.232	
17,700.00	10,680.95	8,469.00	8,241.38	130.11	19.03	5.77	-6,424.36	-581.56	2,430.01	2,368.01	62.00	39.191	
17,800.00	10,680.31	8,452.16	8,236.88	131.91	18.90	5.75	-6,440.59	-581.33	2,455.16	2,392.48	62.68	39.169	SF
17,848.12	10,680.00	8,437.00	8,232.60	132.77	18.78	5.73	-6,455.13	-581.04	2,468.27	2,405.28	62.98	39.190	

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual Wellbore #1 — **Offset Site Error:** 0.00 ft

Survey Program: 500-INC-ONLY — **Offset Well Error:** 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-169.38	-1,769.13	-331.69	1,801.35				
100.00	100.00	29.20	29.20	0.08	0.65	-169.38	-1,769.13	-331.69	1,799.96	1,799.23	0.73	2,466.826	
200.00	200.00	129.20	129.20	0.31	2.86	-169.38	-1,769.13	-331.69	1,799.96	1,796.79	3.16	568.773	
300.00	300.00	229.20	229.20	0.53	5.07	-169.38	-1,769.13	-331.69	1,799.96	1,794.36	5.60	321.444	
400.00	400.00	329.20	329.20	0.76	7.28	-169.38	-1,769.13	-331.69	1,799.96	1,791.92	8.03	224.027	
500.00	500.00	500.00	500.00	0.98	11.06	-169.38	-1,769.13	-331.69	1,801.35	1,789.31	12.03	149.684	
600.00	600.00	529.20	529.20	1.21	12.00	-169.38	-1,769.13	-331.69	1,799.96	1,786.76	13.20	136.368	
700.00	700.00	629.20	629.20	1.43	15.22	-169.38	-1,769.13	-331.69	1,799.96	1,783.31	16.64	108.146	
800.00	800.00	729.20	729.20	1.66	18.44	-169.38	-1,769.13	-331.69	1,799.96	1,779.87	20.09	89.602	
900.00	900.00	829.38	829.20	1.88	21.26	-169.38	-1,769.13	-331.69	1,799.96	1,776.82	23.13	77.807	
1,000.00	1,000.00	929.38	929.20	2.11	23.45	-169.38	-1,769.13	-331.69	1,799.96	1,774.41	25.55	70.450	
1,100.00	1,100.00	1,029.38	1,029.20	2.33	25.64	-169.38	-1,769.13	-331.69	1,799.96	1,771.99	27.97	64.364	
1,200.00	1,200.00	1,129.40	1,129.20	2.56	27.74	-169.38	-1,769.13	-331.69	1,799.96	1,769.66	30.29	59.419	
1,300.00	1,300.00	1,229.40	1,229.20	2.78	29.63	-169.38	-1,769.13	-331.69	1,799.96	1,767.55	32.41	55.543	
1,400.00	1,400.00	1,329.40	1,329.20	3.01	31.52	-169.38	-1,769.13	-331.69	1,799.96	1,765.44	34.52	52.142	
1,500.00	1,500.00	1,429.40	1,429.20	3.23	33.41	-169.38	-1,769.13	-331.69	1,799.96	1,763.32	36.63	49.133	
1,600.00	1,600.00	1,529.40	1,529.20	3.46	35.29	-169.38	-1,769.13	-331.69	1,799.96	1,761.21	38.75	46.453	
1,700.00	1,700.00	1,629.45	1,629.20	3.68	37.24	-169.38	-1,769.13	-331.69	1,799.96	1,759.04	40.91	43.994	
1,800.00	1,800.00	1,729.45	1,729.20	3.91	39.19	-169.38	-1,769.13	-331.69	1,799.96	1,756.86	43.09	41.770	
1,900.00	1,900.00	1,829.45	1,829.20	4.13	41.14	-169.38	-1,769.13	-331.69	1,799.96	1,754.69	45.27	39.760	
2,000.00	2,000.00	1,929.45	1,929.20	4.35	43.10	-169.38	-1,769.13	-331.69	1,799.96	1,752.51	47.45	37.935	
2,100.00	2,100.00	2,054.00	2,053.75	4.58	45.53	-169.38	-1,769.13	-331.69	1,800.12	1,750.02	50.11	35.926	
2,144.18	2,144.18	2,073.63	2,073.38	4.68	46.20	-169.38	-1,769.13	-331.69	1,799.96	1,749.08	50.88	35.376	
2,200.00	2,200.00	2,129.45	2,129.20	4.80	48.12	-169.38	-1,769.13	-331.69	1,799.96	1,747.03	52.93	34.009	
2,300.00	2,300.00	2,229.45	2,229.20	5.03	51.56	-169.38	-1,769.13	-331.69	1,799.96	1,743.37	56.59	31.807	
2,400.00	2,400.00	2,329.45	2,329.20	5.25	55.00	-169.38	-1,769.13	-331.69	1,799.96	1,739.70	60.25	29.873	
2,500.00	2,500.00	2,429.45	2,429.20	5.48	58.44	-169.38	-1,769.13	-331.69	1,799.96	1,736.04	63.92	28.161	
2,600.00	2,600.00	2,600.00	2,599.69	5.70	64.30	-169.38	-1,769.13	-331.69	1,801.34	1,731.33	70.01	25.731	
2,700.00	2,700.00	2,629.51	2,629.20	5.93	65.69	-169.38	-1,769.13	-331.69	1,799.96	1,728.34	71.62	25.132	
2,800.00	2,800.00	2,729.51	2,729.20	6.15	70.39	-169.38	-1,769.13	-331.69	1,799.96	1,723.41	76.55	23.515	
2,850.01	2,850.01	2,779.52	2,779.21	6.27	72.75	-169.38	-1,769.13	-331.69	1,799.96	1,720.95	79.01	22.781	CC
2,900.00	2,900.00	2,829.51	2,829.20	6.37	75.10	-105.56	-1,769.13	-331.69	1,800.02	1,718.55	81.47	22.094	
3,000.00	2,999.98	2,929.49	2,929.18	6.58	79.80	-105.61	-1,769.13	-331.69	1,800.48	1,714.11	86.38	20.844	
3,100.00	3,099.92	3,100.00	3,099.38	6.80	87.82	-105.80	-1,769.13	-331.69	1,802.80	1,708.19	94.60	19.056	
3,145.04	3,144.91	3,100.00	3,099.38	6.89	87.82	-105.81	-1,769.13	-331.69	1,802.19	1,707.49	94.70	19.031	
3,166.82	3,166.65	3,100.00	3,099.38	6.94	87.82	-105.81	-1,769.13	-331.69	1,802.33	1,707.59	94.74	19.023	
3,200.00	3,199.79	3,129.61	3,128.99	7.01	89.32	-105.86	-1,769.13	-331.69	1,802.83	1,706.51	96.32	18.718	
3,300.00	3,299.64	3,229.46	3,228.84	7.23	94.38	-106.02	-1,769.13	-331.69	1,804.35	1,702.75	101.59	17.760	
3,400.00	3,399.48	3,329.30	3,328.68	7.44	99.44	-106.19	-1,769.13	-331.69	1,805.88	1,699.01	106.87	16.897	
3,500.00	3,499.33	3,429.15	3,428.53	7.66	104.50	-106.36	-1,769.13	-331.69	1,807.43	1,695.28	112.15	16.116	
3,600.00	3,599.18	3,529.00	3,528.38	7.89	109.57	-106.53	-1,769.13	-331.69	1,809.00	1,691.56	117.44	15.404	
3,700.00	3,699.02	3,628.85	3,628.22	8.11	114.63	-106.70	-1,769.13	-331.69	1,810.58	1,687.86	122.72	14.754	
3,800.00	3,798.87	3,728.69	3,728.07	8.33	119.69	-106.86	-1,769.13	-331.69	1,812.18	1,684.17	128.01	14.157	
3,900.00	3,898.72	3,828.54	3,827.92	8.56	124.75	-107.03	-1,769.13	-331.69	1,813.79	1,680.50	133.29	13.608	
4,000.00	3,998.57	3,928.39	3,927.77	8.78	129.82	-107.20	-1,769.13	-331.69	1,815.42	1,676.84	138.58	13.100	
4,100.00	4,098.41	4,028.23	4,027.61	9.01	134.88	-107.36	-1,769.13	-331.69	1,817.06	1,673.20	143.87	12.630	
4,200.00	4,198.26	4,128.08	4,127.46	9.24	139.94	-107.53	-1,769.13	-331.69	1,818.72	1,669.57	149.16	12.193	
4,300.00	4,298.11	4,220.00	4,218.47	9.47	144.60	-107.68	-1,769.13	-331.69	1,820.42	1,666.38	154.04	11.818	ES, SF
4,400.00	4,397.95	4,220.00	4,218.47	9.70	144.60	-107.68	-1,769.13	-331.69	1,825.33	1,671.05	154.27	11.832	
4,500.00	4,497.80	4,220.00	4,218.47	9.93	144.60	-107.68	-1,769.13	-331.69	1,835.68	1,681.17	154.50	11.881	
4,600.00	4,597.65	4,220.00	4,218.47	10.16	144.60	-107.68	-1,769.13	-331.69	1,851.38	1,696.64	154.73	11.965	
4,700.00	4,697.50	4,220.00	4,218.47	10.39	144.60	-107.68	-1,769.13	-331.69	1,872.29	1,717.33	154.96	12.082	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 500-INC-ONLY

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,800.00	4,797.34	4,220.00	4,218.47	10.62	144.60	-107.68	-1,769.13	-331.69	1,898.26	1,743.06	155.20	12.231	
4,900.00	4,897.19	4,220.00	4,218.47	10.85	144.60	-107.68	-1,769.13	-331.69	1,929.06	1,773.63	155.43	12.411	
5,000.00	4,997.04	4,220.00	4,218.47	11.09	144.60	-107.68	-1,769.13	-331.69	1,964.47	1,808.81	155.66	12.620	
5,100.00	5,096.88	4,220.00	4,218.47	11.32	144.60	-107.68	-1,769.13	-331.69	2,004.26	1,848.36	155.90	12.856	
5,200.00	5,196.73	4,220.00	4,218.47	11.56	144.60	-107.68	-1,769.13	-331.69	2,048.15	1,892.02	156.13	13.118	
5,300.00	5,296.58	4,220.00	4,218.47	11.79	144.60	-107.68	-1,769.13	-331.69	2,095.91	1,939.54	156.36	13.404	
5,400.00	5,396.43	4,220.00	4,218.47	12.03	144.60	-107.68	-1,769.13	-331.69	2,147.26	1,990.66	156.60	13.712	
5,500.00	5,496.27	4,220.00	4,218.47	12.26	144.60	-107.68	-1,769.13	-331.69	2,201.95	2,045.12	156.83	14.040	
5,600.00	5,596.12	4,220.00	4,218.47	12.50	144.60	-107.68	-1,769.13	-331.69	2,259.75	2,102.69	157.07	14.387	
5,700.00	5,695.97	4,220.00	4,218.47	12.73	144.60	-107.68	-1,769.13	-331.69	2,320.43	2,163.12	157.30	14.751	
5,800.00	5,795.81	4,220.00	4,218.47	12.97	144.60	-107.68	-1,769.13	-331.69	2,383.75	2,226.21	157.54	15.131	
5,900.00	5,895.66	4,220.00	4,218.47	13.21	144.60	-107.68	-1,769.13	-331.69	2,449.52	2,291.74	157.78	15.525	
6,000.00	5,995.51	4,220.00	4,218.47	13.44	144.60	-107.68	-1,769.13	-331.69	2,517.55	2,359.53	158.01	15.933	
6,100.00	6,095.36	4,220.00	4,218.47	13.68	144.60	-107.68	-1,769.13	-331.69	2,587.65	2,429.40	158.25	16.352	
6,200.00	6,195.20	4,220.00	4,218.47	13.92	144.60	-107.68	-1,769.13	-331.69	2,659.67	2,501.18	158.49	16.782	
6,300.00	6,295.05	4,220.00	4,218.47	14.16	144.60	-107.68	-1,769.13	-331.69	2,733.44	2,574.72	158.72	17.221	
6,400.00	6,394.90	4,220.00	4,218.47	14.40	144.60	-107.68	-1,769.13	-331.69	2,808.84	2,649.88	158.96	17.670	
6,500.00	6,494.74	4,220.00	4,218.47	14.63	144.60	-107.68	-1,769.13	-331.69	2,885.74	2,726.54	159.20	18.127	
6,600.00	6,594.59	4,220.00	4,218.47	14.87	144.60	-107.68	-1,769.13	-331.69	2,964.01	2,804.58	159.44	18.590	
6,700.00	6,694.44	4,220.00	4,218.47	15.11	144.60	-107.68	-1,769.13	-331.69	3,043.56	2,883.89	159.68	19.061	
6,800.00	6,794.29	4,220.00	4,218.47	15.35	144.60	-107.68	-1,769.13	-331.69	3,124.28	2,964.37	159.91	19.537	
6,900.00	6,894.13	4,220.00	4,218.47	15.59	144.60	-107.68	-1,769.13	-331.69	3,206.09	3,045.94	160.15	20.019	
7,000.00	6,993.98	4,220.00	4,218.47	15.83	144.60	-107.68	-1,769.13	-331.69	3,288.91	3,128.52	160.39	20.506	
7,100.00	7,093.83	4,220.00	4,218.47	16.07	144.60	-107.68	-1,769.13	-331.69	3,372.66	3,212.03	160.63	20.996	
7,200.00	7,193.67	4,220.00	4,218.47	16.31	144.60	-107.68	-1,769.13	-331.69	3,457.27	3,296.40	160.87	21.491	
7,300.00	7,293.52	4,220.00	4,218.47	16.55	144.60	-107.68	-1,769.13	-331.69	3,542.68	3,381.57	161.11	21.990	
7,400.00	7,393.37	4,220.00	4,218.47	16.79	144.60	-107.68	-1,769.13	-331.69	3,628.84	3,467.49	161.35	22.491	
7,500.00	7,493.22	4,220.00	4,218.47	17.03	144.60	-107.68	-1,769.13	-331.69	3,715.69	3,554.11	161.59	22.995	
7,600.00	7,593.06	4,220.00	4,218.47	17.27	144.60	-107.68	-1,769.13	-331.69	3,803.19	3,641.37	161.83	23.502	
7,700.00	7,692.91	4,220.00	4,218.47	17.51	144.60	-107.68	-1,769.13	-331.69	3,891.29	3,729.23	162.07	24.011	
7,800.00	7,792.76	4,220.00	4,218.47	17.75	144.60	-107.68	-1,769.13	-331.69	3,979.96	3,817.65	162.31	24.521	
7,900.00	7,892.61	4,220.00	4,218.47	17.99	144.60	-107.68	-1,769.13	-331.69	4,069.14	3,906.60	162.55	25.034	
8,000.00	7,992.45	4,220.00	4,218.47	18.23	144.60	-107.68	-1,769.13	-331.69	4,158.82	3,996.04	162.79	25.548	
8,100.00	8,092.30	4,220.00	4,218.47	18.47	144.60	-107.68	-1,769.13	-331.69	4,248.97	4,085.94	163.03	26.063	
8,200.00	8,192.15	4,220.00	4,218.47	18.71	144.60	-107.68	-1,769.13	-331.69	4,339.54	4,176.27	163.27	26.580	
8,300.00	8,291.99	4,220.00	4,218.47	18.95	144.60	-107.68	-1,769.13	-331.69	4,430.52	4,267.01	163.51	27.097	
8,400.00	8,391.84	4,220.00	4,218.47	19.20	144.60	-107.68	-1,769.13	-331.69	4,521.88	4,358.13	163.75	27.615	
8,500.00	8,491.69	4,220.00	4,218.47	19.44	144.60	-107.68	-1,769.13	-331.69	4,613.60	4,449.61	163.99	28.134	
8,600.00	8,591.54	4,220.00	4,218.47	19.68	144.60	-107.68	-1,769.13	-331.69	4,705.65	4,541.42	164.23	28.653	
8,700.00	8,691.38	4,220.00	4,218.47	19.92	144.60	-107.68	-1,769.13	-331.69	4,798.03	4,633.56	164.47	29.173	
8,800.00	8,791.23	4,220.00	4,218.47	20.16	144.60	-107.68	-1,769.13	-331.69	4,890.70	4,725.99	164.71	29.693	
8,900.00	8,891.08	4,220.00	4,218.47	20.40	144.60	-107.68	-1,769.13	-331.69	4,983.66	4,818.70	164.95	30.213	
9,000.00	8,990.92	4,220.00	4,218.47	20.64	144.60	-107.68	-1,769.13	-331.69	5,076.88	4,911.69	165.19	30.733	
9,100.00	9,090.77	4,220.00	4,218.47	20.89	144.60	-107.68	-1,769.13	-331.69	5,170.36	5,004.93	165.43	31.254	
9,200.00	9,190.62	4,220.00	4,218.47	21.13	144.60	-107.68	-1,769.13	-331.69	5,264.08	5,098.40	165.67	31.774	
9,300.00	9,290.47	4,220.00	4,218.47	21.37	144.60	-107.68	-1,769.13	-331.69	5,358.02	5,192.11	165.92	32.294	
9,400.00	9,390.31	4,220.00	4,218.47	21.61	144.60	-107.68	-1,769.13	-331.69	5,452.18	5,286.02	166.16	32.814	
9,483.19	9,473.37	4,220.00	4,218.47	21.81	144.60	-107.68	-1,769.13	-331.69	5,530.66	5,364.31	166.36	33.246	
9,500.00	9,490.16	4,220.00	4,218.47	21.85	144.60	-108.14	-1,769.13	-331.69	5,546.54	5,380.15	166.39	33.334	
9,600.00	9,590.06	4,220.00	4,218.47	22.03	144.60	-110.85	-1,769.13	-331.69	5,640.98	5,474.42	166.56	33.867	
9,700.00	9,690.03	4,220.00	4,218.47	22.21	144.60	-113.50	-1,769.13	-331.69	5,735.40	5,568.68	166.73	34.400	
9,800.00	9,790.02	4,220.00	4,218.47	22.39	144.60	-179.92	-1,769.13	-331.69	5,829.78	5,662.91	166.88	34.935	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 500-INC-ONLY

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,900.00	9,890.02	4,220.00	4,218.47	22.58	144.60	-179.92	-1,769.13	-331.69	5,924.24	5,757.17	167.07	35.460	
10,000.00	9,990.02	4,220.00	4,218.47	22.79	144.60	-179.92	-1,769.13	-331.69	6,018.86	5,851.59	167.28	35.981	
10,100.00	10,090.02	4,220.00	4,218.47	23.00	144.60	-179.92	-1,769.13	-331.69	6,113.66	5,946.18	167.49	36.502	
10,200.00	10,190.02	4,220.00	4,218.47	23.20	144.60	-179.92	-1,769.13	-331.69	6,208.63	6,040.93	167.70	37.023	
10,256.52	10,246.54	4,220.00	4,218.47	23.32	144.60	-179.92	-1,769.13	-331.69	6,262.36	6,094.55	167.82	37.317	
10,275.00	10,265.02	4,220.00	4,218.47	23.36	144.60	-0.05	-1,769.13	-331.69	6,279.84	6,112.11	167.72	37.442	
10,300.00	10,289.96	4,220.00	4,218.47	23.40	144.60	-0.04	-1,769.13	-331.69	6,303.08	6,135.88	167.20	37.699	
10,325.00	10,314.79	4,220.00	4,218.47	23.44	144.60	-0.04	-1,769.13	-331.69	6,325.83	6,159.60	166.23	38.055	
10,350.00	10,339.43	4,220.00	4,218.47	23.48	144.60	-0.03	-1,769.13	-331.69	6,348.02	6,183.21	164.82	38.516	
10,375.00	10,363.81	4,220.00	4,218.47	23.51	144.60	-0.03	-1,769.13	-331.69	6,369.61	6,206.64	162.97	39.085	
10,400.00	10,387.87	4,220.00	4,218.47	23.54	144.60	-0.03	-1,769.13	-331.69	6,390.54	6,229.85	160.69	39.770	
10,425.00	10,411.55	4,220.00	4,218.47	23.57	144.60	-0.03	-1,769.13	-331.69	6,410.75	6,252.77	157.98	40.579	
10,450.00	10,434.77	4,220.00	4,218.47	23.60	144.60	-0.02	-1,769.13	-331.69	6,430.20	6,275.34	154.86	41.523	
10,475.00	10,457.48	4,220.00	4,218.47	23.63	144.60	-0.02	-1,769.13	-331.69	6,448.85	6,297.52	151.33	42.615	
10,500.00	10,479.61	4,220.00	4,218.47	23.66	144.60	-0.02	-1,769.13	-331.69	6,466.65	6,319.24	147.40	43.871	
10,525.00	10,501.10	4,220.00	4,218.47	23.68	144.60	-0.02	-1,769.13	-331.69	6,483.55	6,340.46	143.09	45.310	
10,550.00	10,521.89	4,220.00	4,218.47	23.71	144.60	-0.02	-1,769.13	-331.69	6,499.53	6,361.12	138.41	46.958	
10,575.00	10,541.93	4,220.00	4,218.47	23.73	144.60	-0.02	-1,769.13	-331.69	6,514.53	6,381.16	133.37	48.844	
10,600.00	10,561.15	4,220.00	4,218.47	23.76	144.60	-0.02	-1,769.13	-331.69	6,528.54	6,400.54	128.00	51.005	
10,625.00	10,579.52	4,220.00	4,218.47	23.78	144.60	-0.02	-1,769.13	-331.69	6,541.51	6,419.21	122.30	53.488	
10,650.00	10,596.97	4,220.00	4,218.47	23.81	144.60	-0.02	-1,769.13	-331.69	6,553.41	6,437.12	116.30	56.350	
10,675.00	10,613.46	4,220.00	4,218.47	23.83	144.60	-0.02	-1,769.13	-331.69	6,564.23	6,454.22	110.01	59.667	
10,700.00	10,628.95	4,220.00	4,218.47	23.86	144.60	-0.02	-1,769.13	-331.69	6,573.93	6,470.47	103.47	63.535	
10,725.00	10,643.39	4,220.00	4,218.47	23.89	144.60	-0.02	-1,769.13	-331.69	6,582.50	6,485.82	96.69	68.081	
10,750.00	10,656.74	4,220.00	4,218.47	23.92	144.60	-0.02	-1,769.13	-331.69	6,589.91	6,500.22	89.69	73.474	
10,775.00	10,668.97	4,220.00	4,218.47	23.96	144.60	-0.02	-1,769.13	-331.69	6,596.15	6,513.65	82.51	79.946	
10,800.00	10,680.04	4,220.00	4,218.47	24.00	144.60	-0.02	-1,769.13	-331.69	6,601.21	6,526.04	75.17	87.820	
10,825.00	10,689.92	4,220.00	4,218.47	24.05	144.60	-0.02	-1,769.13	-331.69	6,605.07	6,537.37	67.70	97.564	
10,850.00	10,698.58	4,220.00	4,218.47	24.10	144.60	-0.02	-1,769.13	-331.69	6,607.73	6,547.59	60.14	109.878	
10,875.00	10,706.01	4,220.00	4,218.47	24.16	144.60	-0.02	-1,769.13	-331.69	6,609.17	6,556.66	52.51	125.857	
10,900.00	10,712.17	4,220.00	4,218.47	24.23	144.60	-0.02	-1,769.13	-331.69	6,609.40	6,564.53	44.87	147.307	
10,925.00	10,717.06	4,220.00	4,218.47	24.31	144.60	-0.02	-1,769.13	-331.69	6,608.42	6,571.17	37.25	177.405	
10,950.00	10,720.66	4,220.00	4,218.47	24.39	144.60	-0.02	-1,769.13	-331.69	6,606.23	6,576.49	29.74	222.169	
10,975.00	10,722.97	4,220.00	4,218.47	24.48	144.60	-0.02	-1,769.13	-331.69	6,602.82	6,580.30	22.52	293.155	
11,000.00	10,723.96	4,220.00	4,218.47	24.59	144.60	-0.02	-1,769.13	-331.69	6,598.22	6,581.32	16.90	390.384	
11,009.59	10,724.00	4,220.00	4,218.47	24.63	144.60	-0.02	-1,769.13	-331.69	6,596.14	6,579.53	16.61	397.195	
11,100.00	10,723.41	4,220.00	4,218.47	25.07	144.60	-0.02	-1,769.13	-331.69	6,576.29	6,559.50	16.79	391.791	
11,200.00	10,722.77	4,220.00	4,218.47	25.68	144.60	-0.02	-1,769.13	-331.69	6,555.71	6,538.68	17.02	385.157	
11,300.00	10,722.13	4,220.00	4,218.47	26.40	144.60	-0.02	-1,769.13	-331.69	6,536.59	6,519.30	17.29	377.953	
11,400.00	10,721.48	4,220.00	4,218.47	27.23	144.60	-0.02	-1,769.13	-331.69	6,518.96	6,501.35	17.60	370.305	
11,500.00	10,720.84	4,220.00	4,218.47	28.15	144.60	-0.02	-1,769.13	-331.69	6,502.81	6,484.86	17.95	362.333	
11,600.00	10,720.20	4,220.00	4,218.47	29.16	144.60	-0.02	-1,769.13	-331.69	6,488.16	6,469.84	18.32	354.146	
11,700.00	10,719.55	4,220.00	4,218.47	30.24	144.60	-0.02	-1,769.13	-331.69	6,475.03	6,456.31	18.72	345.843	
11,800.00	10,718.91	4,220.00	4,218.47	31.39	144.60	-0.02	-1,769.13	-331.69	6,463.42	6,444.27	19.15	337.511	
11,900.00	10,718.27	4,220.00	4,218.47	32.60	144.60	-0.02	-1,769.13	-331.69	6,453.33	6,433.73	19.60	329.223	
12,000.00	10,717.62	4,220.00	4,218.47	33.87	144.60	-0.02	-1,769.13	-331.69	6,444.79	6,424.71	20.07	321.037	
12,100.00	10,716.98	4,220.00	4,218.47	35.18	144.60	-0.02	-1,769.13	-331.69	6,437.78	6,417.21	20.57	313.004	
12,200.00	10,716.34	4,220.00	4,218.47	36.54	144.60	-0.02	-1,769.13	-331.69	6,432.32	6,411.24	21.08	305.160	
12,300.00	10,715.69	4,220.00	4,218.47	37.94	144.60	-0.02	-1,769.13	-331.69	6,428.42	6,406.81	21.61	297.534	
12,400.00	10,715.05	4,220.00	4,218.47	39.37	144.60	-0.02	-1,769.13	-331.69	6,426.06	6,403.91	22.15	290.146	
12,500.00	10,714.41	4,220.00	4,218.47	40.84	144.60	-0.02	-1,769.13	-331.69	6,425.26	6,402.56	22.70	283.012	
12,501.25	10,714.40	4,220.00	4,218.47	40.86	144.60	-0.02	-1,769.13	-331.69	6,425.26	6,402.55	22.71	282.923	

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

Integrity Directional Services, LLC

Anticollision Report

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 500-INC-ONLY

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
12,600.00	10,713.76	4,220.00	4,218.47	42.33	144.60	-0.02	-1,769.13	-331.69	6,426.02	6,402.75	23.27	276.139	
12,700.00	10,713.12	4,220.00	4,218.47	43.85	144.60	-0.02	-1,769.13	-331.69	6,428.34	6,404.49	23.85	269.532	
12,800.00	10,712.48	4,220.00	4,218.47	45.39	144.60	-0.02	-1,769.13	-331.69	6,432.21	6,407.77	24.44	263.192	
12,900.00	10,711.83	4,220.00	4,218.47	46.95	144.60	-0.02	-1,769.13	-331.69	6,437.63	6,412.59	25.04	257.116	
13,000.00	10,711.19	4,220.00	4,218.47	48.52	144.60	-0.02	-1,769.13	-331.69	6,444.59	6,418.95	25.64	251.301	
13,100.00	10,710.55	4,220.00	4,218.47	50.12	144.60	-0.02	-1,769.13	-331.69	6,453.10	6,426.84	26.26	245.740	
13,200.00	10,709.90	4,220.00	4,218.47	51.73	144.60	-0.02	-1,769.13	-331.69	6,463.15	6,436.26	26.88	240.426	
13,300.00	10,709.26	4,220.00	4,218.47	53.35	144.60	-0.02	-1,769.13	-331.69	6,474.72	6,447.21	27.51	235.352	
13,400.00	10,708.62	4,220.00	4,218.47	54.99	144.60	-0.02	-1,769.13	-331.69	6,487.82	6,459.67	28.15	230.509	
13,500.00	10,707.97	4,220.00	4,218.47	56.63	144.60	-0.02	-1,769.13	-331.69	6,502.42	6,473.64	28.79	225.888	
13,600.00	10,707.33	4,220.00	4,218.47	58.29	144.60	-0.02	-1,769.13	-331.69	6,518.53	6,489.10	29.43	221.481	
13,700.00	10,706.69	4,220.00	4,218.47	59.96	144.60	-0.02	-1,769.13	-331.69	6,536.13	6,506.05	30.08	217.278	
13,800.00	10,706.04	4,220.00	4,218.47	61.63	144.60	-0.02	-1,769.13	-331.69	6,555.21	6,524.47	30.74	213.271	
13,900.00	10,705.40	4,220.00	4,218.47	63.32	144.60	-0.02	-1,769.13	-331.69	6,575.75	6,544.36	31.40	209.450	
14,000.00	10,704.76	4,220.00	4,218.47	65.01	144.60	-0.02	-1,769.13	-331.69	6,597.75	6,565.69	32.06	205.807	
14,100.00	10,704.11	4,220.00	4,218.47	66.71	144.60	-0.02	-1,769.13	-331.69	6,621.18	6,588.46	32.72	202.334	
14,200.00	10,703.47	4,220.00	4,218.47	68.41	144.60	-0.02	-1,769.13	-331.69	6,646.03	6,612.64	33.39	199.022	
14,300.00	10,702.83	4,220.00	4,218.47	70.12	144.60	-0.02	-1,769.13	-331.69	6,672.29	6,638.23	34.07	195.865	
14,400.00	10,702.18	4,220.00	4,218.47	71.84	144.60	-0.02	-1,769.13	-331.69	6,699.95	6,665.20	34.74	192.854	
14,500.00	10,701.54	4,220.00	4,218.47	73.56	144.60	-0.02	-1,769.13	-331.69	6,728.97	6,693.55	35.42	189.982	
14,600.00	10,700.90	4,220.00	4,218.47	75.29	144.60	-0.02	-1,769.13	-331.69	6,759.35	6,723.25	36.10	187.242	
14,700.00	10,700.25	4,220.00	4,218.47	77.02	144.60	-0.02	-1,769.13	-331.69	6,791.06	6,754.28	36.78	184.629	
14,800.00	10,699.61	4,220.00	4,218.47	78.75	144.60	-0.02	-1,769.13	-331.69	6,824.09	6,786.63	37.47	182.136	
14,900.00	10,698.97	4,220.00	4,218.47	80.49	144.60	-0.02	-1,769.13	-331.69	6,858.43	6,820.27	38.15	179.756	
15,000.00	10,698.32	4,220.00	4,218.47	82.24	144.60	-0.02	-1,769.13	-331.69	6,894.04	6,855.20	38.84	177.485	
15,100.00	10,697.68	4,220.00	4,218.47	83.98	144.60	-0.02	-1,769.13	-331.69	6,930.91	6,891.38	39.53	175.316	
15,200.00	10,697.04	4,220.00	4,218.47	85.73	144.60	-0.02	-1,769.13	-331.69	6,969.02	6,928.80	40.23	173.246	
15,300.00	10,696.39	4,220.00	4,218.47	87.48	144.60	-0.02	-1,769.13	-331.69	7,008.35	6,967.43	40.92	171.269	
15,400.00	10,695.75	4,220.00	4,218.47	89.24	144.60	-0.02	-1,769.13	-331.69	7,048.88	7,007.27	41.62	169.380	
15,500.00	10,695.11	4,220.00	4,218.47	90.99	144.60	-0.02	-1,769.13	-331.69	7,090.59	7,048.28	42.31	167.576	
15,600.00	10,694.46	4,220.00	4,218.47	92.75	144.60	-0.02	-1,769.13	-331.69	7,133.46	7,090.45	43.01	165.851	
15,700.00	10,693.82	4,220.00	4,218.47	94.52	144.60	-0.02	-1,769.13	-331.69	7,177.47	7,133.75	43.71	164.204	
15,800.00	10,693.18	4,220.00	4,218.47	96.28	144.60	-0.02	-1,769.13	-331.69	7,222.59	7,178.18	44.41	162.628	
15,900.00	10,692.53	4,220.00	4,218.47	98.05	144.60	-0.02	-1,769.13	-331.69	7,268.80	7,223.69	45.11	161.122	
16,000.00	10,691.89	4,220.00	4,218.47	99.82	144.60	-0.02	-1,769.13	-331.69	7,316.10	7,270.28	45.82	159.682	
16,100.00	10,691.25	4,220.00	4,218.47	101.59	144.60	-0.02	-1,769.13	-331.69	7,364.44	7,317.92	46.52	158.304	
16,200.00	10,690.60	4,220.00	4,218.47	103.36	144.60	-0.02	-1,769.13	-331.69	7,413.82	7,366.60	47.23	156.986	
16,300.00	10,689.96	4,220.00	4,218.47	105.13	144.60	-0.02	-1,769.13	-331.69	7,464.22	7,416.28	47.93	155.725	
16,400.00	10,689.32	4,220.00	4,218.47	106.91	144.60	-0.02	-1,769.13	-331.69	7,515.60	7,466.96	48.64	154.518	
16,500.00	10,688.67	4,220.00	4,218.47	108.69	144.60	-0.02	-1,769.13	-331.69	7,567.96	7,518.61	49.35	153.362	
16,600.00	10,688.03	4,220.00	4,218.47	110.47	144.60	-0.02	-1,769.13	-331.69	7,621.27	7,571.21	50.06	152.256	
16,700.00	10,687.39	4,220.00	4,218.47	112.25	144.60	-0.02	-1,769.13	-331.69	7,675.51	7,624.75	50.76	151.197	
16,800.00	10,686.74	4,220.00	4,218.47	114.03	144.60	-0.02	-1,769.13	-331.69	7,730.67	7,679.20	51.48	150.183	
16,900.00	10,686.10	4,220.00	4,218.47	115.81	144.60	-0.02	-1,769.13	-331.69	7,786.72	7,734.53	52.19	149.211	
17,000.00	10,685.46	4,220.00	4,218.47	117.60	144.60	-0.02	-1,769.13	-331.69	7,843.64	7,790.75	52.90	148.280	
17,100.00	10,684.81	4,220.00	4,218.47	119.38	144.60	-0.02	-1,769.13	-331.69	7,901.42	7,847.81	53.61	147.388	
17,200.00	10,684.17	4,220.00	4,218.47	121.17	144.60	-0.02	-1,769.13	-331.69	7,960.04	7,905.72	54.32	146.533	
17,300.00	10,683.53	4,220.00	4,218.47	122.95	144.60	-0.02	-1,769.13	-331.69	8,019.48	7,964.44	55.04	145.714	
17,400.00	10,682.88	4,220.00	4,218.47	124.74	144.60	-0.02	-1,769.13	-331.69	8,079.71	8,023.96	55.75	144.928	
17,500.00	10,682.24	4,220.00	4,218.47	126.53	144.60	-0.02	-1,769.13	-331.69	8,140.73	8,084.27	56.46	144.175	
17,600.00	10,681.60	4,220.00	4,218.47	128.32	144.60	-0.02	-1,769.13	-331.69	8,202.52	8,145.34	57.18	143.453	
17,700.00	10,680.95	4,220.00	4,218.47	130.11	144.60	-0.02	-1,769.13	-331.69	8,265.05	8,207.15	57.89	142.760	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - PERKINS SWD #001 (4220'MD) - Wellbore #1 - Actual Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 500-INC-ONLY

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
17,800.00	10,680.31	4,220.00	4,218.47	131.91	144.60	-0.02	-1,769.13	-331.69	8,328.31	8,269.70	58.61	142.095	
17,848.12	10,680.00	4,220.00	4,218.47	132.77	144.60	-0.02	-1,769.13	-331.69	8,359.01	8,300.05	58.96	141.785	

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	13,030.00	6,377.12	0.00	122.14	-103.99	-161.87	-649.55	6,506.75				
100.00	100.00	13,030.00	6,377.12	0.08	122.14	-103.99	-161.87	-649.55	6,407.29	6,327.31	79.98	80.114	
200.00	200.00	13,030.00	6,377.12	0.31	122.14	-103.99	-161.87	-649.55	6,307.85	6,227.64	80.20	78.650	
300.00	300.00	13,030.00	6,377.12	0.53	122.14	-103.99	-161.87	-649.55	6,208.42	6,127.99	80.43	77.194	
400.00	400.00	13,030.00	6,377.12	0.76	122.14	-103.99	-161.87	-649.55	6,109.01	6,028.36	80.65	75.746	
500.00	500.00	13,030.00	6,377.12	0.98	122.14	-103.99	-161.87	-649.55	6,009.62	5,928.75	80.88	74.307	
600.00	600.00	13,030.00	6,377.12	1.21	122.14	-103.99	-161.87	-649.55	5,910.26	5,829.16	81.10	72.876	
700.00	700.00	13,030.00	6,377.12	1.43	122.14	-103.99	-161.87	-649.55	5,810.91	5,729.59	81.33	71.453	
800.00	800.00	13,030.00	6,377.12	1.66	122.14	-103.99	-161.87	-649.55	5,711.59	5,630.04	81.55	70.038	
900.00	900.00	13,030.00	6,377.12	1.88	122.14	-103.99	-161.87	-649.55	5,612.29	5,530.52	81.77	68.631	
1,000.00	1,000.00	13,030.00	6,377.12	2.11	122.14	-103.99	-161.87	-649.55	5,513.02	5,431.02	82.00	67.232	
1,100.00	1,100.00	13,030.00	6,377.12	2.33	122.14	-103.99	-161.87	-649.55	5,413.77	5,331.55	82.22	65.841	
1,200.00	1,200.00	13,030.00	6,377.12	2.56	122.14	-103.99	-161.87	-649.55	5,314.55	5,232.10	82.45	64.458	
1,300.00	1,300.00	13,030.00	6,377.12	2.78	122.14	-103.99	-161.87	-649.55	5,215.36	5,132.69	82.67	63.083	
1,400.00	1,400.00	13,030.00	6,377.12	3.01	122.14	-103.99	-161.87	-649.55	5,116.21	5,033.31	82.90	61.716	
1,500.00	1,500.00	13,030.00	6,377.12	3.23	122.14	-103.99	-161.87	-649.55	5,017.08	4,933.96	83.12	60.357	
1,600.00	1,600.00	13,030.00	6,377.12	3.46	122.14	-103.99	-161.87	-649.55	4,918.00	4,834.65	83.35	59.005	
1,700.00	1,700.00	13,030.00	6,377.12	3.68	122.14	-103.99	-161.87	-649.55	4,818.95	4,735.37	83.57	57.661	
1,800.00	1,800.00	13,030.00	6,377.12	3.91	122.14	-103.99	-161.87	-649.55	4,719.94	4,636.14	83.80	56.325	
1,900.00	1,900.00	13,030.00	6,377.12	4.13	122.14	-103.99	-161.87	-649.55	4,620.97	4,536.95	84.02	54.997	
2,000.00	2,000.00	13,030.00	6,377.12	4.35	122.14	-103.99	-161.87	-649.55	4,522.05	4,437.80	84.25	53.676	
2,100.00	2,100.00	13,030.00	6,377.12	4.58	122.14	-103.99	-161.87	-649.55	4,423.17	4,338.70	84.47	52.363	
2,200.00	2,200.00	13,030.00	6,377.12	4.80	122.14	-103.99	-161.87	-649.55	4,324.35	4,239.66	84.70	51.057	
2,300.00	2,300.00	13,030.00	6,377.12	5.03	122.14	-103.99	-161.87	-649.55	4,225.59	4,140.66	84.92	49.759	
2,400.00	2,400.00	13,030.00	6,377.12	5.25	122.14	-103.99	-161.87	-649.55	4,126.88	4,041.73	85.15	48.468	
2,500.00	2,500.00	13,030.00	6,377.12	5.48	122.14	-103.99	-161.87	-649.55	4,028.24	3,942.86	85.37	47.185	
2,600.00	2,600.00	13,030.00	6,377.12	5.70	122.14	-103.99	-161.87	-649.55	3,929.66	3,844.07	85.60	45.909	
2,700.00	2,700.00	13,030.00	6,377.12	5.93	122.14	-103.99	-161.87	-649.55	3,831.16	3,745.34	85.82	44.641	
2,800.00	2,800.00	13,030.00	6,377.12	6.15	122.14	-103.99	-161.87	-649.55	3,732.74	3,646.69	86.05	43.381	
2,850.01	2,850.01	13,030.00	6,377.12	6.27	122.14	-103.99	-161.87	-649.55	3,683.56	3,597.40	86.16	42.754	
2,900.00	2,900.00	13,030.00	6,377.12	6.37	122.14	-41.96	-161.87	-649.55	3,634.38	3,510.51	123.87	29.340	
3,000.00	2,999.98	13,030.00	6,377.12	6.58	122.14	-45.89	-161.87	-649.55	3,535.90	3,414.38	121.51	29.099	
3,100.00	3,099.92	13,030.00	6,377.12	6.80	122.14	-50.30	-161.87	-649.55	3,437.30	3,319.09	118.21	29.079	
3,166.82	3,166.65	13,030.00	6,377.12	6.94	122.14	-53.51	-161.87	-649.55	3,371.35	3,255.99	115.37	29.223	
3,200.00	3,199.79	13,030.00	6,377.12	7.01	122.14	-53.51	-161.87	-649.55	3,338.60	3,223.16	115.44	28.921	
3,300.00	3,299.64	13,030.00	6,377.12	7.23	122.14	-53.51	-161.87	-649.55	3,239.94	3,124.29	115.65	28.015	
3,400.00	3,399.48	13,030.00	6,377.12	7.44	122.14	-53.51	-161.87	-649.55	3,141.37	3,025.50	115.87	27.112	
3,500.00	3,499.33	13,030.00	6,377.12	7.66	122.14	-53.51	-161.87	-649.55	3,042.89	2,926.81	116.08	26.213	
3,600.00	3,599.18	13,030.00	6,377.12	7.89	122.14	-53.51	-161.87	-649.55	2,944.51	2,828.21	116.30	25.318	
3,700.00	3,699.02	13,030.00	6,377.12	8.11	122.14	-53.51	-161.87	-649.55	2,846.25	2,729.73	116.52	24.427	
3,800.00	3,798.87	13,030.00	6,377.12	8.33	122.14	-53.51	-161.87	-649.55	2,748.11	2,631.37	116.74	23.541	
3,900.00	3,898.72	13,030.00	6,377.12	8.56	122.14	-53.51	-161.87	-649.55	2,650.11	2,533.15	116.96	22.658	
4,000.00	3,998.57	13,030.00	6,377.12	8.78	122.14	-53.51	-161.87	-649.55	2,552.26	2,435.08	117.18	21.780	
4,100.00	4,098.41	13,030.00	6,377.12	9.01	122.14	-53.51	-161.87	-649.55	2,454.59	2,337.19	117.40	20.907	
4,200.00	4,198.26	13,030.00	6,377.12	9.24	122.14	-53.51	-161.87	-649.55	2,357.12	2,239.49	117.63	20.039	
4,300.00	4,298.11	13,030.00	6,377.12	9.47	122.14	-53.51	-161.87	-649.55	2,259.86	2,142.01	117.85	19.176	
4,400.00	4,397.95	13,030.00	6,377.12	9.70	122.14	-53.51	-161.87	-649.55	2,162.86	2,044.78	118.08	18.317	
4,500.00	4,497.80	13,030.00	6,377.12	9.93	122.14	-53.51	-161.87	-649.55	2,066.14	1,947.84	118.30	17.465	
4,600.00	4,597.65	13,030.00	6,377.12	10.16	122.14	-53.51	-161.87	-649.55	1,969.75	1,851.22	118.53	16.618	
4,700.00	4,697.50	13,030.00	6,377.12	10.39	122.14	-53.51	-161.87	-649.55	1,873.73	1,754.98	118.75	15.778	
4,800.00	4,797.34	13,030.00	6,377.12	10.62	122.14	-53.51	-161.87	-649.55	1,778.16	1,659.18	118.98	14.945	
4,900.00	4,897.19	13,030.00	6,377.12	10.85	122.14	-53.51	-161.87	-649.55	1,683.10	1,563.89	119.21	14.119	

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

Integrity Directional Services, LLC

Anticollision Report

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1 — **Offset Site Error:** 0.00 ft

Survey Program: 100-MWD — **Offset Well Error:** 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.00	4,997.04	13,030.00	6,377.12	11.09	122.14	-53.51	-161.87	-649.55	1,588.65	1,469.21	119.44	13.301	
5,100.00	5,096.88	13,030.00	6,377.12	11.32	122.14	-53.51	-161.87	-649.55	1,494.92	1,375.25	119.66	12.493	
5,200.00	5,196.73	13,030.00	6,377.12	11.56	122.14	-53.51	-161.87	-649.55	1,402.05	1,282.16	119.89	11.694	
5,300.00	5,296.58	13,030.00	6,377.12	11.79	122.14	-53.51	-161.87	-649.55	1,310.24	1,190.12	120.12	10.908	
5,400.00	5,396.43	13,030.00	6,377.12	12.03	122.14	-53.51	-161.87	-649.55	1,219.71	1,099.36	120.35	10.135	
5,500.00	5,496.27	13,030.00	6,377.12	12.26	122.14	-53.51	-161.87	-649.55	1,130.79	1,010.21	120.58	9.378	
5,600.00	5,596.12	13,030.00	6,377.12	12.50	122.14	-53.51	-161.87	-649.55	1,043.87	923.05	120.81	8.640	
5,700.00	5,695.97	13,030.00	6,377.12	12.73	122.14	-53.51	-161.87	-649.55	959.50	838.45	121.04	7.927	
5,800.00	5,795.81	13,030.00	6,377.12	12.97	122.14	-53.51	-161.87	-649.55	878.41	757.14	121.27	7.243	
5,900.00	5,895.66	13,030.00	6,377.12	13.21	122.14	-53.51	-161.87	-649.55	801.61	680.11	121.50	6.597	
6,000.00	5,995.51	13,030.00	6,377.12	13.44	122.14	-53.51	-161.87	-649.55	730.45	608.72	121.73	6.000	
6,100.00	6,095.36	13,030.00	6,377.12	13.68	122.14	-53.51	-161.87	-649.55	666.73	544.77	121.97	5.467	
6,200.00	6,195.20	13,030.00	6,377.12	13.92	122.14	-53.51	-161.87	-649.55	612.79	490.59	122.20	5.015	
6,300.00	6,295.05	13,030.00	6,377.12	14.16	122.14	-53.51	-161.87	-649.55	571.39	448.96	122.43	4.667	
6,400.00	6,394.90	13,030.00	6,377.12	14.40	122.14	-53.51	-161.87	-649.55	545.40	422.74	122.66	4.446	
6,495.12	6,489.87	13,030.00	6,377.12	14.62	122.14	-53.51	-161.87	-649.55	537.04	414.16	122.88	4.370	CC, ES
6,500.00	6,494.74	13,030.00	6,377.12	14.63	122.14	-53.51	-161.87	-649.55	537.06	414.17	122.89	4.370	SF
6,600.00	6,594.59	13,030.00	6,377.12	14.87	122.14	-53.51	-161.87	-649.55	547.19	424.06	123.13	4.444	
6,700.00	6,694.44	13,030.00	6,377.12	15.11	122.14	-53.51	-161.87	-649.55	574.79	451.44	123.36	4.660	
6,800.00	6,794.29	13,030.00	6,377.12	15.35	122.14	-53.51	-161.87	-649.55	617.55	493.96	123.59	4.997	
6,900.00	6,894.13	13,030.00	6,377.12	15.59	122.14	-53.51	-161.87	-649.55	672.56	548.74	123.82	5.432	
7,000.00	6,993.98	13,030.00	6,377.12	15.83	122.14	-53.51	-161.87	-649.55	737.10	613.04	124.06	5.942	
7,100.00	7,093.83	13,030.00	6,377.12	16.07	122.14	-53.51	-161.87	-649.55	808.88	684.59	124.29	6.508	
7,200.00	7,193.67	13,030.00	6,377.12	16.31	122.14	-53.51	-161.87	-649.55	886.15	761.63	124.52	7.116	
7,300.00	7,293.52	13,030.00	6,377.12	16.55	122.14	-53.51	-161.87	-649.55	967.60	842.84	124.76	7.756	
7,400.00	7,393.37	13,030.00	6,377.12	16.79	122.14	-53.51	-161.87	-649.55	1,052.24	927.25	124.99	8.419	
7,500.00	7,493.22	13,030.00	6,377.12	17.03	122.14	-53.51	-161.87	-649.55	1,139.38	1,014.16	125.22	9.099	
7,600.00	7,593.06	13,030.00	6,377.12	17.27	122.14	-53.51	-161.87	-649.55	1,228.48	1,103.02	125.46	9.792	
7,700.00	7,692.91	13,030.00	6,377.12	17.51	122.14	-53.51	-161.87	-649.55	1,319.15	1,193.45	125.69	10.495	
7,800.00	7,792.76	13,030.00	6,377.12	17.75	122.14	-53.51	-161.87	-649.55	1,411.07	1,285.14	125.93	11.206	
7,900.00	7,892.61	13,030.00	6,377.12	17.99	122.14	-53.51	-161.87	-649.55	1,504.03	1,377.87	126.16	11.922	
8,000.00	7,992.45	13,030.00	6,377.12	18.23	122.14	-53.51	-161.87	-649.55	1,597.83	1,471.44	126.39	12.642	
8,100.00	8,092.30	13,030.00	6,377.12	18.47	122.14	-53.51	-161.87	-649.55	1,692.35	1,565.72	126.63	13.365	
8,200.00	8,192.15	13,030.00	6,377.12	18.71	122.14	-53.51	-161.87	-649.55	1,787.46	1,660.60	126.86	14.090	
8,300.00	8,291.99	13,030.00	6,377.12	18.95	122.14	-53.51	-161.87	-649.55	1,883.08	1,755.98	127.10	14.816	
8,400.00	8,391.84	13,030.00	6,377.12	19.20	122.14	-53.51	-161.87	-649.55	1,979.14	1,851.80	127.33	15.543	
8,500.00	8,491.69	13,030.00	6,377.12	19.44	122.14	-53.51	-161.87	-649.55	2,075.56	1,947.99	127.57	16.270	
8,600.00	8,591.54	13,030.00	6,377.12	19.68	122.14	-53.51	-161.87	-649.55	2,172.31	2,044.51	127.80	16.997	
8,700.00	8,691.38	13,030.00	6,377.12	19.92	122.14	-53.51	-161.87	-649.55	2,269.34	2,141.30	128.04	17.724	
8,800.00	8,791.23	13,030.00	6,377.12	20.16	122.14	-53.51	-161.87	-649.55	2,366.62	2,238.35	128.27	18.450	
8,900.00	8,891.08	13,030.00	6,377.12	20.40	122.14	-53.51	-161.87	-649.55	2,464.11	2,335.61	128.51	19.175	
9,000.00	8,990.92	13,030.00	6,377.12	20.64	122.14	-53.51	-161.87	-649.55	2,561.80	2,433.06	128.74	19.899	
9,100.00	9,090.77	13,030.00	6,377.12	20.89	122.14	-53.51	-161.87	-649.55	2,659.66	2,530.69	128.98	20.621	
9,200.00	9,190.62	13,030.00	6,377.12	21.13	122.14	-53.51	-161.87	-649.55	2,757.68	2,628.46	129.21	21.342	
9,300.00	9,290.47	13,030.00	6,377.12	21.37	122.14	-53.51	-161.87	-649.55	2,855.83	2,726.38	129.45	22.062	
9,400.00	9,390.31	13,030.00	6,377.12	21.61	122.14	-53.51	-161.87	-649.55	2,954.10	2,824.42	129.68	22.779	
9,483.19	9,473.37	13,030.00	6,377.12	21.81	122.14	-53.51	-161.87	-649.55	3,035.94	2,906.06	129.88	23.375	
9,500.00	9,490.16	13,030.00	6,377.12	21.85	122.14	-54.28	-161.87	-649.55	3,052.49	2,923.30	129.19	23.628	
9,600.00	9,590.06	13,030.00	6,377.12	22.03	122.14	-59.22	-161.87	-649.55	3,151.09	3,026.89	124.21	25.370	
9,700.00	9,690.03	13,030.00	6,377.12	22.21	122.14	-64.93	-161.87	-649.55	3,249.92	3,132.45	117.47	27.666	
9,800.00	9,790.02	13,030.00	6,377.12	22.39	122.14	-135.27	-161.87	-649.55	3,348.91	3,240.49	108.42	30.887	
9,900.00	9,890.02	13,030.00	6,377.12	22.58	122.14	-135.27	-161.87	-649.55	3,448.01	3,339.40	108.61	31.745	

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

Integrity Directional Services, LLC

Anticollision Report

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,000.00	9,990.02	13,030.00	6,377.12	22.79	122.14	-135.27	-161.87	-649.55	3,547.16	3,438.34	108.82	32.595	
10,100.00	10,090.02	13,030.00	6,377.12	23.00	122.14	-135.27	-161.87	-649.55	3,646.36	3,537.32	109.03	33.442	
10,200.00	10,190.02	13,030.00	6,377.12	23.20	122.14	-135.27	-161.87	-649.55	3,745.59	3,636.35	109.24	34.287	
10,256.52	10,246.54	13,030.00	6,377.12	23.32	122.14	-135.27	-161.87	-649.55	3,801.70	3,692.33	109.36	34.762	
10,275.00	10,265.02	13,030.00	6,377.12	23.36	122.14	34.20	-161.87	-649.55	3,820.01	3,727.04	92.97	41.088	
10,300.00	10,289.96	13,030.00	6,377.12	23.40	122.14	25.58	-161.87	-649.55	3,844.65	3,767.01	77.63	49.523	
10,325.00	10,314.79	13,030.00	6,377.12	23.44	122.14	20.28	-161.87	-649.55	3,869.06	3,801.19	67.86	57.013	
10,350.00	10,339.43	13,030.00	6,377.12	23.48	122.14	16.77	-161.87	-649.55	3,893.18	3,831.68	61.50	63.303	
10,375.00	10,363.81	13,030.00	6,377.12	23.51	122.14	14.28	-161.87	-649.55	3,916.97	3,859.63	57.34	68.317	
10,400.00	10,387.87	13,030.00	6,377.12	23.54	122.14	12.45	-161.87	-649.55	3,940.35	3,885.67	54.68	72.067	
10,425.00	10,411.55	13,030.00	6,377.12	23.57	122.14	11.05	-161.87	-649.55	3,963.27	3,910.17	53.10	74.644	
10,450.00	10,434.77	13,030.00	6,377.12	23.60	122.14	9.94	-161.87	-649.55	3,985.68	3,933.38	52.30	76.207	
10,475.00	10,457.48	13,030.00	6,377.12	23.63	122.14	9.05	-161.87	-649.55	4,007.52	3,955.45	52.08	76.954	
10,500.00	10,479.61	13,030.00	6,377.12	23.66	122.14	8.32	-161.87	-649.55	4,028.75	3,976.49	52.26	77.092	
10,525.00	10,501.10	13,030.00	6,377.12	23.68	122.14	7.72	-161.87	-649.55	4,049.32	3,996.60	52.72	76.806	
10,550.00	10,521.89	13,030.00	6,377.12	23.71	122.14	7.21	-161.87	-649.55	4,069.17	4,015.80	53.37	76.245	
10,575.00	10,541.93	13,030.00	6,377.12	23.73	122.14	6.77	-161.87	-649.55	4,088.28	4,034.15	54.13	75.523	
10,600.00	10,561.15	13,030.00	6,377.12	23.76	122.14	6.40	-161.87	-649.55	4,106.59	4,051.63	54.96	74.724	
10,625.00	10,579.52	13,030.00	6,377.12	23.78	122.14	6.09	-161.87	-649.55	4,124.06	4,068.26	55.80	73.904	
10,650.00	10,596.97	13,030.00	6,377.12	23.81	122.14	5.81	-161.87	-649.55	4,140.67	4,084.02	56.64	73.102	
10,675.00	10,613.46	13,030.00	6,377.12	23.83	122.14	5.57	-161.87	-649.55	4,156.36	4,098.91	57.45	72.342	
10,700.00	10,628.95	13,030.00	6,377.12	23.86	122.14	5.36	-161.87	-649.55	4,171.12	4,112.90	58.22	71.640	
10,725.00	10,643.39	13,030.00	6,377.12	23.89	122.14	5.18	-161.87	-649.55	4,184.91	4,125.97	58.94	71.003	
10,750.00	10,656.74	13,022.11	6,377.28	23.92	122.00	5.01	-169.75	-649.11	4,197.70	4,138.16	59.54	70.501	
10,775.00	10,668.97	13,000.11	6,377.70	23.96	121.61	4.84	-191.71	-647.88	4,209.38	4,149.40	59.98	70.185	
10,800.00	10,680.04	12,977.53	6,378.13	24.00	121.21	4.69	-214.25	-646.62	4,219.88	4,159.54	60.34	69.933	
10,825.00	10,689.92	12,957.49	6,378.51	24.05	120.86	4.57	-234.25	-645.51	4,229.20	4,168.53	60.67	69.712	
10,850.00	10,698.58	12,937.63	6,378.87	24.10	120.50	4.46	-254.08	-644.45	4,237.31	4,176.38	60.94	69.537	
10,875.00	10,706.01	12,917.44	6,379.22	24.16	120.14	4.37	-274.24	-643.39	4,244.21	4,183.05	61.15	69.401	
10,900.00	10,712.17	12,896.97	6,379.56	24.23	119.78	4.30	-294.67	-642.35	4,249.86	4,188.53	61.33	69.295	
10,925.00	10,717.06	12,883.00	6,379.79	24.31	119.53	4.25	-308.63	-641.66	4,254.26	4,192.74	61.52	69.152	
10,950.00	10,720.66	12,862.14	6,380.09	24.39	119.16	4.20	-329.46	-640.66	4,257.41	4,195.77	61.63	69.076	
10,975.00	10,722.97	12,846.28	6,380.28	24.48	118.88	4.18	-345.30	-639.92	4,259.31	4,197.55	61.76	68.960	
11,000.00	10,723.96	12,830.38	6,380.44	24.59	118.59	4.16	-361.19	-639.20	4,259.97	4,198.09	61.88	68.844	
11,009.59	10,724.00	12,824.27	6,380.49	24.63	118.49	4.16	-367.29	-638.92	4,259.89	4,197.97	61.92	68.798	
11,100.00	10,723.41	12,761.42	6,380.77	25.07	117.37	4.12	-430.09	-636.26	4,258.60	4,196.97	61.63	69.101	
11,200.00	10,722.77	12,695.00	6,380.78	25.68	116.19	4.08	-496.45	-633.70	4,257.71	4,196.34	61.37	69.376	
11,273.91	10,722.30	12,638.03	6,380.47	26.21	115.20	4.06	-553.40	-631.80	4,257.49	4,196.34	61.15	69.623	
11,300.00	10,722.13	12,621.58	6,380.30	26.40	114.91	4.05	-569.84	-631.31	4,257.53	4,196.43	61.10	69.680	
11,400.00	10,721.48	12,558.86	6,379.32	27.23	113.83	4.02	-632.52	-629.55	4,258.23	4,197.28	60.95	69.866	
11,500.00	10,720.84	12,507.00	6,378.07	28.15	112.94	4.00	-684.34	-627.80	4,259.84	4,198.93	60.91	69.937	
11,600.00	10,720.20	12,442.03	6,375.83	29.16	111.84	3.95	-749.20	-624.91	4,262.39	4,201.59	60.80	70.106	
11,700.00	10,719.55	12,308.60	6,370.35	30.24	109.55	3.83	-882.23	-616.20	4,265.50	4,205.31	60.18	70.875	
11,800.00	10,718.91	12,093.16	6,365.22	31.39	105.83	3.64	-1,097.18	-602.73	4,267.21	4,208.24	58.97	72.365	
11,900.00	10,718.27	11,990.96	6,364.94	32.60	104.03	3.58	-1,199.29	-598.57	4,266.56	4,207.90	58.66	72.739	
11,963.00	10,717.86	11,946.00	6,364.65	33.40	103.24	3.56	-1,244.22	-597.08	4,266.43	4,207.81	58.62	72.780	
12,000.00	10,717.62	11,917.30	6,364.37	33.87	102.73	3.55	-1,272.90	-596.22	4,266.47	4,207.89	58.58	72.828	
12,100.00	10,716.98	11,851.00	6,363.57	35.18	101.56	3.52	-1,339.18	-594.51	4,266.93	4,208.34	58.59	72.831	
12,200.00	10,716.34	11,773.53	6,362.15	36.54	100.22	3.50	-1,416.62	-593.09	4,268.03	4,209.50	58.53	72.923	
12,300.00	10,715.69	11,596.69	6,360.65	37.94	97.19	3.48	-1,593.45	-592.27	4,267.85	4,210.10	57.75	73.897	
12,400.00	10,715.05	11,458.19	6,360.84	39.37	94.81	3.51	-1,731.92	-594.59	4,267.18	4,209.89	57.29	74.481	
12,500.00	10,714.41	11,382.00	6,361.03	40.84	93.48	3.53	-1,808.09	-596.39	4,266.38	4,209.08	57.30	74.457	

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

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1

Offset Site Error: 0.00 ft

Survey Program: 100-MWD

Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
12,565.57	10,713.99	11,342.36	6,360.90	41.82	92.80	3.54	-1,847.72	-597.42	4,266.23	4,208.84	57.39	74.339	
12,600.00	10,713.76	11,316.52	6,360.76	42.33	92.35	3.55	-1,873.54	-598.15	4,266.26	4,208.86	57.40	74.325	
12,700.00	10,713.12	11,226.98	6,360.01	43.85	90.81	3.59	-1,963.03	-601.00	4,266.63	4,209.29	57.34	74.412	
12,800.00	10,712.48	11,157.58	6,359.27	45.39	89.63	3.62	-2,032.40	-603.30	4,267.29	4,209.86	57.43	74.302	
12,900.00	10,711.83	11,100.00	6,358.00	46.95	88.66	3.63	-2,089.94	-604.75	4,268.97	4,211.35	57.62	74.089	
13,000.00	10,711.19	11,032.16	6,355.85	48.52	87.52	3.64	-2,157.74	-605.49	4,271.53	4,213.79	57.74	73.983	
13,100.00	10,710.55	10,912.00	6,351.68	50.12	85.47	3.63	-2,277.83	-604.84	4,274.32	4,216.85	57.47	74.375	
13,200.00	10,709.90	10,818.00	6,348.73	51.73	83.86	3.62	-2,371.78	-604.67	4,276.79	4,219.38	57.40	74.502	
13,300.00	10,709.26	10,724.00	6,345.61	53.35	82.26	3.61	-2,465.73	-604.67	4,279.44	4,222.09	57.35	74.623	
13,400.00	10,708.62	10,473.59	6,340.20	54.99	78.05	3.60	-2,716.06	-604.54	4,281.78	4,225.63	56.14	76.265	
13,500.00	10,707.97	10,386.02	6,340.37	56.63	76.55	3.59	-2,803.63	-604.05	4,280.92	4,224.77	56.14	76.248	
13,532.70	10,707.76	10,368.92	6,340.32	57.18	76.25	3.59	-2,820.72	-604.04	4,280.80	4,224.57	56.23	76.128	
13,600.00	10,707.33	10,316.00	6,339.77	58.29	75.32	3.59	-2,873.64	-604.29	4,281.02	4,224.74	56.28	76.063	
13,700.00	10,706.69	10,263.59	6,338.87	59.96	74.44	3.60	-2,926.04	-604.85	4,281.95	4,225.40	56.56	75.711	
13,800.00	10,706.04	10,005.55	6,339.69	61.63	70.13	3.65	-3,184.01	-609.30	4,280.61	4,225.27	55.34	77.350	
13,900.00	10,705.40	9,917.65	6,341.23	63.32	68.63	3.66	-3,271.89	-610.27	4,278.28	4,222.91	55.37	77.274	
14,000.00	10,704.76	9,755.00	6,344.18	65.01	65.89	3.68	-3,434.50	-611.56	4,276.14	4,221.30	54.85	77.964	
14,100.00	10,704.11	9,685.88	6,346.22	66.71	64.70	3.68	-3,503.59	-611.89	4,272.67	4,217.66	55.02	77.663	
14,200.00	10,703.47	9,661.00	6,346.72	68.41	64.27	3.69	-3,528.47	-612.05	4,270.53	4,215.02	55.51	76.932	
14,286.92	10,702.91	9,621.42	6,346.93	69.90	63.60	3.69	-3,568.04	-612.06	4,269.80	4,213.99	55.81	76.505	
14,300.00	10,702.83	9,617.73	6,346.90	70.12	63.54	3.68	-3,571.74	-612.03	4,269.82	4,213.94	55.87	76.421	
14,400.00	10,702.18	9,565.00	6,345.55	71.84	62.64	3.67	-3,624.44	-611.13	4,271.13	4,214.96	56.16	76.047	
14,500.00	10,701.54	9,565.00	6,345.55	73.56	62.64	3.67	-3,624.44	-611.13	4,273.62	4,216.77	56.85	75.175	
14,600.00	10,700.90	9,470.00	6,341.24	75.29	61.04	3.63	-3,719.30	-608.23	4,277.30	4,220.48	56.83	75.270	
14,700.00	10,700.25	9,425.62	6,338.82	77.02	60.29	3.60	-3,763.57	-606.45	4,281.78	4,224.60	57.18	74.879	
14,800.00	10,699.61	9,069.11	6,326.53	78.75	54.39	3.43	-4,119.55	-595.50	4,285.69	4,230.47	55.22	77.617	
14,900.00	10,698.97	8,994.00	6,326.32	80.49	53.13	3.41	-4,194.65	-594.14	4,285.17	4,229.82	55.35	77.413	
15,000.00	10,698.32	8,885.69	6,325.87	82.24	51.35	3.38	-4,302.93	-591.82	4,284.80	4,229.55	55.25	77.553	
15,100.00	10,697.68	8,804.00	6,325.32	83.98	49.96	3.34	-4,384.59	-589.42	4,284.62	4,229.28	55.34	77.423	
15,103.52	10,697.66	8,804.00	6,325.32	84.04	49.96	3.34	-4,384.59	-589.42	4,284.62	4,229.26	55.37	77.388	
15,200.00	10,697.04	8,745.12	6,324.51	85.73	48.97	3.32	-4,443.44	-587.62	4,285.10	4,229.50	55.60	77.066	
15,300.00	10,696.39	8,626.19	6,322.47	87.48	46.98	3.28	-4,562.31	-584.97	4,286.09	4,230.66	55.43	77.330	
15,400.00	10,695.75	8,528.15	6,321.37	89.24	45.31	3.26	-4,660.34	-583.62	4,286.48	4,231.07	55.41	77.361	
15,500.00	10,695.11	8,452.33	6,320.28	90.99	44.07	3.25	-4,736.15	-583.14	4,287.22	4,231.66	55.56	77.164	
15,600.00	10,694.46	8,240.71	6,320.05	92.75	40.57	3.23	-4,947.75	-582.63	4,286.32	4,231.59	54.73	78.317	
15,700.00	10,693.82	8,174.19	6,320.40	94.52	39.45	3.23	-5,014.28	-582.29	4,285.13	4,230.17	54.95	77.976	
15,784.12	10,693.28	8,140.00	6,320.35	96.00	38.87	3.23	-5,048.46	-582.11	4,284.84	4,229.54	55.30	77.482	
15,800.00	10,693.18	8,115.03	6,320.20	96.28	38.46	3.22	-5,073.43	-582.00	4,284.80	4,229.56	55.23	77.576	
15,900.00	10,692.53	8,045.00	6,319.11	98.05	37.31	3.22	-5,143.45	-581.94	4,285.59	4,230.15	55.44	77.306	
16,000.00	10,691.89	7,959.27	6,317.37	99.82	35.95	3.22	-5,229.16	-582.56	4,286.95	4,231.41	55.53	77.197	
16,100.00	10,691.25	7,876.67	6,315.73	101.59	34.67	3.23	-5,311.74	-583.17	4,288.32	4,232.67	55.65	77.054	
16,200.00	10,690.60	7,714.45	6,312.86	103.36	32.22	3.20	-5,473.93	-581.69	4,289.48	4,234.28	55.20	77.704	
16,300.00	10,689.96	7,578.50	6,312.38	105.13	30.11	3.17	-5,609.87	-579.87	4,289.06	4,234.11	54.95	78.059	
16,400.00	10,689.32	7,505.00	6,312.10	106.91	28.98	3.17	-5,683.36	-579.39	4,288.74	4,233.59	55.14	77.777	
16,500.00	10,688.67	7,352.00	6,312.28	108.69	26.74	3.15	-5,836.36	-578.60	4,287.86	4,233.08	54.79	78.263	
16,598.69	10,688.04	7,308.63	6,312.28	110.44	26.08	3.14	-5,879.72	-578.16	4,287.20	4,232.01	55.19	77.677	
16,600.00	10,688.03	7,308.09	6,312.28	110.47	26.07	3.14	-5,880.27	-578.15	4,287.20	4,232.00	55.20	77.669	
16,700.00	10,687.39	7,260.00	6,311.56	112.25	25.34	3.14	-5,928.35	-577.87	4,287.91	4,232.33	55.58	77.147	
16,800.00	10,686.74	7,170.27	6,309.60	114.03	24.10	3.14	-6,018.05	-577.94	4,289.42	4,233.73	55.69	77.027	
16,900.00	10,686.10	7,077.00	6,307.73	115.81	22.81	3.14	-6,111.31	-578.35	4,290.81	4,235.03	55.78	76.923	
17,000.00	10,685.46	7,001.26	6,305.95	117.60	21.73	3.14	-6,187.03	-578.94	4,292.59	4,236.58	56.00	76.652	
17,100.00	10,684.81	6,921.79	6,303.53	119.38	20.69	3.16	-6,266.44	-580.27	4,295.05	4,238.84	56.21	76.409	

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

Integrity Directional Services, LLC

Anticollision Report

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 30, T 26 S. , R 29 E - Ridge Nose Fed Com 1H - Wellbore #1 - Wellbore #1 — **Offset Site Error:** 0.00 ft

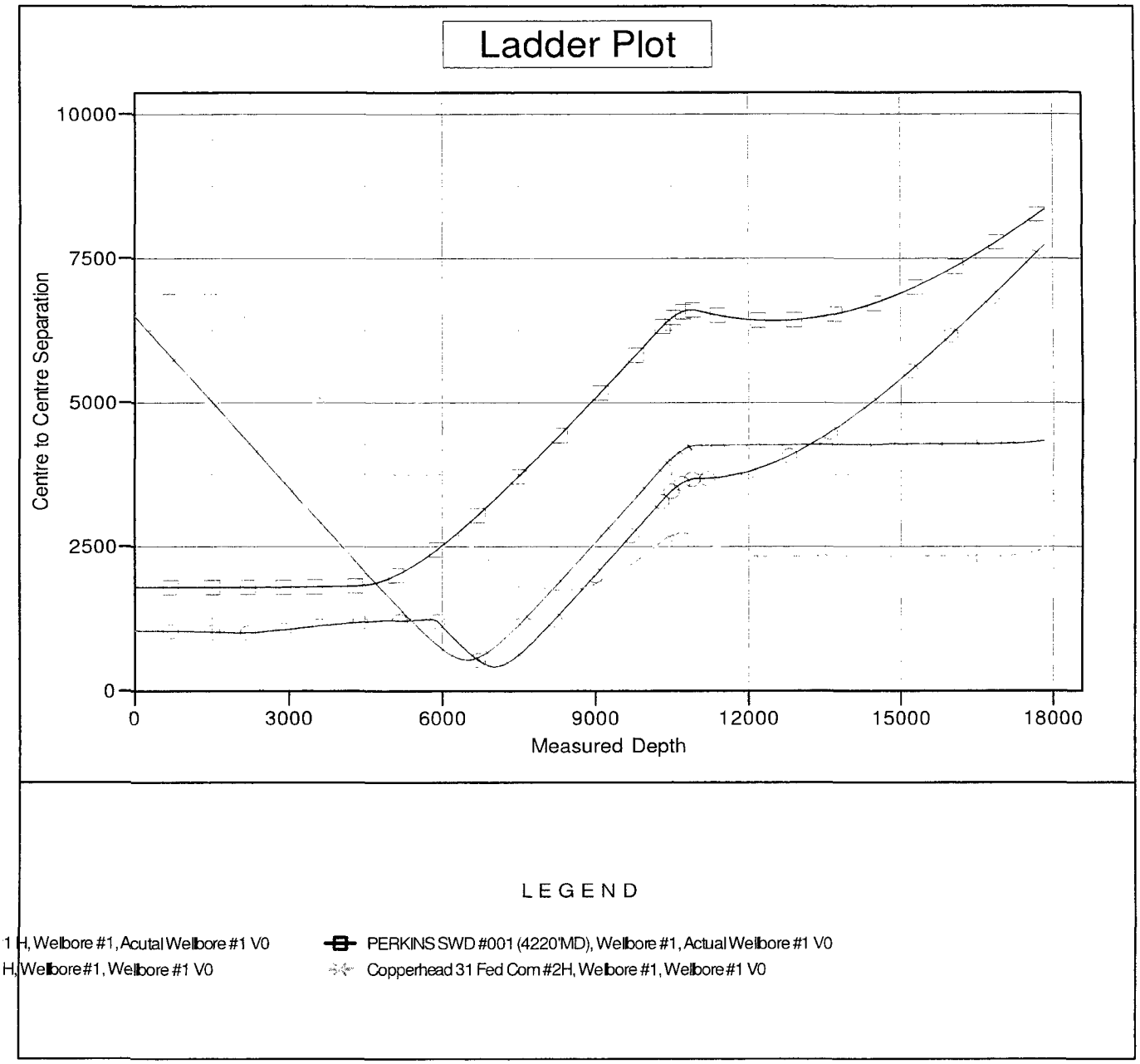
Survey Program: 100-MWD — **Offset Well Error:** 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
17,200.00	10,684.17	6,780.84	6,300.67	121.17	18.93	3.22	-6,407.27	-585.33	4,296.37	4,240.30	56.07	76.620	
17,300.00	10,683.53	6,750.41	6,299.79	122.95	18.54	3.24	-6,437.65	-586.73	4,298.88	4,242.27	56.62	75.929	
17,400.00	10,682.88	6,736.00	6,299.20	124.74	18.35	3.24	-6,452.03	-587.42	4,303.13	4,245.87	57.25	75.158	
17,500.00	10,682.24	6,704.00	6,297.19	126.53	17.95	3.26	-6,483.92	-589.06	4,309.17	4,251.37	57.80	74.558	
17,600.00	10,681.60	6,688.71	6,295.87	128.32	17.76	3.27	-6,499.13	-589.90	4,317.10	4,258.66	58.43	73.879	
17,700.00	10,680.95	6,672.00	6,294.23	130.11	17.55	3.28	-6,515.74	-590.84	4,326.84	4,267.78	59.07	73.255	
17,800.00	10,680.31	6,641.00	6,290.43	131.91	17.18	3.31	-6,546.44	-592.75	4,338.52	4,278.89	59.63	72.761	
17,848.12	10,680.00	6,641.00	6,290.43	132.77	17.18	3.31	-6,546.44	-592.75	4,344.71	4,284.73	59.97	72.442	

Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=25' @ 3013.80ft (Latshaw 44)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

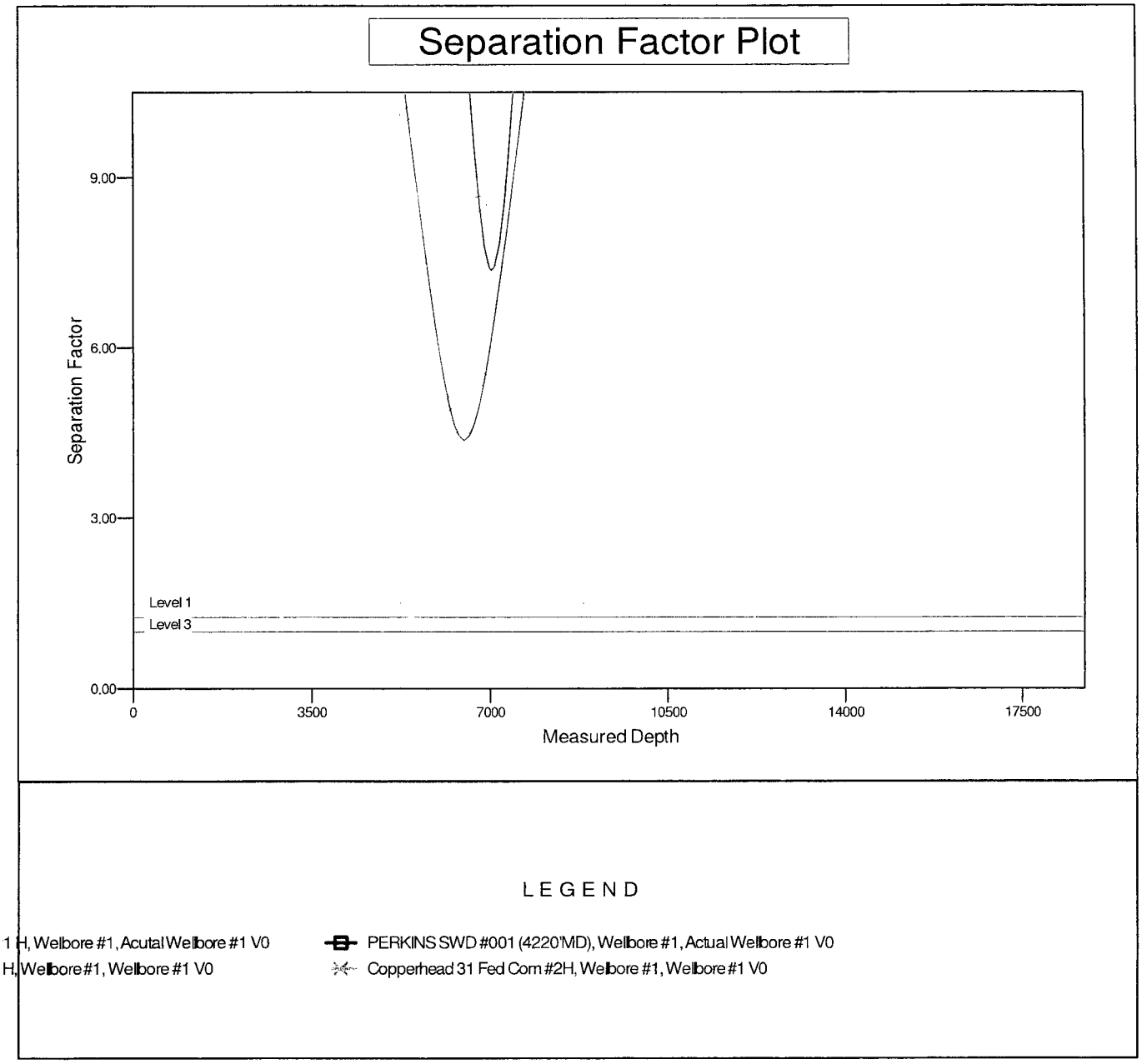
Coordinates are relative to: Copperhead 31 Fed Com 21H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.17°



Company:	COG Production, LLC	**Local Co-ordinate Reference:**	Well Copperhead 31 Fed Com 21H
Project:	Lea County, NM (NAD 27)	**TVD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Reference Site:	Sec. 30, T 26 S. , R 29 E	**MD Reference:**	KB=25' @ 3013.80ft (Latshaw 44)
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Copperhead 31 Fed Com 21H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #3	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=25' @ 3013.80ft (Latshaw 44)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Copperhead 31 Fed Com 21H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.17°



LEGEND

1 H, Wellbore #1, Acutal Wellbore #1 V0
H, Wellbore #1, Wellbore #1 V0
PERKINS SWD #001 (4220'MD), Wellbore #1, Actual Wellbore #1 V0
Copperhead 31 Fed Com #2H, Wellbore #1, Wellbore #1 V0

PHOENIX
TECHNOLOGY SERVICES

May 8, 2017

Oil Conservation Division
State of New Mexico
811 S. First St.
Artesia, New Mexico 88210

Dear District 2 - Artesia

Attention: Regulatory Department

Re: Apache Corporation
Hummingbird Federal Com #16H
Eddy County, NM
API #30-015-43481
Job No. 61124

Enclosed please find the Survey Data Certification, and the original Plat and one copy of the Survey Report performed on the above referenced Well by Phoenix Technology Services, Inc. (P-5 No. 664171). Other information required by your office is as follows:

Name & Title of Surveyor	Drain Hole Number	Surveyed Depths		Dates Performed		Type of Survey
		From	To	Start	End	
George Rayl	16H	4,847	10,006	4/24/17	4/28/17	MWD

A certified plat on which the bottom hole location is oriented both to the surface location and to the lease lines (or unit lines in case of pooling) is attached to the survey report. If any other information is required, please contact the undersigned at the letterhead address and phone number.

Best Regards,

Brittany Carley

Brittany Carley
Operations Administrator

12329 Cutten Rd. Houston, TX 77066 • Phone (713) 337-0600 • Fax (713) 337-0599
www.phxtech.com

SURVEY DATA CERTIFICATION

PHOENIX
TECHNOLOGY SERVICES

Job #:	61124
Client:	Apache - TX
County & State:	Eddy, NM
Well:	Hummingbird Federal Com #16H
API No:	30-015-43481
Proposed Direction:	89.57

TIE-IN DATA

MD	TVD	INC	AZM	N/-S	E/-W	DATA SOURCE
4795.00 ft	4794.74 ft	0.58	128.02	-13.35	-32.45	Gyro
				Data Source Company:		Phoenix

SURVEY DATA

First Survey Date	First Survey Depth	INC	AZM
24-Apr-17	4,847 ft	0.50°	240.98°

Last Survey Date	Last Survey Depth	INC	AZM
28-Apr-17	10,006 ft	89.75°	89.91°

Survey Instrument Type
Phoenix MWD

Projected TD Survey Date	Projected TD Survey Depth	INC	AZM
28-Apr-17	10,073 ft	89.75°	89.91°

CORRECTION INFORMATION

Magnetic Declination Used	7.33	degrees
Grid Convergence Used	0.27	degrees
Total Correction	7.06	degrees

Corrected to True/Grid North
Grid

TO THE BEST OF MY KNOWLEDGE, I CERTIFY THIS SURVEY DATA TO BE TRUE AND CORRECT.

JOR
Signature

April 28, 2017
Date

Apache
EXPLORING WHAT'S POSSIBLE

Apache Corporation

Eddy County, NM (NAD27 NME)
Hummingbird Federal Com
#16H

OH / Job #61124

Survey: Phoenix MWD Surveys

Standard Survey Report

29 April, 2017

PHOENIX
TECHNOLOGY SERVICES

Phoenix Technology Services LP

Survey Report

Company:	Apache Corporation	**Local Co-ordinate Reference:**	Well #16H
Project:	Eddy County, NM (NAD27 NME)	**TVD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Site:	Hummingbird Federal Com	**MD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Well:	#16H	**North Reference:**	Grid
Wellbore:	OH / Job #61124	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Trinidad 436)	**Database:**	Compass 5000 GCR

Project	Eddy County, NM (NAD27 NME)		
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	Hummingbird Federal Com				
Site Position:		**Northing:**	677,262.80 usft	**Latitude:**	32° 51' 39.07462 N
From:	Map	**Easting:**	655,481.80 usft	**Longitude:**	103° 49' 37.14798 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.27 °

Well	#16H					
Well Position	**+N/-S**	0.00 usft	**Northing:**	680,351.80 usft	**Latitude:**	32° 52' 9.69771 N
	+E/-W	0.00 usft	**Easting:**	654,265.30 usft	**Longitude:**	103° 49' 51.23729 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	4,037.00 usft

Wellbore	OH / Job #61124			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	5/26/2017	7.33	60.83	48,430

Design	Surveys (Trinidad 436)				
Audit Notes:					
Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.00	0.00	0.00	89.57	

Survey Program **Date** 4/29/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
81.77	4,795.00	Phoenix Gyro Surveys (OH / Job #61124)	PHX_SPT_GTD	PHX Continuous north-seeking gyro
4,847.00	10,073.00	Phoenix MWD Surveys (OH / Job #61124)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

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)
4,795.00	0.58	128.02	4,794.74	-13.35	-32.45	-32.55	0.00	0.00	0.00
4,847.00	0.50	240.98	4,846.74	-13.62	-32.44	-32.54	1.73	-0.15	217.23
First Phoenix Survey									
4,910.00	1.40	87.47	4,909.73	-13.72	-31.91	-32.01	2.95	1.43	-243.67
4,972.00	9.44	89.99	4,971.40	-13.69	-26.06	-26.16	12.97	12.97	4.06
5,035.00	18.26	85.41	5,032.51	-12.89	-11.02	-11.12	14.10	14.00	-7.27
5,098.00	26.65	84.66	5,090.69	-10.78	12.92	12.84	13.32	13.32	-1.19
5,160.00	33.18	88.29	5,144.40	-8.98	43.76	43.69	10.93	10.53	5.85
5,223.00	38.13	89.74	5,195.58	-8.38	80.47	80.40	7.97	7.86	2.30
5,286.00	44.05	90.06	5,243.04	-8.31	121.85	121.79	9.40	9.40	0.51

Company:	Apache Corporation	**Local Co-ordinate Reference:**	Well #16H
Project:	Eddy County, NM (NAD27 NME)	**TVD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Site:	Hummingbird Federal Com	**MD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Well:	#16H	**North Reference:**	Grid
Wellbore:	OH / Job #61124	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Trinidad 436)	**Database:**	Compass 5000 GCR

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)
5,348.00	48.36	90.75	5,285.93	-8.64	166.59	166.53	7.00	6.95	1.11
5,410.00	51.46	91.75	5,325.86	-9.68	214.01	213.93	5.15	5.00	1.61
5,473.00	58.81	91.71	5,361.85	-11.24	265.64	265.55	11.67	11.67	-0.06
5,535.00	63.64	91.02	5,391.68	-12.53	319.95	319.85	7.85	7.79	-1.11
5,598.00	66.92	91.27	5,418.03	-13.67	377.16	377.05	5.22	5.21	0.40
5,661.00	75.18	91.22	5,438.47	-14.97	436.68	436.56	13.11	13.11	-0.08
5,686.00	78.80	91.17	5,444.09	-15.47	461.03	460.90	14.48	14.48	-0.20
5,725.00	82.53	91.37	5,450.42	-16.33	499.50	499.36	9.58	9.56	0.51
5,786.00	88.26	90.44	5,455.31	-17.29	560.27	560.12	9.52	9.39	-1.52
5,847.00	88.23	90.24	5,457.18	-17.65	621.24	621.09	0.33	-0.05	-0.33
5,909.00	88.10	89.86	5,459.17	-17.70	683.20	683.05	0.65	-0.21	-0.61
5,972.00	88.38	89.48	5,461.10	-17.34	746.17	746.02	0.75	0.44	-0.60
6,034.00	90.59	88.48	5,461.66	-16.24	808.16	808.01	3.91	3.56	-1.61
6,096.00	93.11	87.68	5,459.66	-14.16	870.08	869.96	4.26	4.06	-1.29
6,159.00	93.64	88.13	5,455.95	-11.86	932.93	932.82	1.10	0.84	0.71
6,222.00	91.20	90.17	5,453.29	-10.93	995.86	995.75	5.05	-3.87	3.24
6,283.00	90.17	90.96	5,452.56	-11.53	1,056.85	1,056.74	2.13	-1.69	1.30
6,345.00	89.75	90.63	5,452.60	-12.39	1,118.85	1,118.72	0.86	-0.68	-0.53
6,408.00	88.01	90.39	5,453.83	-12.95	1,181.83	1,181.70	2.79	-2.76	-0.38
6,470.00	88.35	90.73	5,455.80	-13.56	1,243.80	1,243.66	0.78	0.55	0.55
6,532.00	88.60	90.89	5,457.45	-14.43	1,305.77	1,305.62	0.48	0.40	0.26
6,594.00	88.93	90.90	5,458.79	-15.40	1,367.74	1,367.59	0.53	0.53	0.02
6,656.00	89.02	90.24	5,459.90	-16.02	1,429.73	1,429.57	1.07	0.15	-1.06
6,718.00	89.11	90.10	5,460.91	-16.20	1,491.72	1,491.56	0.27	0.15	-0.23
6,781.00	87.25	89.46	5,462.91	-15.96	1,554.69	1,554.53	3.12	-2.95	-1.02
6,843.00	87.34	89.80	5,465.84	-15.56	1,616.62	1,616.46	0.57	0.15	0.55
6,905.00	87.43	88.83	5,468.67	-14.82	1,678.55	1,678.39	1.57	0.15	-1.56
6,967.00	86.73	87.67	5,471.82	-12.93	1,740.44	1,740.29	2.18	-1.13	-1.87
7,030.00	87.31	87.70	5,475.10	-10.39	1,803.30	1,803.17	0.92	0.92	0.05
7,092.00	90.00	86.71	5,476.56	-7.36	1,865.20	1,865.10	4.62	4.34	-1.60
7,155.00	88.66	87.09	5,477.29	-3.96	1,928.10	1,928.02	2.21	-2.13	0.60
7,217.00	88.77	87.26	5,478.68	-0.90	1,990.01	1,989.95	0.33	0.18	0.27
7,279.00	89.05	87.19	5,479.86	2.10	2,051.93	2,051.89	0.47	0.45	-0.11
7,341.00	89.37	87.49	5,480.72	4.98	2,113.86	2,113.84	0.71	0.52	0.48
7,403.00	89.52	87.68	5,481.32	7.59	2,175.80	2,175.80	0.39	0.24	0.31
7,466.00	89.81	87.66	5,481.69	10.15	2,238.75	2,238.76	0.46	0.46	-0.03
7,528.00	89.83	87.95	5,481.88	12.52	2,300.70	2,300.73	0.47	0.03	0.47
7,590.00	88.71	87.81	5,482.67	14.82	2,362.65	2,362.70	1.82	-1.81	-0.23
7,652.00	88.80	88.02	5,484.02	17.07	2,424.60	2,424.66	0.37	0.15	0.34
7,714.00	89.27	88.26	5,485.06	19.08	2,486.55	2,486.63	0.85	0.76	0.39
7,776.00	89.44	87.84	5,485.76	21.19	2,548.51	2,548.60	0.73	0.27	-0.68
7,838.00	89.55	87.73	5,486.31	23.59	2,610.46	2,610.57	0.25	0.18	-0.18
7,900.00	89.61	88.01	5,486.76	25.89	2,672.42	2,672.54	0.46	0.10	0.45

Company:	Apache Corporation	**Local Co-ordinate Reference:**	Well #16H
Project:	Eddy County, NM (NAD27 NME)	**TVD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Site:	Hummingbird Federal Com	**MD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Well:	#16H	**North Reference:**	Grid
Wellbore:	OH / Job #61124	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Trinidad 436)	**Database:**	Compass 5000 GCR

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)
7,962.00	89.64	87.84	5,487.17	28.14	2,734.38	2,734.51	0.28	0.05	-0.27
8,025.00	89.69	87.85	5,487.53	30.51	2,797.33	2,797.48	0.08	0.08	0.02
8,087.00	89.91	88.07	5,487.75	32.71	2,859.29	2,859.46	0.50	0.35	0.35
8,149.00	90.17	89.50	5,487.71	34.03	2,921.28	2,921.45	2.34	0.42	2.31
8,211.00	89.94	89.18	5,487.65	34.74	2,983.27	2,983.45	0.64	-0.37	-0.52
8,274.00	88.80	89.82	5,488.34	35.29	3,046.27	3,046.44	2.08	-1.81	1.02
8,336.00	89.05	89.48	5,489.50	35.67	3,108.25	3,108.43	0.68	0.40	-0.55
8,398.00	89.30	89.73	5,490.40	36.10	3,170.25	3,170.43	0.57	0.40	0.40
8,460.00	89.58	90.20	5,491.00	36.14	3,232.24	3,232.42	0.88	0.45	0.76
8,522.00	88.77	91.32	5,491.90	35.32	3,294.23	3,294.40	2.23	-1.31	1.81
8,584.00	88.99	91.03	5,493.11	34.04	3,356.20	3,356.36	0.59	0.35	-0.47
8,647.00	89.44	91.31	5,493.97	32.76	3,419.18	3,419.33	0.84	0.71	0.44
8,709.00	89.72	91.02	5,494.42	31.50	3,481.17	3,481.31	0.65	0.45	-0.47
8,772.00	89.44	91.31	5,494.89	30.22	3,544.16	3,544.28	0.64	-0.44	0.46
8,834.00	89.91	91.40	5,495.24	28.75	3,606.14	3,606.25	0.77	0.76	0.15
8,896.00	90.22	91.44	5,495.17	27.21	3,668.12	3,668.22	0.50	0.50	0.06
8,958.00	89.30	90.59	5,495.43	26.12	3,730.11	3,730.20	2.02	-1.48	-1.37
9,020.00	88.91	90.57	5,496.40	25.49	3,792.10	3,792.18	0.63	-0.63	-0.03
9,083.00	89.08	90.39	5,497.50	24.96	3,855.08	3,855.16	0.39	0.27	-0.29
9,145.00	89.24	90.59	5,498.41	24.43	3,917.07	3,917.15	0.41	0.26	0.32
9,208.00	89.52	90.40	5,499.09	23.89	3,980.07	3,980.14	0.54	0.44	-0.30
9,270.00	90.03	90.24	5,499.34	23.54	4,042.07	4,042.13	0.86	0.82	-0.26
9,332.00	88.35	89.08	5,500.21	23.91	4,104.06	4,104.12	3.29	-2.71	-1.87
9,395.00	88.52	88.90	5,501.93	25.02	4,167.02	4,167.09	0.39	0.27	-0.29
9,457.00	88.49	88.71	5,503.55	26.31	4,228.99	4,229.07	0.31	-0.05	-0.31
9,519.00	88.49	88.48	5,505.18	27.83	4,290.95	4,291.04	0.37	0.00	-0.37
9,582.00	88.63	88.45	5,506.77	29.52	4,353.91	4,354.00	0.23	0.22	-0.05
9,645.00	88.80	88.40	5,508.18	31.25	4,416.87	4,416.98	0.28	0.27	-0.08
9,707.00	88.96	88.55	5,509.39	32.90	4,478.83	4,478.95	0.35	0.26	0.24
9,770.00	89.05	88.64	5,510.49	34.44	4,541.80	4,541.93	0.20	0.14	0.14
9,833.00	88.99	88.37	5,511.56	36.09	4,604.77	4,604.91	0.44	-0.10	-0.43
9,895.00	89.11	88.94	5,512.59	37.54	4,666.75	4,666.90	0.94	0.19	0.92
9,957.00	89.47	89.19	5,513.36	38.55	4,728.73	4,728.89	0.71	0.58	0.40
10,006.00	89.75	89.91	5,513.69	38.94	4,777.73	4,777.89	1.58	0.57	1.47
Final Phoenix MWD Survey									
10,073.00	89.75	89.91	5,513.99	39.04	4,844.73	4,844.89	0.00	0.00	0.00
Projection to TD									

Company:	Apache Corporation	**Local Co-ordinate Reference:**	Well #16H
Project:	Eddy County, NM (NAD27 NME)	**TVD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Site:	Hummingbird Federal Com	**MD Reference:**	GL + KB @ 4053.50usft (Trinidad 436)
Well:	#16H	**North Reference:**	Grid
Wellbore:	OH / Job #61124	**Survey Calculation Method:**	Minimum Curvature
Design:	Surveys (Trinidad 436)	**Database:**	Compass 5000 GCR

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
4,847.00	4,846.74	-13.62	-32.44	First Phoenix Survey
10,006.00	5,513.69	38.94	4,777.73	Final Phoenix MWD Survey
10,073.00	5,513.99	39.04	4,844.73	Projection to TD

DISTRICT I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
DISTRICT II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
DISTRICT III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

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

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name

Property Code	Property Name	Well Number
	HUMMINGBIRD FEDERAL COM	16H
OGRID No.	Operator Name	Elevation
	APACHE CORPORATION	4037'

Surface Location

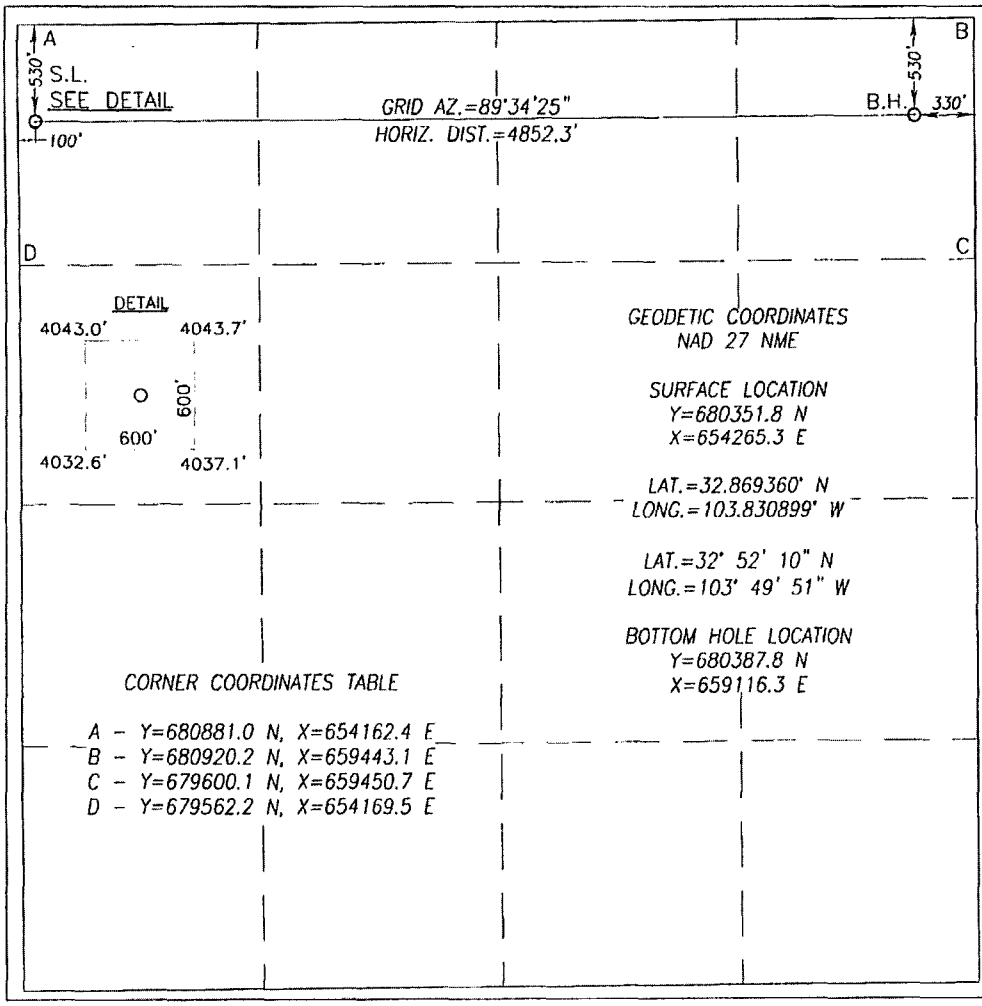
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	1	17-S	31-E		530	NORTH	100	WEST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	1	17-S	31-E		530	NORTH	330	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.

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



OPERATOR CERTIFICATION

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

Signature Date

Printed Name

E-mail Address

SURVEYOR CERTIFICATION

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

JULY 30, 2013

Date of Survey

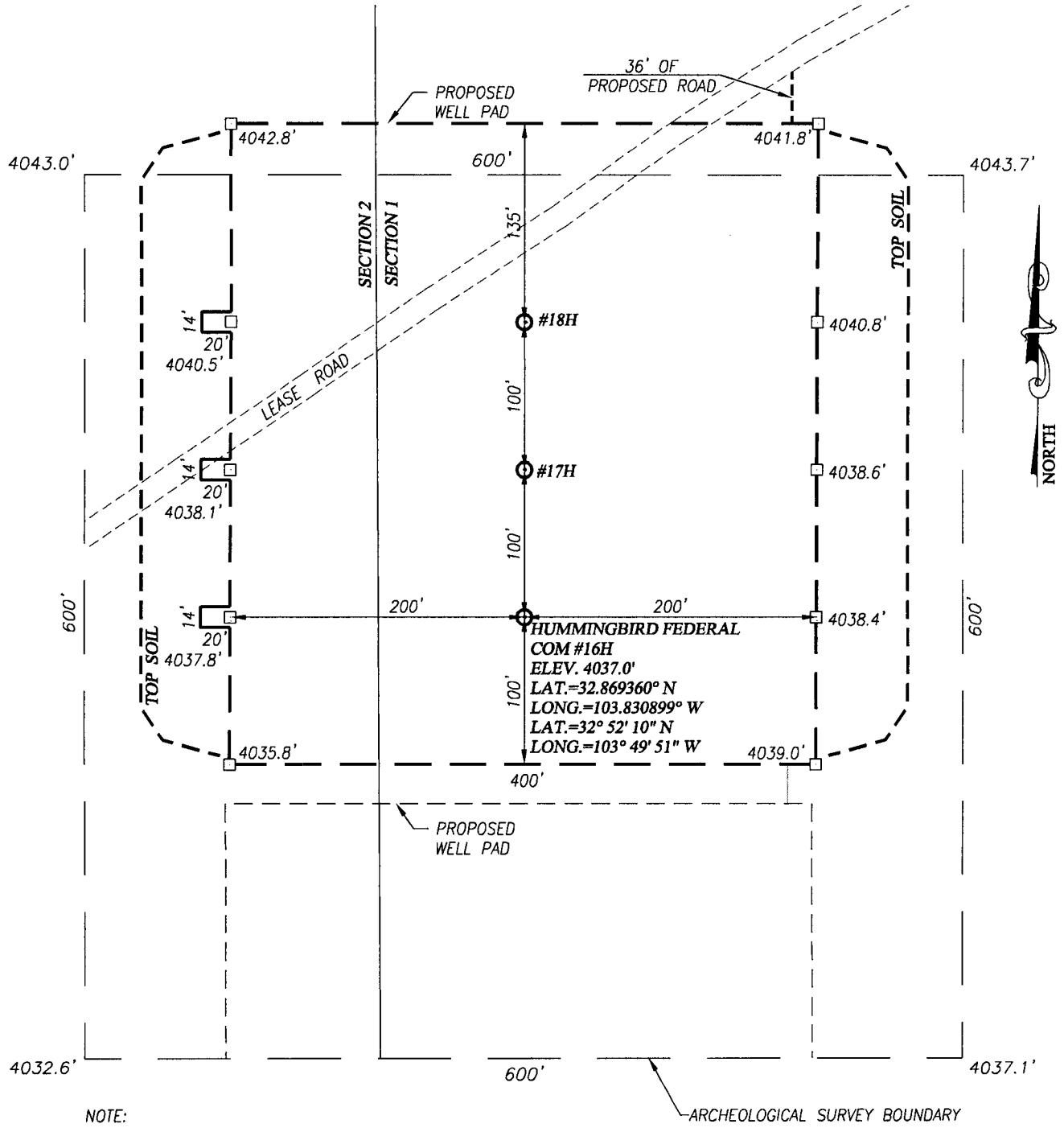
Signature & Seal of Professional Surveyor:

RONALD J. EIDSON NEW MEXICO 3239 REGISTERED PROFESSIONAL SURVEYOR

Ronald J. Eidson 02/22/2013

Certificate Number: Gary G. Eidson 12641
Ronald J. Eidson 3239

BKL JWSC W.O. 13.11.0811



NOTE:
SEE "LOCATION VERIFICATION MAP"
FOR PROPOSED ROAD LOCATION.

100 0 100 200 Feet

Scale: 1"=100'

DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF US. HIGHWAY 82 AND LEA CO. RD. L-124 (SUPEE) GO NORTH-NORTHWEST APPROX. 2.7 MILES; TURN LEFT AND GO SOUTHWEST 172 FEET; TURN LEFT AND GO SOUTH 36 FEET TO THIS LOCATION.

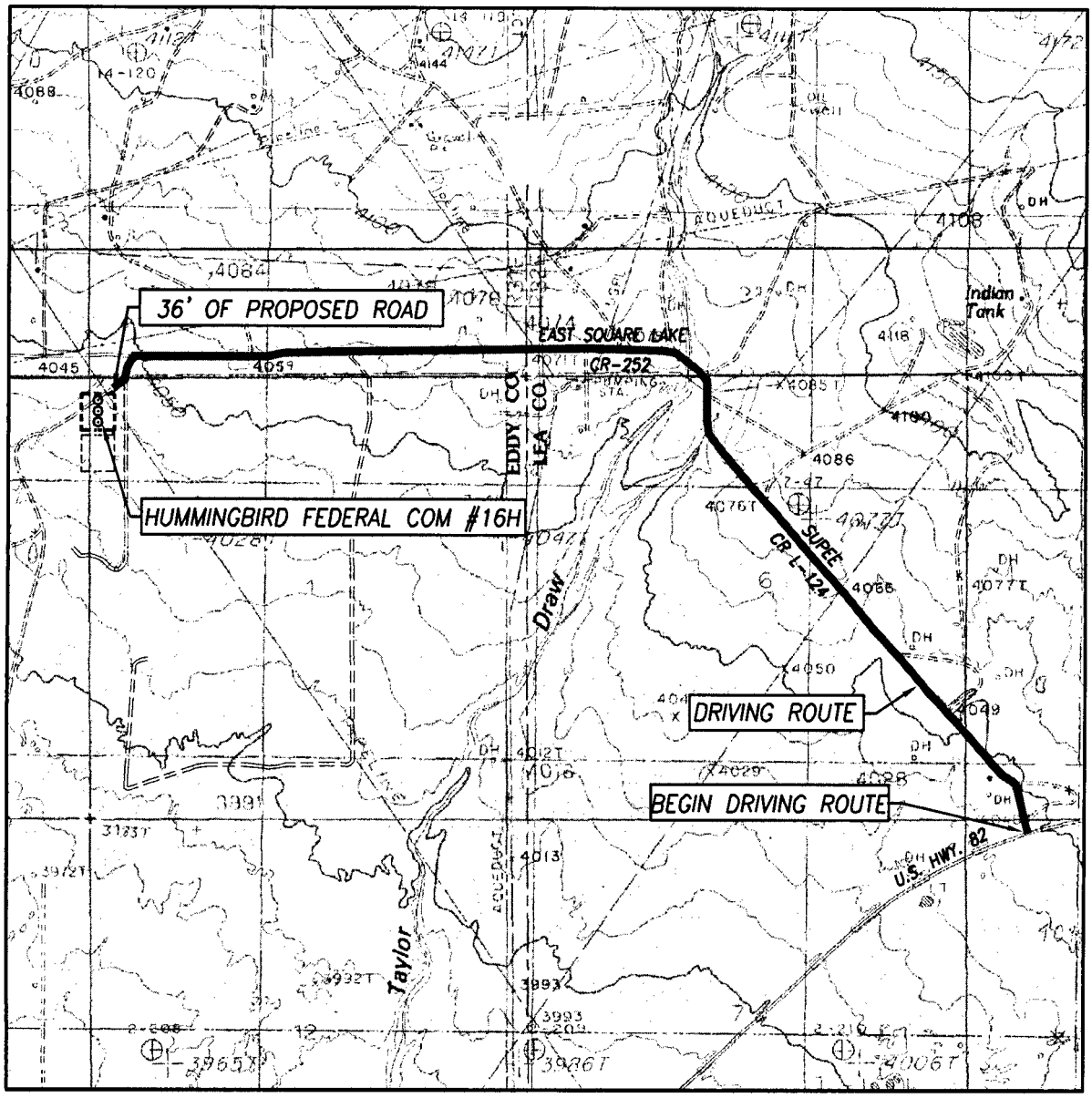
APACHE CORPORATION

HUMMINGBIRD FEDERAL COM #16H WELL
LOCATED 530 FEET FROM THE NORTH LINE
AND 100 FEET FROM THE WEST LINE OF SECTION 1,
TOWNSHIP 17 SOUTH, RANGE 31 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO

PROVIDING SURVEYING SERVICES
SINCE 1946
JOHN WEST SURVEYING COMPANY
412 N. DAL PASO HOBBS, N.M. 88240
(575) 393-3117 www.jwsc.biz
TBPLS# 10021000

Survey Date: 7/30/13	CAD Date: 6/11/15	Drawn By: LSL
W.O. No.: 15130617	Rev: .	Rel. W.O.: 13110811	Sheet 1 of 1

TOPOGRAPHICAL AND ACCESS ROAD MAP



SCALE: 1" = 2000'

CONTOUR INTERVAL:
MALJAMAR, N.M. – 10'
MALJAMAR NE, N.M. – 5'

SEC. 1 TWP. 17-S RGE. 31-E

SURVEY N.M.P.M.

COUNTY EDDY STATE NEW MEXICO

DESCRIPTION 530' FNL & 100' FWL

ELEVATION 4037'

OPERATOR APACHE CORPORATION

LEASE HUMMINGBIRD FEDERAL COM

U.S.G.S. TOPOGRAPHIC MAP
MALJAMAR, N.M.

DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF US. HIGHWAY 82 AND LEA CO. RD. L-124 (SUPEE) GO NORTH-NORTHWEST APPROX. 2.7 MILES; TURN LEFT AND GO SOUTHWEST 172 FEET; TURN LEFT AND GO SOUTH 36 FEET TO THIS LOCATION.

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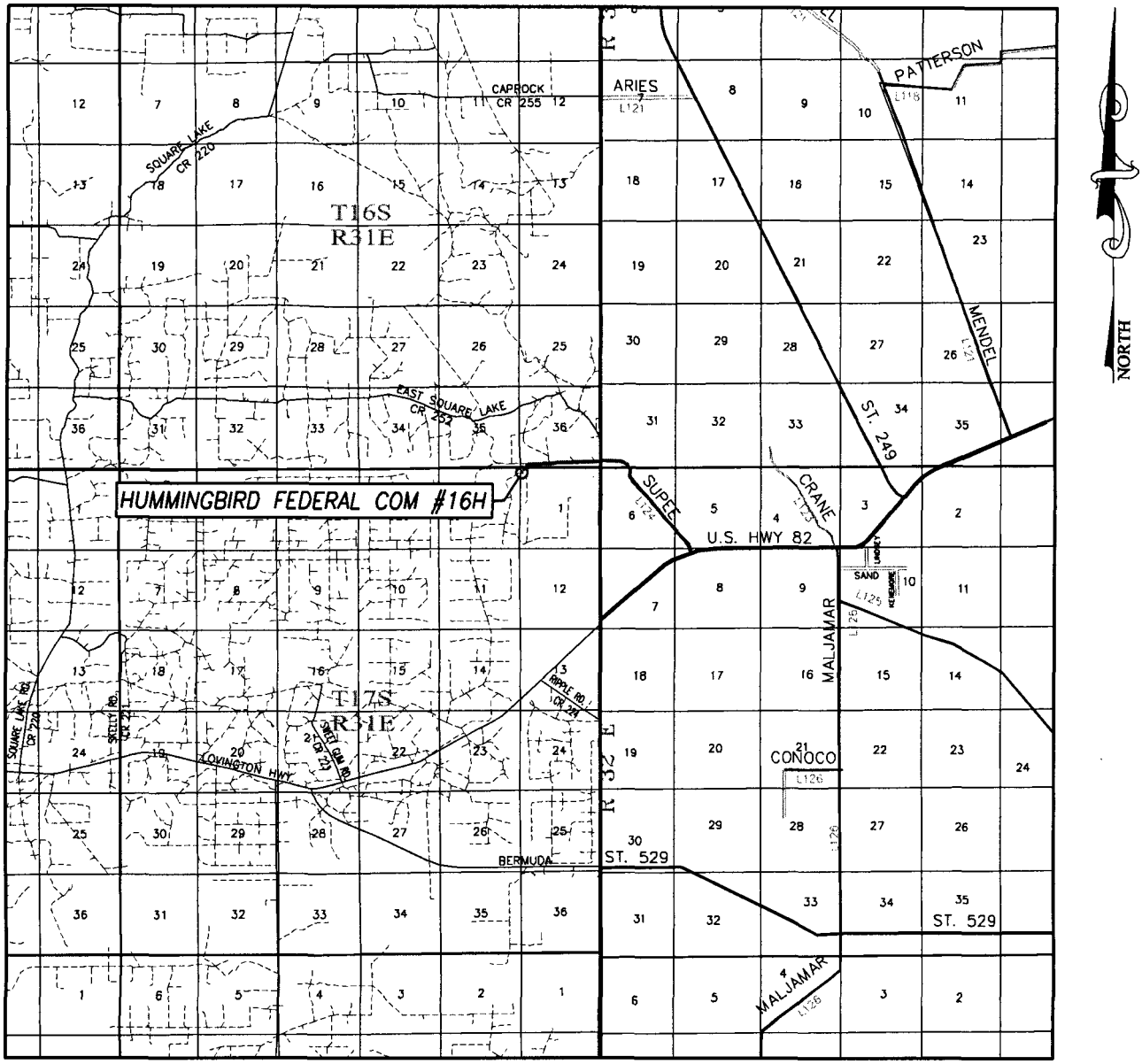
VICINITY MAP



SCALE: 1" = 2 MILES

DRIVING ROUTE: SEE TOPOGRAPHICAL AND ACCESS ROAD MAP

SEC. 1 TWP. 17-S RGE. 31-E

SURVEY N.M.P.M.

COUNTY EDDY STATE NEW MEXICO

DESCRIPTION 530' FNL & 100' FWL

ELEVATION 4037'

OPERATOR APACHE CORPORATION

LEASE HUMMINGBIRD FEDERAL COM

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