



CONCHO

COG Production, LLC

Lea County, NM (NAD 27)

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

Copperhead 31 Fed Com 21H

Wellbore #1

30-015-44118

NM OIL CONSERVATION

ARTESIA DISTRICT

SEP 14 2017

RECEIVED

Survey: IDS MWD Surveys

Survey Report - Geographic

31 May, 2017





Integrity Directional Services, LLC
Survey Report - Geographic



Company: 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
Design: Wellbore #1

Local Co-ordinate Reference: Well Copperhead 31 Fed Com 21H
TVD Reference: KB=25' @ 2953.8usft (Latshaw 44)
MD Reference: KB=25' @ 2953.8usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Project: Lea County, NM (NAD 27)

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

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

Site Position: Northing: 371,210.69 usft Latitude: 32° 1' 12.667 N
From: Map Easting: 597,099.30 usft Longitude: 104° 1' 12.131 W
Position Uncertainty: 0.0 usft Slot Radius: 13-3/16 " Grid Convergence: 0.17 °

Well: Copperhead 31 Fed Com 21H, ACTIVE

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

Wellbore: Wellbore #1

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

Design: Wellbore #1

Audit Notes:

Version: 1.0 Phase: ACTUAL Tie On Depth: 0.0

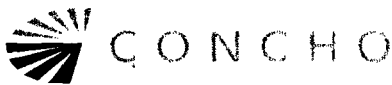
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)
	0.0	0.0	0.0	182.77

Survey Program: Date: 5/31/2017

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

Survey

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



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,440.0	21.24	202.36	10,424.3	104.7	-356.9	371,315.36	596,742.44	32° 1' 13.713 N	104° 1' 16.273 W
10,487.0	25.41	195.14	10,467.5	87.0	-362.7	371,297.74	596,736.56	32° 1' 13.539 N	104° 1' 16.342 W
10,534.0	27.87	194.72	10,509.5	66.7	-368.2	371,277.38	596,731.13	32° 1' 13.338 N	104° 1' 16.405 W
10,581.0	29.93	190.89	10,550.6	44.5	-373.2	371,255.23	596,726.13	32° 1' 13.119 N	104° 1' 16.464 W
10,612.0	32.59	184.45	10,577.1	28.6	-375.3	371,239.31	596,724.02	32° 1' 12.961 N	104° 1' 16.489 W
10,643.0	36.38	181.13	10,602.7	11.1	-376.1	371,221.79	596,723.19	32° 1' 12.788 N	104° 1' 16.500 W
10,675.0	41.06	180.61	10,627.6	-8.9	-376.4	371,201.78	596,722.89	32° 1' 12.590 N	104° 1' 16.504 W
10,706.0	46.90	181.79	10,649.9	-30.4	-376.9	371,180.27	596,722.43	32° 1' 12.377 N	104° 1' 16.510 W
10,737.0	52.40	182.00	10,670.0	-54.0	-377.7	371,158.66	596,721.64	32° 1' 12.143 N	104° 1' 16.520 W
10,769.0	55.87	180.68	10,688.8	-80.0	-378.3	371,130.74	596,721.04	32° 1' 11.887 N	104° 1' 16.528 W
10,800.0	61.89	178.42	10,704.8	-106.5	-378.0	371,104.22	596,721.27	32° 1' 11.624 N	104° 1' 16.526 W
10,813.5	64.56	176.65	10,710.8	-118.5	-377.5	371,092.18	596,721.79	32° 1' 11.505 N	104° 1' 16.520 W
Cross Hardline 10813.5 MD/10710.8 TVD 136.6 VS									
10,826.0	67.06	175.08	10,716.0	-129.9	-376.7	371,080.81	596,722.61	32° 1' 11.393 N	104° 1' 16.511 W
10,857.0	70.07	173.74	10,727.3	-158.6	-373.9	371,052.09	596,725.43	32° 1' 11.108 N	104° 1' 16.479 W
10,888.0	71.97	173.09	10,737.4	-187.7	-370.5	371,022.97	596,728.79	32° 1' 10.820 N	104° 1' 16.441 W
10,919.0	73.31	173.34	10,746.6	-217.1	-367.0	370,993.59	596,732.28	32° 1' 10.529 N	104° 1' 16.402 W
10,950.0	74.58	173.09	10,755.2	-246.7	-363.5	370,964.01	596,735.80	32° 1' 10.236 N	104° 1' 16.362 W
10,981.0	75.60	174.26	10,763.2	-276.5	-360.2	370,934.24	596,739.10	32° 1' 9.942 N	104° 1' 16.324 W
11,028.0	77.94	175.85	10,773.9	-322.0	-356.3	370,888.66	596,743.04	32° 1' 9.490 N	104° 1' 16.280 W
11,075.0	81.50	176.44	10,782.3	-368.2	-353.2	370,842.53	596,746.15	32° 1' 9.034 N	104° 1' 16.246 W
11,122.0	81.80	176.58	10,789.1	-414.6	-350.3	370,796.11	596,748.98	32° 1' 8.574 N	104° 1' 16.214 W
11,169.0	84.50	177.15	10,794.8	-461.2	-347.8	370,749.52	596,751.53	32° 1' 8.113 N	104° 1' 16.186 W
11,264.0	92.60	177.72	10,797.2	-556.0	-343.5	370,654.73	596,755.78	32° 1' 7.175 N	104° 1' 16.140 W
11,358.0	88.50	176.97	10,796.3	-649.8	-339.2	370,560.85	596,760.13	32° 1' 6.246 N	104° 1' 16.093 W
11,452.0	90.15	178.59	10,797.4	-743.8	-335.5	370,466.94	596,763.77	32° 1' 5.316 N	104° 1' 16.054 W
11,547.0	90.58	178.42	10,796.8	-838.7	-333.1	370,371.97	596,766.25	32° 1' 4.376 N	104° 1' 16.028 W
11,641.0	91.00	178.32	10,795.5	-932.7	-330.4	370,278.02	596,768.92	32° 1' 3.446 N	104° 1' 16.000 W
11,735.0	89.48	178.17	10,795.1	-1,026.6	-327.5	370,184.07	596,771.80	32° 1' 2.517 N	104° 1' 15.970 W
11,829.0	89.20	174.35	10,796.1	-1,120.4	-321.4	370,090.29	596,777.93	32° 1' 1.588 N	104° 1' 15.902 W
11,923.0	89.90	174.80	10,796.9	-1,214.0	-312.5	369,996.71	596,786.82	32° 1' 0.662 N	104° 1' 15.802 W
12,017.0	90.15	175.63	10,796.8	-1,307.6	-304.6	369,903.04	596,794.66	32° 0' 59.735 N	104° 1' 15.714 W
12,049.0	90.60	177.00	10,796.6	-1,339.6	-302.6	369,871.11	596,796.72	32° 0' 59.419 N	104° 1' 15.691 W
12,112.0	91.31	179.73	10,795.6	-1,402.5	-300.8	369,808.15	596,798.51	32° 0' 58.796 N	104° 1' 15.672 W
12,206.0	90.58	181.02	10,794.0	-1,496.5	-301.4	369,714.17	596,797.90	32° 0' 57.865 N	104° 1' 15.682 W
12,299.0	88.41	178.88	10,794.9	-1,589.5	-301.3	369,621.18	596,797.98	32° 0' 56.945 N	104° 1' 15.685 W
12,394.0	88.92	183.91	10,797.1	-1,684.4	-303.6	369,526.27	596,795.67	32° 0' 56.006 N	104° 1' 15.715 W
12,487.0	91.42	186.35	10,796.8	-1,777.0	-311.9	369,433.66	596,787.35	32° 0' 55.090 N	104° 1' 15.814 W
12,627.0	89.54	183.53	10,795.6	-1,916.5	-324.0	369,294.20	596,775.30	32° 0' 53.710 N	104° 1' 15.959 W
12,676.0	90.91	185.88	10,795.4	-1,965.3	-328.0	369,245.37	596,771.28	32° 0' 53.227 N	104° 1' 16.007 W
12,770.0	91.44	184.04	10,793.5	-2,058.9	-336.1	369,151.75	596,763.16	32° 0' 52.300 N	104° 1' 16.105 W
12,864.0	89.50	178.00	10,792.7	-2,152.9	-337.8	369,057.81	596,761.48	32° 0' 51.371 N	104° 1' 16.127 W
12,958.0	91.53	180.96	10,791.9	-2,246.9	-337.0	368,963.84	596,762.34	32° 0' 50.441 N	104° 1' 16.121 W
13,052.0	90.58	181.02	10,790.2	-2,340.8	-338.6	368,869.87	596,760.71	32° 0' 49.511 N	104° 1' 16.143 W
13,145.0	90.21	180.78	10,789.5	-2,433.8	-340.0	368,776.88	596,759.25	32° 0' 48.591 N	104° 1' 16.163 W
13,239.0	89.12	182.26	10,790.1	-2,527.8	-342.5	368,682.92	596,756.76	32° 0' 47.661 N	104° 1' 16.195 W
13,333.0	92.48	184.33	10,788.7	-2,621.6	-347.9	368,589.10	596,751.36	32° 0' 46.733 N	104° 1' 16.261 W
13,427.0	90.97	180.19	10,785.9	-2,715.5	-351.6	368,495.24	596,747.66	32° 0' 45.804 N	104° 1' 16.307 W
13,521.0	90.88	175.91	10,784.4	-2,809.4	-348.4	368,401.33	596,750.85	32° 0' 44.874 N	104° 1' 16.273 W
13,614.0	89.90	176.38	10,783.8	-2,902.1	-342.2	368,308.54	596,757.11	32° 0' 43.956 N	104° 1' 16.203 W
13,708.0	90.01	178.20	10,783.8	-2,996.0	-337.8	368,214.65	596,761.55	32° 0' 43.026 N	104° 1' 16.155 W
13,802.0	91.53	180.71	10,782.6	-3,090.0	-336.9	368,120.68	596,762.45	32° 0' 42.096 N	104° 1' 16.148 W
13,895.0	89.73	179.62	10,781.6	-3,183.0	-337.1	368,027.69	596,762.18	32° 0' 41.176 N	104° 1' 16.154 W
13,989.0	89.28	178.95	10,782.4	-3,277.0	-336.0	367,933.70	596,763.35	32° 0' 40.246 N	104° 1' 16.143 W
14,083.0	89.28	181.33	10,783.5	-3,371.0	-336.2	367,839.71	596,763.12	32° 0' 39.316 N	104° 1' 16.149 W



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Survey Report - Geographic



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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
14,177.0	89.68	181.56	10,784.4	-3,464.9	-338.6	367,745.75	596,760.75	32° 0' 38.386 N	104° 1' 16.180 W
14,271.0	89.59	180.91	10,785.0	-3,558.9	-340.6	367,651.77	596,758.72	32° 0' 37.456 N	104° 1' 16.207 W
14,366.0	90.94	181.83	10,784.6	-3,653.9	-342.8	367,556.80	596,756.45	32° 0' 36.516 N	104° 1' 16.236 W
14,460.0	90.38	182.15	10,783.5	-3,747.8	-346.1	367,462.87	596,753.19	32° 0' 35.587 N	104° 1' 16.277 W
14,554.0	89.28	182.79	10,783.8	-3,841.7	-350.2	367,368.96	596,749.14	32° 0' 34.657 N	104° 1' 16.327 W
14,648.0	89.28	180.89	10,784.9	-3,935.7	-353.2	367,275.02	596,746.12	32° 0' 33.728 N	104° 1' 16.366 W
14,742.0	91.44	183.12	10,784.3	-4,029.6	-356.5	367,181.09	596,742.83	32° 0' 32.798 N	104° 1' 16.407 W
14,837.0	92.01	184.69	10,781.5	-4,124.3	-362.9	367,086.35	596,736.37	32° 0' 31.861 N	104° 1' 16.485 W
14,931.0	90.38	182.80	10,779.5	-4,218.1	-369.1	366,992.58	596,730.23	32° 0' 30.933 N	104° 1' 16.560 W
15,025.0	89.06	179.03	10,780.0	-4,312.1	-370.6	366,898.61	596,728.73	32° 0' 30.003 N	104° 1' 16.580 W
15,118.0	89.17	179.14	10,781.4	-4,405.1	-369.1	366,805.64	596,730.21	32° 0' 29.083 N	104° 1' 16.566 W
15,213.0	92.01	180.12	10,780.4	-4,500.0	-368.5	366,710.66	596,730.83	32° 0' 28.143 N	104° 1' 16.562 W
15,307.0	89.85	178.88	10,778.9	-4,594.0	-367.7	366,616.68	596,731.65	32° 0' 27.213 N	104° 1' 16.556 W
15,401.0	90.04	178.26	10,779.0	-4,688.0	-365.3	366,522.71	596,733.99	32° 0' 26.283 N	104° 1' 16.532 W
15,495.0	89.03	177.45	10,779.8	-4,781.9	-361.8	366,428.78	596,737.51	32° 0' 25.353 N	104° 1' 16.494 W
15,589.0	89.85	178.51	10,780.7	-4,875.8	-358.5	366,334.84	596,740.82	32° 0' 24.423 N	104° 1' 16.459 W
15,683.0	91.39	181.18	10,779.7	-4,969.8	-358.2	366,240.86	596,741.08	32° 0' 23.493 N	104° 1' 16.459 W
15,777.0	90.55	180.13	10,778.1	-5,063.8	-359.3	366,146.88	596,740.00	32° 0' 22.563 N	104° 1' 16.474 W
15,871.0	90.41	180.05	10,777.3	-5,157.8	-359.4	366,052.89	596,739.86	32° 0' 21.633 N	104° 1' 16.479 W
15,965.0	90.63	180.40	10,776.4	-5,251.8	-359.8	365,958.89	596,739.49	32° 0' 20.703 N	104° 1' 16.487 W
16,058.0	90.60	180.53	10,775.4	-5,344.8	-360.6	365,865.90	596,738.73	32° 0' 19.783 N	104° 1' 16.499 W
16,153.0	90.13	179.83	10,774.8	-5,439.8	-360.9	365,770.90	596,738.43	32° 0' 18.842 N	104° 1' 16.505 W
16,246.0	91.72	182.01	10,773.3	-5,532.8	-362.4	365,677.94	596,736.94	32° 0' 17.922 N	104° 1' 16.526 W
16,341.0	89.93	180.01	10,772.0	-5,627.7	-364.0	365,582.97	596,735.27	32° 0' 16.983 N	104° 1' 16.548 W
16,435.0	91.05	184.10	10,771.2	-5,721.6	-367.4	365,489.05	596,731.90	32° 0' 16.053 N	104° 1' 16.591 W
16,528.0	90.01	181.92	10,770.3	-5,814.5	-372.3	365,396.19	596,727.02	32° 0' 15.134 N	104° 1' 16.650 W
16,622.0	89.85	180.68	10,770.4	-5,908.5	-374.4	365,302.22	596,724.88	32° 0' 14.204 N	104° 1' 16.678 W
16,716.0	90.13	180.89	10,770.4	-6,002.5	-375.7	365,208.23	596,723.60	32° 0' 13.274 N	104° 1' 16.697 W
16,810.0	90.32	181.40	10,770.1	-6,096.4	-377.6	365,114.25	596,721.72	32° 0' 12.344 N	104° 1' 16.721 W
16,905.0	90.86	183.14	10,769.1	-6,191.4	-381.3	365,019.33	596,717.95	32° 0' 11.405 N	104° 1' 16.768 W
16,999.0	90.21	182.01	10,768.2	-6,285.3	-385.6	364,925.43	596,713.73	32° 0' 10.476 N	104° 1' 16.821 W
17,092.0	90.91	180.03	10,767.3	-6,378.2	-387.2	364,832.46	596,712.08	32° 0' 9.556 N	104° 1' 16.843 W
17,186.0	89.99	177.45	10,766.6	-6,472.2	-385.2	364,738.49	596,714.14	32° 0' 8.626 N	104° 1' 16.822 W
17,280.0	91.44	177.97	10,765.4	-6,566.1	-381.4	364,644.58	596,717.90	32° 0' 7.696 N	104° 1' 16.782 W
17,374.0	90.32	176.46	10,763.9	-6,660.0	-376.8	364,550.70	596,722.47	32° 0' 6.767 N	104° 1' 16.732 W
17,467.0	89.37	176.13	10,764.2	-6,752.8	-370.8	364,457.90	596,728.47	32° 0' 5.848 N	104° 1' 16.665 W
17,561.0	91.81	179.82	10,763.2	-6,846.7	-367.5	364,363.99	596,731.80	32° 0' 4.919 N	104° 1' 16.630 W
17,656.0	91.39	180.27	10,760.6	-6,941.7	-367.6	364,269.02	596,731.72	32° 0' 3.979 N	104° 1' 16.634 W
17,741.5	89.99	179.62	10,759.5	-7,027.2	-367.5	364,183.50	596,731.81	32° 0' 3.133 N	104° 1' 16.635 W
Copperhead 31 Fed Com 21H LTP									
17,741.8	89.99	179.61	10,759.5	-7,027.5	-367.5	364,183.23	596,731.81	32° 0' 3.130 N	104° 1' 16.635 W
Cross Hardline 17741.8 MD/10759.5 TVD 7037 VS									
17,749.0	89.87	179.56	10,759.6	-7,034.7	-367.4	364,176.03	596,731.86	32° 0' 3.059 N	104° 1' 16.635 W
17,814.0	90.49	180.14	10,759.4	-7,099.7	-367.3	364,111.03	596,732.03	32° 0' 2.416 N	104° 1' 16.635 W
Last IDS Survey 17814 MD/10759.4 TVD									
17,860.0	90.49	180.14	10,759.0	-7,145.7	-367.4	364,065.04	596,731.92	32° 0' 1.960 N	104° 1' 16.638 W
PTB 17860 MD/10759 TVD - Copperhead 31 Fed Com 21H BHL									



Integrity Directional Services, LLC

Survey Report - Geographic



Company: 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
Design: Wellbore #1

Local Co-ordinate Reference: Well Copperhead 31 Fed Com 21H
TVD Reference: KB=25' @ 2953.8usft (Latshaw 44)
MD Reference: KB=25' @ 2953.8usft (Latshaw 44)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Survey Annotations

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

Checked By: _____ Approved By: _____ Date: _____