



HOBBS OCD

MAR 25 2015

RECEIVED

COG Operating LLC

Lea County, New Mexico

Pan Head Fee

Pan Head Fee Well No. 23H

Original Hole

SHL: 330 FNL 1765 FWL Sect 11-T17S-R32E Lot C

BHL: 983 FNL 1648 FWL Sect 14-T17S-R32E Lot C

Plan: rev1

Standard_report

17 March, 2015

30-025-40887



MAR 31 2015



Standard_report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Pan Head Fee Well No. 23H
Project:	Lea County, New Mexico	TVD Reference:	RKB=4155+12 @ 4167.00usft (United #43)
Site:	Pan Head Fee	MD Reference:	RKB=4155+12 @ 4167.00usft (United #43)
Well:	Pan Head Fee Well No. 23H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	rev1	Database:	Dbase Nov0914

Project:	Lea County, New Mexico		
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:	Pan Head Fee		
Site Position:		Northing:	675,378.00 usft
From:	Map	Easting:	680,940.30 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.85531054
		Longitude:	-103.74411423
		Grid Convergence:	0.32 °

Well	Pan Head Fee Well No. 23H, Surf Loc: 330 FNL 1765 FWL Sect 11-T17S-R32E Unit C					
Well Position	+N/-S	0.00 usft	Northing:	675,384.20 usft	Latitude:	32.85530549
	+E/-W	0.00 usft	Easting:	682,374.90 usft	Longitude:	-103.73944266
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	4,155.00 usft

Wellbore	Original Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/14/2015	7.26	60.65	48,604

Design:	rev1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	180.80

Survey Tool Program		Date 3/17/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	12,161.41	rev1 (Original Hole)	MWD	MWD - Standard



Standard_report

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Well:	Pan Head Fee Well No. 23H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	rev1	Database:	Dbase Nov0914

Planned Survey										
MD (usft)	Inc. (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	DLeg (°/100usft)	V. Sec (usft)	Northing (usft)	Easting (usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	



Standard_report

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Site:	Pan Head Fee	MD Reference:	RKB=4155+12 @ 4167.00usft (United #43)
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Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	rev1	Database:	Dbase Nov0914

Planned Survey										
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2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	



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5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
5,929.13	0.00	0.00	5,929.13	0.00	0.00	0.00	0.00	675,384.20	682,374.90	
KOP Begin 11°/100' build										
6,000.00	7.80	180.80	5,999.78	-4.81	-0.07	11.00	4.81	675,379.39	682,374.83	
6,100.00	18.80	180.80	6,096.95	-27.77	-0.39	11.00	27.78	675,356.43	682,374.51	
6,200.00	29.80	180.80	6,187.96	-68.85	-0.96	11.00	68.86	675,315.35	682,373.94	
6,300.00	40.80	180.80	6,269.45	-126.54	-1.76	11.00	126.55	675,257.66	682,373.14	
6,400.00	51.80	180.80	6,338.44	-198.71	-2.76	11.00	198.73	675,185.49	682,372.14	
6,500.00	62.80	180.80	6,392.38	-282.72	-3.93	11.00	282.75	675,101.48	682,370.97	
6,600.00	73.80	180.80	6,429.31	-375.48	-5.21	11.00	375.51	675,008.72	682,369.69	
6,700.00	84.80	180.80	6,447.85	-473.58	-6.58	11.00	473.62	674,910.62	682,368.32	
6,747.31	90.00	180.80	6,450.00	-520.82	-7.23	11.00	520.87	674,863.38	682,367.67	
Begin 90.00 lateral section										
6,800.00	90.00	180.80	6,450.00	-573.50	-7.96	0.00	573.56	674,810.70	682,366.94	
6,900.00	90.00	180.80	6,450.00	-673.49	-9.35	0.00	673.56	674,710.71	682,365.55	
7,000.00	90.00	180.80	6,450.00	-773.48	-10.74	0.00	773.56	674,610.72	682,364.16	
7,100.00	90.00	180.80	6,450.00	-873.47	-12.13	0.00	873.56	674,510.73	682,362.77	
7,200.00	90.00	180.80	6,450.00	-973.47	-13.52	0.00	973.56	674,410.73	682,361.38	
7,300.00	90.00	180.80	6,450.00	-1,073.46	-14.90	0.00	1,073.56	674,310.74	682,360.00	
7,400.00	90.00	180.80	6,450.00	-1,173.45	-16.29	0.00	1,173.56	674,210.75	682,358.61	
7,500.00	90.00	180.80	6,450.00	-1,273.44	-17.68	0.00	1,273.56	674,110.76	682,357.22	
7,600.00	90.00	180.80	6,450.00	-1,373.43	-19.07	0.00	1,373.56	674,010.77	682,355.83	



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Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	rev1	Database:	Dbase Nov0914

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7,700.00	90.00	180.80	6,450.00	-1,473.42	-20.46	0.00	1,473.56	673,910.78	682,354.44	
7,800.00	90.00	180.80	6,450.00	-1,573.41	-21.85	0.00	1,573.56	673,810.79	682,353.05	
7,900.00	90.00	180.80	6,450.00	-1,673.40	-23.23	0.00	1,673.56	673,710.80	682,351.67	
8,000.00	90.00	180.80	6,450.00	-1,773.39	-24.62	0.00	1,773.56	673,610.81	682,350.28	
8,100.00	90.00	180.80	6,450.00	-1,873.38	-26.01	0.00	1,873.56	673,510.82	682,348.89	
8,200.00	90.00	180.80	6,450.00	-1,973.37	-27.40	0.00	1,973.56	673,410.83	682,347.50	
8,300.00	90.00	180.80	6,450.00	-2,073.36	-28.79	0.00	2,073.56	673,310.84	682,346.11	
8,400.00	90.00	180.80	6,450.00	-2,173.35	-30.18	0.00	2,173.56	673,210.85	682,344.72	
8,500.00	90.00	180.80	6,450.00	-2,273.34	-31.57	0.00	2,273.56	673,110.86	682,343.33	
8,600.00	90.00	180.80	6,450.00	-2,373.33	-32.95	0.00	2,373.56	673,010.87	682,341.95	
8,700.00	90.00	180.80	6,450.00	-2,473.32	-34.34	0.00	2,473.56	672,910.88	682,340.56	
8,800.00	90.00	180.80	6,450.00	-2,573.31	-35.73	0.00	2,573.56	672,810.89	682,339.17	
8,900.00	90.00	180.80	6,450.00	-2,673.30	-37.12	0.00	2,673.56	672,710.90	682,337.78	
9,000.00	90.00	180.80	6,450.00	-2,773.29	-38.51	0.00	2,773.56	672,610.91	682,336.39	
9,100.00	90.00	180.80	6,450.00	-2,873.28	-39.90	0.00	2,873.56	672,510.92	682,335.00	
9,200.00	90.00	180.80	6,450.00	-2,973.27	-41.28	0.00	2,973.56	672,410.93	682,333.62	
9,300.00	90.00	180.80	6,450.00	-3,073.26	-42.67	0.00	3,073.56	672,310.94	682,332.23	
9,400.00	90.00	180.80	6,450.00	-3,173.25	-44.06	0.00	3,173.56	672,210.95	682,330.84	
9,500.00	90.00	180.80	6,450.00	-3,273.24	-45.45	0.00	3,273.56	672,110.96	682,329.45	
9,600.00	90.00	180.80	6,450.00	-3,373.23	-46.84	0.00	3,373.56	672,010.97	682,328.06	
9,700.00	90.00	180.80	6,450.00	-3,473.22	-48.23	0.00	3,473.56	671,910.98	682,326.67	
9,800.00	90.00	180.80	6,450.00	-3,573.21	-49.61	0.00	3,573.56	671,810.99	682,325.29	
9,900.00	90.00	180.80	6,450.00	-3,673.20	-51.00	0.00	3,673.56	671,711.00	682,323.90	
10,000.00	90.00	180.80	6,450.00	-3,773.20	-52.39	0.00	3,773.56	671,611.00	682,322.51	
10,100.00	90.00	180.80	6,450.00	-3,873.19	-53.78	0.00	3,873.56	671,511.01	682,321.12	
10,200.00	90.00	180.80	6,450.00	-3,973.18	-55.17	0.00	3,973.56	671,411.02	682,319.73	
10,300.00	90.00	180.80	6,450.00	-4,073.17	-56.56	0.00	4,073.56	671,311.03	682,318.34	



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10,400.00	90.00	180.80	6,450.00	-4,173.16	-57.94	0.00	4,173.56	671,211.04	682,316.96	
10,500.00	90.00	180.80	6,450.00	-4,273.15	-59.33	0.00	4,273.56	671,111.05	682,315.57	
10,600.00	90.00	180.80	6,450.00	-4,373.14	-60.72	0.00	4,373.56	671,011.06	682,314.18	
10,700.00	90.00	180.80	6,450.00	-4,473.13	-62.11	0.00	4,473.56	670,911.07	682,312.79	
10,800.00	90.00	180.80	6,450.00	-4,573.12	-63.50	0.00	4,573.56	670,811.08	682,311.40	
10,900.00	90.00	180.80	6,450.00	-4,673.11	-64.89	0.00	4,673.56	670,711.09	682,310.01	
11,000.00	90.00	180.80	6,450.00	-4,773.10	-66.27	0.00	4,773.56	670,611.10	682,308.63	
11,100.00	90.00	180.80	6,450.00	-4,873.09	-67.66	0.00	4,873.56	670,511.11	682,307.24	
11,200.00	90.00	180.80	6,450.00	-4,973.08	-69.05	0.00	4,973.56	670,411.12	682,305.85	
11,300.00	90.00	180.80	6,450.00	-5,073.07	-70.44	0.00	5,073.56	670,311.13	682,304.46	
11,400.00	90.00	180.80	6,450.00	-5,173.06	-71.83	0.00	5,173.56	670,211.14	682,303.07	
11,500.00	90.00	180.80	6,450.00	-5,273.05	-73.22	0.00	5,273.56	670,111.15	682,301.68	
11,600.00	90.00	180.80	6,450.00	-5,373.04	-74.60	0.00	5,373.56	670,011.16	682,300.30	
11,700.00	90.00	180.80	6,450.00	-5,473.03	-75.99	0.00	5,473.56	669,911.17	682,298.91	
11,800.00	90.00	180.80	6,450.00	-5,573.02	-77.38	0.00	5,573.56	669,811.18	682,297.52	
11,900.00	90.00	180.80	6,450.00	-5,673.01	-78.77	0.00	5,673.56	669,711.19	682,296.13	
12,000.00	90.00	180.80	6,450.00	-5,773.00	-80.16	0.00	5,773.56	669,611.20	682,294.74	
12,100.00	90.00	180.80	6,450.00	-5,872.99	-81.55	0.00	5,873.56	669,511.21	682,293.35	
12,161.51	90.00	180.80	6,450.00	-5,934.50	-82.40	0.00	5,935.07	669,449.70	682,292.50	

PBHL/TD



Standard_report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Pan Head Fee Well No. 23H
Project:	Lea County, New Mexico	TVD Reference:	RKB=4155+12 @ 4167.00usft (United #43)
Site:	Pan Head Fee	MD Reference:	RKB=4155+12 @ 4167.00usft (United #43)
Well:	Pan Head Fee Well No. 23H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	rev1	Database:	Dbase Nov0914

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,929.13	5,929.13	0.00	0.00	KOP Begin 11°/100' build
6,747.31	6,450.00	-520.82	-7.23	Begin 90.00 lateral section
12,161.51	6,450.00	-5,934.50	-82.40	PBHL/TD



COG Operating LLC

Well: Pan Head Fee Well No. 23H
 Site: Pan Head Fee
 Project: Lea County, New Mexico
 Design: rev1
 Rig: United #43

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	5929.13	0.00	0.00	5929.13	0.00	0.00	0.00	0.00	0.00	KOP Begin 11"/100' build
3	6747.31	90.00	180.80	6450.00	-520.82	-7.23	11.00	180.80	520.87	Begin 90.00 lateral section
4	12161.51	90.00	180.80	6450.00	-5934.50	-82.40	0.00	0.00	5935.07	PBHL/TD

Surface Location: RKB=4155+12 @ 4167.00usft (United #43)

US State Plane 1927 (Exact solution)

New Mexico East 3001

Northing

675384.20

Easting

682374.90

Latitude

32.85530549

Longitude

-103.73944266

Total Correction (M => G) . To convert a Magnetic Direction to a Grid Direction, Add 6.94°



Azimuths to Grid North

True North: -0.32°

Magnetic North: 6.93°

Magnetic Field

Strength: 48604.2snT

Dip Angle: 60.65°

Date: 2/14/2015

Model: IGRF2010



PRODIRECTIONAL

