

HOBBS OCD

APR 21 2016

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COG Operating, LLC

Lea County, NM

Sec 27, T22S, R34E

Squints Federal Com #8H

Wellbore #1

Plan: Design #1

DDC Well Planning Report

08 June, 2015



APR 25 2016



HP
Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Squints Federal Com #8H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3436.0usft (Ensign #772)
Project:	Lea County, NM	MD Reference:	Well @ 3436.0usft (Ensign #772)
Site:	Sec 27, T22S, R34E	North Reference:	Grid
Well:	Squints Federal Com #8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Project:	Lea County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Sec 27, T22S, R34E		
Site Position:	From: Map	Northing:	494,272.80 usft
		Easting:	770,960.20 usft
		Latitude:	32° 21' 20.947 N
		Longitude:	103° 27' 21.105 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Grid Convergence:	0.47 °

Well:	Squints Federal Com #8H		
Well Position	+N/-S	-19.8 usft	Northing:
	+E/-W	-2,441.7 usft	Easting:
			Latitude:
			Longitude:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Ground Level:	3,405.0 usft

Wellbore:	Wellbore #1		
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Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2015	5/28/2015	7.14	60.23	48,240

Design:	Design #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			359.49

Plan Sections										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Dogleg Rate	Build Rate	Turn Rate	TFO	Target
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)	(°)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
9,872.5	0.00	0.00	9,872.5	0.0	0.0	0.00	0.00	0.00	0.00	
10,625.0	90.30	359.49	10,350.0	479.9	-4.3	12.00	12.00	-0.07	359.49	
20,185.1	90.30	359.49	10,300.0	10,039.5	-89.2	0.00	0.00	0.00	0.00	PBHL Squints Federa



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Well:	Squints Federal Com #8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned 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)
KOP 12°/100'									
9,872.5	0.00	0.00	9,872.5	0.0	0.0	0.0	0.00	0.00	0.00
9,900.0	3.30	359.49	9,900.0	0.8	0.0	0.8	12.00	12.00	0.00
10,000.0	15.30	359.49	9,998.5	16.9	-0.2	16.9	12.00	12.00	0.00
SBSG_sand									
10,079.2	24.80	359.49	10,072.8	44.0	-0.4	44.0	12.00	12.00	0.00
10,100.0	27.30	359.49	10,091.5	53.2	-0.5	53.2	12.00	12.00	0.00
10,200.0	39.30	359.49	10,174.9	108.0	-1.0	108.0	12.00	12.00	0.00
10,300.0	51.30	359.49	10,245.1	178.9	-1.6	178.9	12.00	12.00	0.00
10,400.0	63.30	359.49	10,299.1	262.9	-2.3	262.9	12.00	12.00	0.00
10,500.0	75.30	359.49	10,334.3	356.3	-3.2	356.3	12.00	12.00	0.00
10,600.0	87.30	359.49	10,349.4	455.0	-4.0	455.0	12.00	12.00	0.00
End of Curve / 90.30° Inc / 359.49° Azm / 10350' TVD									
10,625.0	90.30	359.49	10,350.0	479.9	-4.3	480.0	12.00	12.00	0.00
10,700.0	90.30	359.49	10,349.6	554.9	-4.9	555.0	0.00	0.00	0.00
10,800.0	90.30	359.49	10,349.0	654.9	-5.8	655.0	0.00	0.00	0.00
10,900.0	90.30	359.49	10,348.5	754.9	-6.7	755.0	0.00	0.00	0.00
11,000.0	90.30	359.49	10,348.0	854.9	-7.6	855.0	0.00	0.00	0.00
11,100.0	90.30	359.49	10,347.5	954.9	-8.5	955.0	0.00	0.00	0.00
11,200.0	90.30	359.49	10,347.0	1,054.9	-9.4	1,055.0	0.00	0.00	0.00
11,300.0	90.30	359.49	10,346.4	1,154.9	-10.3	1,155.0	0.00	0.00	0.00
11,400.0	90.30	359.49	10,345.9	1,254.9	-11.1	1,255.0	0.00	0.00	0.00
11,500.0	90.30	359.49	10,345.4	1,354.9	-12.0	1,355.0	0.00	0.00	0.00
11,600.0	90.30	359.49	10,344.9	1,454.9	-12.9	1,455.0	0.00	0.00	0.00
11,700.0	90.30	359.49	10,344.3	1,554.9	-13.8	1,555.0	0.00	0.00	0.00
11,800.0	90.30	359.49	10,343.8	1,654.9	-14.7	1,654.9	0.00	0.00	0.00
11,900.0	90.30	359.49	10,343.3	1,754.9	-15.6	1,754.9	0.00	0.00	0.00
12,000.0	90.30	359.49	10,342.8	1,854.9	-16.5	1,854.9	0.00	0.00	0.00
12,100.0	90.30	359.49	10,342.3	1,954.9	-17.4	1,954.9	0.00	0.00	0.00
12,200.0	90.30	359.49	10,341.7	2,054.9	-18.3	2,054.9	0.00	0.00	0.00
12,300.0	90.30	359.49	10,341.2	2,154.9	-19.1	2,154.9	0.00	0.00	0.00
12,400.0	90.30	359.49	10,340.7	2,254.9	-20.0	2,254.9	0.00	0.00	0.00
12,500.0	90.30	359.49	10,340.2	2,354.8	-20.9	2,354.9	0.00	0.00	0.00
12,600.0	90.30	359.49	10,339.6	2,454.8	-21.8	2,454.9	0.00	0.00	0.00
12,700.0	90.30	359.49	10,339.1	2,554.8	-22.7	2,554.9	0.00	0.00	0.00
12,800.0	90.30	359.49	10,338.6	2,654.8	-23.6	2,654.9	0.00	0.00	0.00
12,900.0	90.30	359.49	10,338.1	2,754.8	-24.5	2,754.9	0.00	0.00	0.00
13,000.0	90.30	359.49	10,337.5	2,854.8	-25.4	2,854.9	0.00	0.00	0.00
13,100.0	90.30	359.49	10,337.0	2,954.8	-26.3	2,954.9	0.00	0.00	0.00
13,200.0	90.30	359.49	10,336.5	3,054.8	-27.1	3,054.9	0.00	0.00	0.00
13,300.0	90.30	359.49	10,336.0	3,154.8	-28.0	3,154.9	0.00	0.00	0.00
13,400.0	90.30	359.49	10,335.5	3,254.8	-28.9	3,254.9	0.00	0.00	0.00
13,500.0	90.30	359.49	10,334.9	3,354.8	-29.8	3,354.9	0.00	0.00	0.00
13,600.0	90.30	359.49	10,334.4	3,454.8	-30.7	3,454.9	0.00	0.00	0.00
13,700.0	90.30	359.49	10,333.9	3,554.8	-31.6	3,554.9	0.00	0.00	0.00
13,800.0	90.30	359.49	10,333.4	3,654.8	-32.5	3,654.9	0.00	0.00	0.00
13,900.0	90.30	359.49	10,332.8	3,754.8	-33.4	3,754.9	0.00	0.00	0.00
14,000.0	90.30	359.49	10,332.3	3,854.8	-34.2	3,854.9	0.00	0.00	0.00
14,100.0	90.30	359.49	10,331.8	3,954.8	-35.1	3,954.9	0.00	0.00	0.00
14,200.0	90.30	359.49	10,331.3	4,054.8	-36.0	4,054.9	0.00	0.00	0.00
14,300.0	90.30	359.49	10,330.8	4,154.8	-36.9	4,154.9	0.00	0.00	0.00
14,400.0	90.30	359.49	10,330.2	4,254.7	-37.8	4,254.9	0.00	0.00	0.00
14,500.0	90.30	359.49	10,329.7	4,354.7	-38.7	4,354.9	0.00	0.00	0.00



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Well:	Squints Federal Com #8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned 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)
14,600.0	90.30	359.49	10,329.2	4,454.7	-39.6	4,454.9	0.00	0.00	0.00
14,700.0	90.30	359.49	10,328.7	4,554.7	-40.5	4,554.9	0.00	0.00	0.00
14,800.0	90.30	359.49	10,328.1	4,654.7	-41.4	4,654.9	0.00	0.00	0.00
14,900.0	90.30	359.49	10,327.6	4,754.7	-42.2	4,754.9	0.00	0.00	0.00
15,000.0	90.30	359.49	10,327.1	4,854.7	-43.1	4,854.9	0.00	0.00	0.00
15,100.0	90.30	359.49	10,326.6	4,954.7	-44.0	4,954.9	0.00	0.00	0.00
15,200.0	90.30	359.49	10,326.1	5,054.7	-44.9	5,054.9	0.00	0.00	0.00
15,300.0	90.30	359.49	10,325.5	5,154.7	-45.8	5,154.9	0.00	0.00	0.00
15,400.0	90.30	359.49	10,325.0	5,254.7	-46.7	5,254.9	0.00	0.00	0.00
15,500.0	90.30	359.49	10,324.5	5,354.7	-47.6	5,354.9	0.00	0.00	0.00
15,600.0	90.30	359.49	10,324.0	5,454.7	-48.5	5,454.9	0.00	0.00	0.00
15,700.0	90.30	359.49	10,323.4	5,554.7	-49.4	5,554.9	0.00	0.00	0.00
15,800.0	90.30	359.49	10,322.9	5,654.7	-50.2	5,654.9	0.00	0.00	0.00
15,900.0	90.30	359.49	10,322.4	5,754.7	-51.1	5,754.9	0.00	0.00	0.00
16,000.0	90.30	359.49	10,321.9	5,854.7	-52.0	5,854.9	0.00	0.00	0.00
16,100.0	90.30	359.49	10,321.3	5,954.7	-52.9	5,954.9	0.00	0.00	0.00
16,200.0	90.30	359.49	10,320.8	6,054.6	-53.8	6,054.9	0.00	0.00	0.00
16,300.0	90.30	359.49	10,320.3	6,154.6	-54.7	6,154.9	0.00	0.00	0.00
16,400.0	90.30	359.49	10,319.8	6,254.6	-55.6	6,254.9	0.00	0.00	0.00
16,500.0	90.30	359.49	10,319.3	6,354.6	-56.5	6,354.9	0.00	0.00	0.00
16,600.0	90.30	359.49	10,318.7	6,454.6	-57.3	6,454.9	0.00	0.00	0.00
16,700.0	90.30	359.49	10,318.2	6,554.6	-58.2	6,554.9	0.00	0.00	0.00
16,800.0	90.30	359.49	10,317.7	6,654.6	-59.1	6,654.9	0.00	0.00	0.00
16,900.0	90.30	359.49	10,317.2	6,754.6	-60.0	6,754.9	0.00	0.00	0.00
17,000.0	90.30	359.49	10,316.6	6,854.6	-60.9	6,854.9	0.00	0.00	0.00
17,100.0	90.30	359.49	10,316.1	6,954.6	-61.8	6,954.9	0.00	0.00	0.00
17,200.0	90.30	359.49	10,315.6	7,054.6	-62.7	7,054.9	0.00	0.00	0.00
17,300.0	90.30	359.49	10,315.1	7,154.6	-63.6	7,154.9	0.00	0.00	0.00
17,400.0	90.30	359.49	10,314.6	7,254.6	-64.5	7,254.9	0.00	0.00	0.00
17,500.0	90.30	359.49	10,314.0	7,354.6	-65.3	7,354.9	0.00	0.00	0.00
17,600.0	90.30	359.49	10,313.5	7,454.6	-66.2	7,454.9	0.00	0.00	0.00
17,700.0	90.30	359.49	10,313.0	7,554.6	-67.1	7,554.9	0.00	0.00	0.00
17,800.0	90.30	359.49	10,312.5	7,654.6	-68.0	7,654.9	0.00	0.00	0.00
17,900.0	90.30	359.49	10,311.9	7,754.6	-68.9	7,754.9	0.00	0.00	0.00
18,000.0	90.30	359.49	10,311.4	7,854.6	-69.8	7,854.9	0.00	0.00	0.00
18,100.0	90.30	359.49	10,310.9	7,954.5	-70.7	7,954.9	0.00	0.00	0.00
18,200.0	90.30	359.49	10,310.4	8,054.5	-71.6	8,054.9	0.00	0.00	0.00
18,300.0	90.30	359.49	10,309.9	8,154.5	-72.5	8,154.9	0.00	0.00	0.00
18,400.0	90.30	359.49	10,309.3	8,254.5	-73.3	8,254.9	0.00	0.00	0.00
18,500.0	90.30	359.49	10,308.8	8,354.5	-74.2	8,354.9	0.00	0.00	0.00
18,600.0	90.30	359.49	10,308.3	8,454.5	-75.1	8,454.9	0.00	0.00	0.00
18,700.0	90.30	359.49	10,307.8	8,554.5	-76.0	8,554.9	0.00	0.00	0.00
18,800.0	90.30	359.49	10,307.2	8,654.5	-76.9	8,654.9	0.00	0.00	0.00
18,900.0	90.30	359.49	10,306.7	8,754.5	-77.8	8,754.9	0.00	0.00	0.00
19,000.0	90.30	359.49	10,306.2	8,854.5	-78.7	8,854.9	0.00	0.00	0.00
19,100.0	90.30	359.49	10,305.7	8,954.5	-79.6	8,954.8	0.00	0.00	0.00
19,200.0	90.30	359.49	10,305.1	9,054.5	-80.4	9,054.8	0.00	0.00	0.00
19,300.0	90.30	359.49	10,304.6	9,154.5	-81.3	9,154.8	0.00	0.00	0.00
19,400.0	90.30	359.49	10,304.1	9,254.5	-82.2	9,254.8	0.00	0.00	0.00
19,500.0	90.30	359.49	10,303.6	9,354.5	-83.1	9,354.8	0.00	0.00	0.00
19,600.0	90.30	359.49	10,303.1	9,454.5	-84.0	9,454.8	0.00	0.00	0.00
19,700.0	90.30	359.49	10,302.5	9,554.5	-84.9	9,554.8	0.00	0.00	0.00
19,800.0	90.30	359.49	10,302.0	9,654.5	-85.8	9,654.8	0.00	0.00	0.00
19,900.0	90.30	359.49	10,301.5	9,754.5	-86.7	9,754.8	0.00	0.00	0.00



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Well:	Squints Federal Com #8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned 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)	
20,000.0	90.30	359.49	10,301.0	9,854.4	-87.6	9,854.8	0.00	0.00	0.00	
20,100.0	90.30	359.49	10,300.4	9,954.4	-88.4	9,954.8	0.00	0.00	0.00	
PBHL @ 20185' MD / 10300' TVD										
20,185.1	90.30	359.49	10,300.0	10,039.5	-89.2	10,039.9	0.00	0.00	0.00	

Design Targets										
Target Name	hit/miss target	Dip Angle (°)	Dip Dir (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL Squints Federal #	- plan hits target center	0.00	0.00	10,300.0	10,039.5	-89.2	504,292.50	768,429.30	32° 23' 0.297 N	103° 27' 49.659 W
	- Point									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,673.0	1,673.0	Rustler		-0.30	359.49	
1,869.0	1,869.0	TOS		-0.30	359.49	
3,609.0	3,609.0	BOS / Tansill		-0.30	359.49	
3,688.0	3,688.0	Yates		-0.30	359.49	
3,896.0	3,896.0	Seven Rivers		-0.30	359.49	
4,017.0	4,017.0	Captain Reef		-0.30	359.49	
5,285.0	5,285.0	Base of Reef (BLCN)		-0.30	359.49	
5,801.0	5,801.0	CYCN		-0.30	359.49	
7,194.0	7,194.0	BYCN		-0.30	359.49	
8,506.0	8,506.0	Bone Spring (BSGL)		-0.30	359.49	
8,814.0	8,814.0	U Avalon Sh		-0.30	359.49	
8,940.0	8,940.0	L Avalon Sh		-0.30	359.49	
9,588.0	9,588.0	FBSG_sand		-0.30	359.49	
10,079.2	10,072.8	SBSG_sand		-0.30	359.49	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment	
9,872.5	9,872.5	0.0	0.0	KOP 12°/100'	
10,625.0	10,350.0	479.9	-4.3	End of Curve / 90.30° Inc / 359.49° Azm / 10350' TVD	
20,185.1	10,300.0	10,039.5	-89.2	PBHL @ 20185' MD / 10300' TVD	