



COG Operating, LLC

Lea County, NM
Sec 28, T22S, R34E
Smalls Federal 6H

Wellbore #1

Plan: Design #1

DDC Well Planning Report

07 July, 2015



FEB 11 2016



HP Well Planning Report



Database:	Compass	Local Co-ordinate Reference:	Well Smalls Federal 6H
Company:	COG Operating, LLC	TVD Reference:	Well @ 3437.0usft (Ensign #772)
Project:	Lea County, NM	MD Reference:	Well @ 3437.0usft (Ensign #772)
Site:	Sec 28, T22S, R34E	North Reference:	Grid
Well:	Smalls Federal 6H	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 28, T22S, R34E		
Site Position:		Northing:	494,242.70 usft
From:	Map	Easting:	767,268.60 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 21' 20.947 N
		Longitude:	103° 28' 4.141 W
		Grid Convergence:	0.46 °

Well:	Smalls Federal 6H		
Well Position	+N-S	-12.3 usft	Northing: 494,230.40 usft
	+E-W	-1,449.6 usft	Easting: 765,819.00 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 21' 20.941 N
		Longitude:	103° 28' 21.040 W
		Ground Level:	3,406.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2015	7/7/2015	7.13
			Dip Angle
			(°)
			Field Strength
			(nT)
			60.23
			48,228

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
			Direction
			(°)
			359.99

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
9,812.5	0.00	0.00	9,812.5	0.0	0.0	0.00	0.00	0.00	0.00	
10,562.5	90.00	359.99	10,290.0	477.5	-0.1	12.00	12.00	0.00	359.99	
14,841.4	90.00	359.99	10,290.0	4,756.4	-0.9	0.00	0.00	0.00	0.00	PBHL Smalls Federal



HP
Well Planning Report



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Well:	Smalls Federal 6H	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'									
9,812.5	0.00	0.00	9,812.5	0.0	0.0	0.0	0.00	0.00	0.00
9,900.0	10.50	359.99	9,899.5	8.0	0.0	8.0	12.00	12.00	0.00
10,000.0	22.50	359.99	9,995.2	36.3	0.0	36.3	12.00	12.00	0.00
SBSG_sand									
10,045.1	27.91	359.99	10,036.0	55.5	0.0	55.5	12.00	12.00	0.00
10,100.0	34.50	359.99	10,082.9	84.0	0.0	84.0	12.00	12.00	0.00
10,200.0	46.50	359.99	10,158.8	148.8	0.0	148.8	12.00	12.00	0.00
10,300.0	58.50	359.99	10,219.6	228.0	0.0	228.0	12.00	12.00	0.00
10,400.0	70.50	359.99	10,262.6	318.1	-0.1	318.1	12.00	12.00	0.00
10,500.0	82.50	359.99	10,285.9	415.1	-0.1	415.1	12.00	12.00	0.00
End of Curve / 90° Inc / 359.99° Azm / 10290' TVD									
10,562.5	90.00	359.99	10,290.0	477.5	-0.1	477.5	12.00	12.00	0.00
10,600.0	90.00	359.99	10,290.0	515.0	-0.1	515.0	0.00	0.00	0.00
10,700.0	90.00	359.99	10,290.0	615.0	-0.1	615.0	0.00	0.00	0.00
10,800.0	90.00	359.99	10,290.0	715.0	-0.1	715.0	0.00	0.00	0.00
10,900.0	90.00	359.99	10,290.0	815.0	-0.2	815.0	0.00	0.00	0.00
11,000.0	90.00	359.99	10,290.0	915.0	-0.2	915.0	0.00	0.00	0.00
11,100.0	90.00	359.99	10,290.0	1,015.0	-0.2	1,015.0	0.00	0.00	0.00
11,200.0	90.00	359.99	10,290.0	1,115.0	-0.2	1,115.0	0.00	0.00	0.00
11,300.0	90.00	359.99	10,290.0	1,215.0	-0.2	1,215.0	0.00	0.00	0.00
11,400.0	90.00	359.99	10,290.0	1,315.0	-0.2	1,315.0	0.00	0.00	0.00
11,500.0	90.00	359.99	10,290.0	1,415.0	-0.3	1,415.0	0.00	0.00	0.00
11,600.0	90.00	359.99	10,290.0	1,515.0	-0.3	1,515.0	0.00	0.00	0.00
11,700.0	90.00	359.99	10,290.0	1,615.0	-0.3	1,615.0	0.00	0.00	0.00
11,800.0	90.00	359.99	10,290.0	1,715.0	-0.3	1,715.0	0.00	0.00	0.00
11,900.0	90.00	359.99	10,290.0	1,815.0	-0.3	1,815.0	0.00	0.00	0.00
12,000.0	90.00	359.99	10,290.0	1,915.0	-0.4	1,915.0	0.00	0.00	0.00
12,100.0	90.00	359.99	10,290.0	2,015.0	-0.4	2,015.0	0.00	0.00	0.00
12,200.0	90.00	359.99	10,290.0	2,115.0	-0.4	2,115.0	0.00	0.00	0.00
12,300.0	90.00	359.99	10,290.0	2,215.0	-0.4	2,215.0	0.00	0.00	0.00
12,400.0	90.00	359.99	10,290.0	2,315.0	-0.4	2,315.0	0.00	0.00	0.00
12,500.0	90.00	359.99	10,290.0	2,415.0	-0.5	2,415.0	0.00	0.00	0.00
12,600.0	90.00	359.99	10,290.0	2,515.0	-0.5	2,515.0	0.00	0.00	0.00
12,700.0	90.00	359.99	10,290.0	2,615.0	-0.5	2,615.0	0.00	0.00	0.00
12,800.0	90.00	359.99	10,290.0	2,715.0	-0.5	2,715.0	0.00	0.00	0.00
12,900.0	90.00	359.99	10,290.0	2,815.0	-0.5	2,815.0	0.00	0.00	0.00
13,000.0	90.00	359.99	10,290.0	2,915.0	-0.6	2,915.0	0.00	0.00	0.00
13,100.0	90.00	359.99	10,290.0	3,015.0	-0.6	3,015.0	0.00	0.00	0.00
13,200.0	90.00	359.99	10,290.0	3,115.0	-0.6	3,115.0	0.00	0.00	0.00
13,300.0	90.00	359.99	10,290.0	3,215.0	-0.6	3,215.0	0.00	0.00	0.00
13,400.0	90.00	359.99	10,290.0	3,315.0	-0.6	3,315.0	0.00	0.00	0.00
13,500.0	90.00	359.99	10,290.0	3,415.0	-0.6	3,415.0	0.00	0.00	0.00
13,600.0	90.00	359.99	10,290.0	3,515.0	-0.7	3,515.0	0.00	0.00	0.00
13,700.0	90.00	359.99	10,290.0	3,615.0	-0.7	3,615.0	0.00	0.00	0.00
13,800.0	90.00	359.99	10,290.0	3,715.0	-0.7	3,715.0	0.00	0.00	0.00
13,900.0	90.00	359.99	10,290.0	3,815.0	-0.7	3,815.0	0.00	0.00	0.00
14,000.0	90.00	359.99	10,290.0	3,915.0	-0.7	3,915.0	0.00	0.00	0.00
14,100.0	90.00	359.99	10,290.0	4,015.0	-0.8	4,015.0	0.00	0.00	0.00
14,200.0	90.00	359.99	10,290.0	4,115.0	-0.8	4,115.0	0.00	0.00	0.00
14,300.0	90.00	359.99	10,290.0	4,215.0	-0.8	4,215.0	0.00	0.00	0.00
14,400.0	90.00	359.99	10,290.0	4,315.0	-0.8	4,315.0	0.00	0.00	0.00
14,500.0	90.00	359.99	10,290.0	4,415.0	-0.8	4,415.0	0.00	0.00	0.00



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Site:	Sec 28, T2S, R34E	North Reference:	Grid
Well:	Smalls Federal 6H	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	90.00	359.99	10,290.0	4,515.0	-0.9	4,515.0	0.00	0.00	0.00
14,700.0	90.00	359.99	10,290.0	4,615.0	-0.9	4,615.0	0.00	0.00	0.00
14,800.0	90.00	359.99	10,290.0	4,715.0	-0.9	4,715.0	0.00	0.00	0.00
PBHL @ 14841' MD / 10290' TVD									
14,841.4	90.00	359.99	10,290.0	4,756.4	-0.9	4,756.4	0.00	0.00	0.00

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL Smalls Federal 6H	0.00	0.00	10,290.0	4,756.4	-0.9	498,986.80	765,818.10	32° 22' 8.006 N	103° 28' 20.604 W
- plan hits target center									
- Point									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,417.0	2,417.0	Rustler		0.00	359.99	
2,680.0	2,680.0	TOS		0.00	359.99	
3,639.0	3,639.0	BOS / Tansill		0.00	359.99	
3,710.0	3,710.0	Yates		0.00	359.99	
3,845.0	3,845.0	Seven Rivers		0.00	359.99	
4,014.0	4,014.0	Captain Reef		0.00	359.99	
5,211.0	5,211.0	Base of Reef (BLCN)		0.00	359.99	
5,902.0	5,902.0	CYCN		0.00	359.99	
7,105.0	7,105.0	BYCN		0.00	359.99	
8,507.0	8,507.0	Bone Spring (BSGL)		0.00	359.99	
8,799.0	8,799.0	U Avalon Sh		0.00	359.99	
9,040.0	9,040.0	L Avalon Sh		0.00	359.99	
9,570.0	9,570.0	FBSG_sand		0.00	359.99	
10,045.1	10,036.0	SBSG_sand		0.00	359.99	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
9,812.5	9,812.5	0.0	0.0	KOP 12°/100'	
10,562.5	10,290.0	477.5	-0.1	End of Curve / 90° Inc / 359.99° Azm / 10290' TVD	
14,841.4	10,290.0	4,756.4	-0.9	PBHL @ 14841' MD / 10290' TVD	



COG Operating, LLC

Lea County, NM

Sec 28, T22S, R34E

Smalls Federal 6H

Wellbore #1

Design #1

DDC Anticollision Report

07 July, 2015





HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Smalls Federal 6H
Project:	Lea County, NM	TVD Reference:	Well @ 3437.0usft (Ensign #772)
Reference Site:	Sec 28, T22S, R34E	MD Reference:	Well @ 3437.0usft (Ensign #772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Smalls Federal 6H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference	Design #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program		Date: 7/7/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	14,841.4	Design #1 (Wellbore #1)	MWD default	MWD - Standard

Summary		Reference	Offset	Distance		Separation	Warning
Site Name		Measured Depth (usft)	Measured Depth (usft)	Between Centres (usft)	Between Ellipses (usft)	Factor	
Offset Well - Wellbore - Design							
Sec 28, T22S, R34E							
Smalls Federal 2H - Wellbore #1 - Design #1		9,834.2	9,834.2	29.9	-14.0	0.681	Level 1, CC
Smalls Federal 2H - Wellbore #1 - Design #1		9,850.0	9,850.0	29.9	-14.1	0.680	Level 1, ES, SF

Offset Design												Offset Site Error:	0.0 usft
Survey Program: 0-MWD default												Offset Well Error:	0.0 usft
Reference	Vertical	Measured	Offset	Vertical	Semi Major Axis		Highside	Offset Wellbore Centre		Distance		Separation	Warning
Measured Depth (usft)	Depth (usft)	Depth (usft)	Depth (usft)	Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	+N/S (usft)	+E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Factor	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.04	0.5	29.9	29.9			
100.0	100.0	100.0	100.0	0.1	0.1	89.04	89.04	0.5	29.9	29.9	29.7	192.820	
200.0	200.0	200.0	200.0	0.3	0.3	89.04	89.04	0.5	29.9	29.9	29.3	49.459	
300.0	300.0	300.0	300.0	0.5	0.5	89.04	89.04	0.5	29.9	29.9	28.9	28.368	
400.0	400.0	400.0	400.0	0.8	0.8	89.04	89.04	0.5	29.9	29.9	28.4	19.887	
500.0	500.0	500.0	500.0	1.0	1.0	89.04	89.04	0.5	29.9	29.9	28.0	15.310	
600.0	600.0	600.0	600.0	1.2	1.2	89.04	89.04	0.5	29.9	29.9	27.5	12.446	
700.0	700.0	700.0	700.0	1.4	1.4	89.04	89.04	0.5	29.9	29.9	27.1	10.484	
800.0	800.0	800.0	800.0	1.7	1.7	89.04	89.04	0.5	29.9	29.9	26.6	9.057	
900.0	900.0	900.0	900.0	1.9	1.9	89.04	89.04	0.5	29.9	29.9	26.2	7.972	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	89.04	89.04	0.5	29.9	29.9	25.7	7.119	
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.3	89.04	89.04	0.5	29.9	29.9	25.3	6.430	
1,200.0	1,200.0	1,200.0	1,200.0	2.5	2.5	89.04	89.04	0.5	29.9	29.9	24.8	5.864	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	89.04	89.04	0.5	29.9	29.9	24.4	5.389	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	89.04	89.04	0.5	29.9	29.9	23.9	4.985	
1,500.0	1,500.0	1,500.0	1,500.0	3.2	3.2	89.04	89.04	0.5	29.9	29.9	23.5	4.637	
1,600.0	1,600.0	1,600.0	1,600.0	3.4	3.4	89.04	89.04	0.5	29.9	29.9	23.0	4.335	
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	89.04	89.04	0.5	29.9	29.9	22.6	4.070	
1,800.0	1,800.0	1,800.0	1,800.0	3.9	3.9	89.04	89.04	0.5	29.9	29.9	22.1	3.835	
1,900.0	1,900.0	1,900.0	1,900.0	4.1	4.1	89.04	89.04	0.5	29.9	29.9	21.7	3.626	
2,000.0	2,000.0	2,000.0	2,000.0	4.3	4.3	89.04	89.04	0.5	29.9	29.9	21.2	3.439	
2,100.0	2,100.0	2,100.0	2,100.0	4.6	4.6	89.04	89.04	0.5	29.9	29.9	20.8	3.270	
2,200.0	2,200.0	2,200.0	2,200.0	4.8	4.8	89.04	89.04	0.5	29.9	29.9	20.3	3.117	
2,300.0	2,300.0	2,300.0	2,300.0	5.0	5.0	89.04	89.04	0.5	29.9	29.9	19.9	2.977	
2,400.0	2,400.0	2,400.0	2,400.0	5.2	5.2	89.04	89.04	0.5	29.9	29.9	19.4	2.850	

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



HP
Anticollision Report



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Reference Site:	Sec 28, T22S, R34E	MD Reference:	Well @ 3437.0usft (Ensign #772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Smalls Federal 6H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 28, T22S, R34E - Smalls Federal 2H - Wellbore #1 - Design #1												Offset Site Error:	0.0 usft
Survey Program: 0-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference Offset (usft)		Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)		Distance Between Centres (usft)		Between Ellipses (usft)	Separation Factor	Warning
2,500.0	2,500.0	2,500.0	2,500.0	5.5	5.5	89.04	0.5	29.9	29.9	19.0	2.733		
2,600.0	2,600.0	2,600.0	2,600.0	5.7	5.7	89.04	0.5	29.9	29.9	18.5	2.825		
2,700.0	2,700.0	2,700.0	2,700.0	5.9	5.9	89.04	0.5	29.9	29.9	18.1	2.525		
2,800.0	2,800.0	2,800.0	2,800.0	6.1	6.1	89.04	0.5	29.9	29.9	17.6	2.433		
2,900.0	2,900.0	2,900.0	2,900.0	6.4	6.4	89.04	0.5	29.9	29.9	17.2	2.347		
3,000.0	3,000.0	3,000.0	3,000.0	6.6	6.6	89.04	0.5	29.9	29.9	16.7	2.267		
3,100.0	3,100.0	3,100.0	3,100.0	6.8	6.8	89.04	0.5	29.9	29.9	16.3	2.192		
3,200.0	3,200.0	3,200.0	3,200.0	7.0	7.0	89.04	0.5	29.9	29.9	15.8	2.122		
3,300.0	3,300.0	3,300.0	3,300.0	7.3	7.3	89.04	0.5	29.9	29.9	15.4	2.057		
3,400.0	3,400.0	3,400.0	3,400.0	7.5	7.5	89.04	0.5	29.9	29.9	14.9	1.995		
3,500.0	3,500.0	3,500.0	3,500.0	7.7	7.7	89.04	0.5	29.9	29.9	14.5	1.937		
3,600.0	3,600.0	3,600.0	3,600.0	7.9	7.9	89.04	0.5	29.9	29.9	14.0	1.882		
3,700.0	3,700.0	3,700.0	3,700.0	8.2	8.2	89.04	0.5	29.9	29.9	13.6	1.830		
3,800.0	3,800.0	3,800.0	3,800.0	8.4	8.4	89.04	0.5	29.9	29.9	13.1	1.781		
3,900.0	3,900.0	3,900.0	3,900.0	8.6	8.6	89.04	0.5	29.9	29.9	12.7	1.735		
4,000.0	4,000.0	4,000.0	4,000.0	8.8	8.8	89.04	0.5	29.9	29.9	12.2	1.691		
4,100.0	4,100.0	4,100.0	4,100.0	9.1	9.1	89.04	0.5	29.9	29.9	11.8	1.649		
4,200.0	4,200.0	4,200.0	4,200.0	9.3	9.3	89.04	0.5	29.9	29.9	11.3	1.609		
4,300.0	4,300.0	4,300.0	4,300.0	9.5	9.5	89.04	0.5	29.9	29.9	10.9	1.571		
4,400.0	4,400.0	4,400.0	4,400.0	9.7	9.7	89.04	0.5	29.9	29.9	10.4	1.535		
4,500.0	4,500.0	4,500.0	4,500.0	10.0	10.0	89.04	0.5	29.9	29.9	10.0	1.500		
4,600.0	4,600.0	4,600.0	4,600.0	10.2	10.2	89.04	0.5	29.9	29.9	9.5	1.467	Level 3	
4,700.0	4,700.0	4,700.0	4,700.0	10.4	10.4	89.04	0.5	29.9	29.9	9.1	1.435	Level 3	
4,800.0	4,800.0	4,800.0	4,800.0	10.6	10.6	89.04	0.5	29.9	29.9	8.6	1.405	Level 3	
4,900.0	4,900.0	4,900.0	4,900.0	10.9	10.9	89.04	0.5	29.9	29.9	8.2	1.376	Level 3	
5,000.0	5,000.0	5,000.0	5,000.0	11.1	11.1	89.04	0.5	29.9	29.9	7.7	1.348	Level 3	
5,100.0	5,100.0	5,100.0	5,100.0	11.3	11.3	89.04	0.5	29.9	29.9	7.3	1.321	Level 3	
5,200.0	5,200.0	5,200.0	5,200.0	11.5	11.5	89.04	0.5	29.9	29.9	6.8	1.296	Level 3	
5,300.0	5,300.0	5,300.0	5,300.0	11.8	11.8	89.04	0.5	29.9	29.9	6.4	1.271	Level 3	
5,400.0	5,400.0	5,400.0	5,400.0	12.0	12.0	89.04	0.5	29.9	29.9	5.9	1.247	Level 2	
5,500.0	5,500.0	5,500.0	5,500.0	12.2	12.2	89.04	0.5	29.9	29.9	5.5	1.224	Level 2	
5,600.0	5,600.0	5,600.0	5,600.0	12.4	12.4	89.04	0.5	29.9	29.9	5.0	1.202	Level 2	
5,700.0	5,700.0	5,700.0	5,700.0	12.7	12.7	89.04	0.5	29.9	29.9	4.6	1.181	Level 2	
5,800.0	5,800.0	5,800.0	5,800.0	12.9	12.9	89.04	0.5	29.9	29.9	4.1	1.160	Level 2	
5,900.0	5,900.0	5,900.0	5,900.0	13.1	13.1	89.04	0.5	29.9	29.9	3.7	1.140	Level 2	
6,000.0	6,000.0	6,000.0	6,000.0	13.3	13.3	89.04	0.5	29.9	29.9	3.2	1.121	Level 2	
6,100.0	6,100.0	6,100.0	6,100.0	13.6	13.6	89.04	0.5	29.9	29.9	2.8	1.102	Level 2	
6,200.0	6,200.0	6,200.0	6,200.0	13.8	13.8	89.04	0.5	29.9	29.9	2.3	1.084	Level 2	
6,300.0	6,300.0	6,300.0	6,300.0	14.0	14.0	89.04	0.5	29.9	29.9	1.9	1.067	Level 2	
6,400.0	6,400.0	6,400.0	6,400.0	14.2	14.2	89.04	0.5	29.9	29.9	1.4	1.050	Level 2	
6,500.0	6,500.0	6,500.0	6,500.0	14.5	14.5	89.04	0.5	29.9	29.9	1.0	1.034	Level 2	
6,600.0	6,600.0	6,600.0	6,600.0	14.7	14.7	89.04	0.5	29.9	29.9	0.5	1.018	Level 2	
6,700.0	6,700.0	6,700.0	6,700.0	14.9	14.9	89.04	0.5	29.9	29.9	0.1	1.003	Level 2	
6,800.0	6,800.0	6,800.0	6,800.0	15.1	15.1	89.04	0.5	29.9	29.9	-0.4	0.988	Level 1	
6,900.0	6,900.0	6,900.0	6,900.0	15.4	15.4	89.04	0.5	29.9	29.9	-0.8	0.973	Level 1	
7,000.0	7,000.0	7,000.0	7,000.0	15.6	15.6	89.04	0.5	29.9	29.9	-1.3	0.959	Level 1	
7,100.0	7,100.0	7,100.0	7,100.0	15.8	15.8	89.04	0.5	29.9	29.9	-1.7	0.946	Level 1	
7,200.0	7,200.0	7,200.0	7,200.0	16.0	16.0	89.04	0.5	29.9	29.9	-2.2	0.932	Level 1	
7,300.0	7,300.0	7,300.0	7,300.0	16.3	16.3	89.04	0.5	29.9	29.9	-2.6	0.920	Level 1	
7,400.0	7,400.0	7,400.0	7,400.0	16.5	16.5	89.04	0.5	29.9	29.9	-3.1	0.907	Level 1	
7,500.0	7,500.0	7,500.0	7,500.0	16.7	16.7	89.04	0.5	29.9	29.9	-3.5	0.895	Level 1	
7,600.0	7,600.0	7,600.0	7,600.0	16.9	16.9	89.04	0.5	29.9	29.9	-4.0	0.883	Level 1	

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Smalls Federal 6H
Project:	Lea County, NM	TVD Reference:	Well @ 3437.0usft (Ensign #772)
Reference Site:	Sec 28, T22S, R34E	MD Reference:	Well @ 3437.0usft (Ensign #772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Smalls Federal 6H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28, T22S, R34E - Smalls Federal 2H - Wellbore #1 - Design #1												Offset Site Error:	0.0 usft
Survey Program: 0-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S- (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
7,700.0	7,700.0	7,700.0	7,700.0	17.2	17.2	89.04	0.5	29.9	29.9	-4.4	0.871	Level 1	
7,800.0	7,800.0	7,800.0	7,800.0	17.4	17.4	89.04	0.5	29.9	29.9	-4.9	0.860	Level 1	
7,900.0	7,900.0	7,900.0	7,900.0	17.6	17.6	89.04	0.5	29.9	29.9	-5.3	0.849	Level 1	
8,000.0	8,000.0	8,000.0	8,000.0	17.8	17.8	89.04	0.5	29.9	29.9	-5.8	0.838	Level 1	
8,100.0	8,100.0	8,100.0	8,100.0	18.1	18.1	89.04	0.5	29.9	29.9	-6.2	0.828	Level 1	
8,200.0	8,200.0	8,200.0	8,200.0	18.3	18.3	89.04	0.5	29.9	29.9	-6.7	0.818	Level 1	
8,300.0	8,300.0	8,300.0	8,300.0	18.5	18.5	89.04	0.5	29.9	29.9	-7.1	0.808	Level 1	
8,400.0	8,400.0	8,400.0	8,400.0	18.7	18.7	89.04	0.5	29.9	29.9	-7.6	0.798	Level 1	
8,500.0	8,500.0	8,500.0	8,500.0	19.0	19.0	89.04	0.5	29.9	29.9	-8.0	0.789	Level 1	
8,600.0	8,600.0	8,600.0	8,600.0	19.2	19.2	89.04	0.5	29.9	29.9	-8.5	0.779	Level 1	
8,700.0	8,700.0	8,700.0	8,700.0	19.4	19.4	89.04	0.5	29.9	29.9	-8.9	0.770	Level 1	
8,800.0	8,800.0	8,800.0	8,800.0	19.6	19.6	89.04	0.5	29.9	29.9	-9.4	0.762	Level 1	
8,900.0	8,900.0	8,900.0	8,900.0	19.9	19.9	89.04	0.5	29.9	29.9	-9.8	0.753	Level 1	
9,000.0	9,000.0	9,000.0	9,000.0	20.1	20.1	89.04	0.5	29.9	29.9	-10.3	0.745	Level 1	
9,100.0	9,100.0	9,100.0	9,100.0	20.3	20.3	89.04	0.5	29.9	29.9	-10.7	0.736	Level 1	
9,200.0	9,200.0	9,200.0	9,200.0	20.5	20.5	89.04	0.5	29.9	29.9	-11.2	0.728	Level 1	
9,300.0	9,300.0	9,300.0	9,300.0	20.8	20.8	89.04	0.5	29.9	29.9	-11.6	0.720	Level 1	
9,400.0	9,400.0	9,400.0	9,400.0	21.0	21.0	89.04	0.5	29.9	29.9	-12.1	0.713	Level 1	
9,500.0	9,500.0	9,500.0	9,500.0	21.2	21.2	89.04	0.5	29.9	29.9	-12.5	0.705	Level 1	
9,600.0	9,600.0	9,600.0	9,600.0	21.4	21.4	89.04	0.5	29.9	29.9	-13.0	0.698	Level 1	
9,700.0	9,700.0	9,700.0	9,700.0	21.7	21.7	89.04	0.5	29.9	29.9	-13.4	0.690	Level 1	
9,800.0	9,800.0	9,800.0	9,800.0	21.9	21.9	89.04	0.5	29.9	29.9	-13.9	0.683	Level 1	
9,812.5	9,812.5	9,812.5	9,812.5	21.9	21.9	89.04	0.5	29.9	29.9	-13.9	0.682	Level 1	
9,825.0	9,825.0	9,825.0	9,825.0	21.9	21.9	89.37	0.5	29.9	29.9	-14.0	0.682	Level 1	
9,834.2	9,834.2	9,834.2	9,834.2	22.0	22.0	90.00	0.5	29.9	29.9	-14.0	0.681	Level 1, CC	
9,850.0	9,850.0	9,850.0	9,850.0	22.0	22.0	91.87	0.5	29.9	29.9	-14.1	0.680	Level 1, ES, SF	
9,875.0	9,874.8	9,874.8	9,874.8	22.0	22.0	96.79	0.5	29.9	30.1	-14.0	0.683	Level 1	
9,900.0	9,899.5	9,899.5	9,899.5	22.1	22.1	103.86	0.5	29.9	30.8	-13.3	0.698	Level 1	
9,925.0	9,924.0	9,924.0	9,924.0	22.2	22.2	112.44	0.5	29.9	32.5	-11.7	0.736	Level 1	
9,950.0	9,948.1	9,948.1	9,948.1	22.2	22.2	121.58	0.5	29.9	35.5	-8.4	0.808	Level 1	
9,975.0	9,971.9	9,971.9	9,971.9	22.3	22.3	130.29	0.5	29.9	40.2	-3.3	0.924	Level 1	
10,000.0	9,995.2	9,995.2	9,995.2	22.3	22.3	137.93	0.5	29.9	46.7	3.8	1.090	Level 2	
10,025.0	10,018.1	10,018.1	10,018.1	22.4	22.4	144.25	0.5	29.9	54.9	12.9	1.307	Level 3	
10,050.0	10,040.3	10,040.3	10,040.3	22.4	22.4	149.33	0.5	29.9	64.7	23.7	1.578		
10,075.0	10,062.0	10,062.0	10,062.0	22.5	22.5	153.35	0.5	29.9	76.0	36.1	1.905		
10,100.0	10,082.9	10,082.9	10,082.9	22.5	22.5	156.51	0.5	29.9	88.7	50.0	2.292		
10,125.0	10,103.2	10,103.2	10,103.2	22.6	22.6	159.00	0.5	29.9	102.6	65.2	2.745		
10,150.0	10,122.6	10,122.6	10,122.6	22.6	22.6	160.95	0.5	29.9	117.8	81.8	3.270		
10,175.0	10,141.2	10,141.2	10,141.2	22.7	22.6	162.49	0.5	29.9	134.0	99.4	3.877		
10,200.0	10,158.8	10,158.8	10,158.8	22.8	22.7	163.68	0.5	29.9	151.3	118.2	4.578		
10,225.0	10,175.6	10,175.6	10,175.6	22.8	22.7	164.58	0.5	29.9	169.5	138.1	5.387		
10,250.0	10,191.3	10,191.3	10,191.3	22.9	22.8	165.23	0.5	29.9	188.7	158.8	6.320		
10,275.0	10,206.0	10,206.0	10,206.0	23.0	22.8	165.66	0.5	29.9	208.7	180.5	7.398		
10,300.0	10,219.6	10,219.6	10,219.6	23.1	22.8	165.88	0.5	29.9	229.5	202.9	8.642		
10,325.0	10,232.1	10,232.1	10,232.1	23.2	22.9	165.88	0.5	29.9	250.9	226.0	10.071		
10,350.0	10,243.5	10,243.5	10,243.5	23.3	22.9	165.65	0.5	29.9	273.1	249.7	11.696		
10,375.0	10,253.6	10,253.6	10,253.6	23.4	22.9	165.13	0.5	29.9	295.8	273.9	13.500		
10,400.0	10,262.6	10,262.6	10,262.6	23.5	22.9	164.25	0.5	29.9	319.0	298.3	15.403		
10,425.0	10,270.3	10,270.3	10,270.3	23.6	22.9	162.86	0.5	29.9	342.7	322.7	17.197		
10,450.0	10,276.8	10,276.8	10,276.8	23.7	23.0	160.69	0.5	29.9	366.7	346.9	18.476		
10,475.0	10,282.0	10,282.0	10,282.0	23.8	23.0	157.18	0.5	29.9	391.1	370.1	18.635		
10,500.0	10,285.9	10,285.9	10,285.9	24.0	23.0	151.08	0.5	29.9	415.7	391.4	17.124		

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



HP
Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Smalls Federal 6H
Project:	Lea County, NM	TVD Reference:	Well @ 3437.0usft (Ensign #772)
Reference Site:	Sec 28, T22S, R34E	MD Reference:	Well @ 3437.0usft (Ensign #772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Smalls Federal 6H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Offset Design Sec 28, T22S, R34E - Smalls Federal 2H - Wellbore #1 - Design #1												Offset Site Error:	0.0 usft
Survey Program: 0-MWD default												Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
10,525.0	10,288.5	10,288.5	10,288.5	24.1	23.0	139.07	0.5	29.9	440.5	409.0	13.976		
10,550.0	10,289.8	10,289.8	10,289.8	24.3	23.0	112.13	0.5	29.9	465.4	421.6	10.612		
10,562.5	10,290.0	10,290.0	10,290.0	24.3	23.0	90.01	0.5	29.9	477.9	430.6	10.100		
10,600.0	10,290.0	10,290.0	10,290.0	24.6	23.0	90.01	0.5	29.9	515.3	467.8	10.838		
10,700.0	10,290.0	10,290.0	10,290.0	25.3	23.0	90.01	0.5	29.9	615.2	566.9	12.749		
10,800.0	10,290.0	10,290.0	10,290.0	26.1	23.0	90.01	0.5	29.9	715.1	666.0	14.574		
10,900.0	10,290.0	11,689.7	11,080.0	27.0	28.5	178.20	815.1	24.6	790.4	777.7	62.110		
11,000.0	10,290.0	11,789.7	11,080.0	28.0	29.4	178.25	915.1	24.0	790.4	776.4	56.632		
11,100.0	10,290.0	11,889.7	11,080.0	29.1	30.5	178.29	1,015.1	23.3	790.4	775.1	51.898		
11,200.0	10,290.0	11,989.7	11,080.0	30.2	31.6	178.34	1,115.1	22.7	790.3	773.8	47.801		
11,300.0	10,290.0	12,089.7	11,080.0	31.4	32.7	178.39	1,215.1	22.0	790.3	772.4	44.241		
11,400.0	10,290.0	12,189.7	11,080.0	32.7	34.0	178.43	1,315.1	21.4	790.3	771.1	41.132		
11,500.0	10,290.0	12,289.7	11,080.0	34.0	35.2	178.48	1,415.1	20.7	790.3	769.7	38.401		
11,600.0	10,290.0	12,389.7	11,080.0	35.4	36.6	178.52	1,515.1	20.1	790.3	768.3	35.989		
11,700.0	10,290.0	12,489.7	11,080.0	36.8	37.9	178.57	1,615.1	19.4	790.2	766.9	33.847		
11,800.0	10,290.0	12,589.7	11,080.0	38.2	39.3	178.61	1,715.1	18.8	790.2	765.5	31.934		
11,900.0	10,290.0	12,689.7	11,080.0	39.7	40.7	178.66	1,815.1	18.1	790.2	764.1	30.217		
12,000.0	10,290.0	12,789.6	11,080.0	41.2	42.2	178.70	1,915.1	17.5	790.2	762.6	28.669		
12,100.0	10,290.0	12,889.6	11,080.0	42.7	43.7	178.75	2,015.1	16.9	790.2	761.2	27.267		
12,200.0	10,290.0	12,989.6	11,080.0	44.3	45.2	178.80	2,115.1	16.2	790.2	759.8	25.991		
12,300.0	10,290.0	13,089.6	11,080.0	45.9	46.8	178.84	2,215.1	15.6	790.2	758.3	24.827		
12,400.0	10,290.0	13,189.6	11,080.0	47.4	48.3	178.89	2,315.1	14.9	790.1	756.9	23.760		
12,500.0	10,290.0	13,289.6	11,080.0	49.1	49.9	178.93	2,415.1	14.3	790.1	755.4	22.779		
12,600.0	10,290.0	13,389.6	11,080.0	50.7	51.5	178.98	2,515.0	13.6	790.1	754.0	21.874		
12,700.0	10,290.0	13,489.6	11,080.0	52.3	53.1	179.02	2,615.0	13.0	790.1	752.6	21.037		
12,800.0	10,290.0	13,589.6	11,080.0	53.9	54.7	179.07	2,715.0	12.3	790.1	751.1	20.260		
12,900.0	10,290.0	13,689.6	11,080.0	55.6	56.3	179.11	2,815.0	11.7	790.1	749.7	19.538		
13,000.0	10,290.0	13,789.6	11,080.0	57.3	58.0	179.16	2,915.0	11.0	790.1	748.2	18.865		
13,100.0	10,290.0	13,889.6	11,080.0	58.9	59.6	179.21	3,015.0	10.4	790.1	746.8	18.236		
13,200.0	10,290.0	13,989.6	11,080.0	60.6	61.3	179.25	3,115.0	9.7	790.1	745.3	17.647		
13,300.0	10,290.0	14,089.6	11,080.0	62.3	63.0	179.30	3,215.0	9.1	790.1	743.8	17.095		
13,400.0	10,290.0	14,189.6	11,080.0	64.0	64.7	179.34	3,315.0	8.4	790.1	742.4	16.575		
13,500.0	10,290.0	14,289.6	11,080.0	65.7	66.3	179.39	3,415.0	7.8	790.0	740.9	16.086		
13,600.0	10,290.0	14,389.6	11,080.0	67.4	68.0	179.43	3,515.0	7.1	790.0	739.5	15.625		
13,700.0	10,290.0	14,489.6	11,080.0	69.1	69.7	179.48	3,615.0	6.5	790.0	738.0	15.189		
13,800.0	10,290.0	14,589.6	11,080.0	70.9	71.4	179.53	3,715.0	5.8	790.0	736.6	14.776		
13,900.0	10,290.0	14,689.6	11,080.0	72.6	73.2	179.57	3,815.0	5.2	790.0	735.1	14.385		
14,000.0	10,290.0	14,789.6	11,080.0	74.3	74.9	179.62	3,915.0	4.5	790.0	733.6	14.014		
14,100.0	10,290.0	14,889.6	11,080.0	76.1	76.6	179.66	4,015.0	3.9	790.0	732.2	13.662		
14,200.0	10,290.0	14,989.6	11,080.0	77.8	78.3	179.71	4,115.0	3.3	790.0	730.7	13.327		
14,300.0	10,290.0	15,089.6	11,080.0	79.5	80.1	179.75	4,215.0	2.6	790.0	729.3	13.007		
14,400.0	10,290.0	15,189.6	11,080.0	81.3	81.8	179.80	4,315.0	2.0	790.0	727.8	12.703		
14,500.0	10,290.0	15,289.6	11,080.0	83.0	83.5	179.84	4,415.0	1.3	790.0	726.4	12.412		
14,600.0	10,290.0	15,389.6	11,080.0	84.8	85.3	179.89	4,515.0	0.7	790.0	724.9	12.134		
14,700.0	10,290.0	15,489.6	11,080.0	86.5	87.0	179.94	4,615.0	0.0	790.0	723.4	11.868		
14,800.0	10,290.0	15,589.6	11,080.0	88.3	88.8	179.98	4,715.0	-0.6	790.0	722.0	11.614		
14,841.4	10,290.0	15,631.0	11,080.0	89.0	89.5	180.00	4,756.4	-0.9	790.0	721.4	11.511		
14,841.4	10,290.0	15,631.0	11,080.0	89.0	89.5	180.00	4,756.4	-0.9	790.0	721.4	11.511		



HP Anticollision Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Smalls Federal 6H
Project:	Lea County, NM	TVD Reference:	Well @ 3437.0usft (Ensign #772)
Reference Site:	Sec 28, T22S, R34E	MD Reference:	Well @ 3437.0usft (Ensign #772)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	Smalls Federal 6H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to Well @ 3437.0usft (Ensign #772)

Offset Depths are relative to Offset Datum

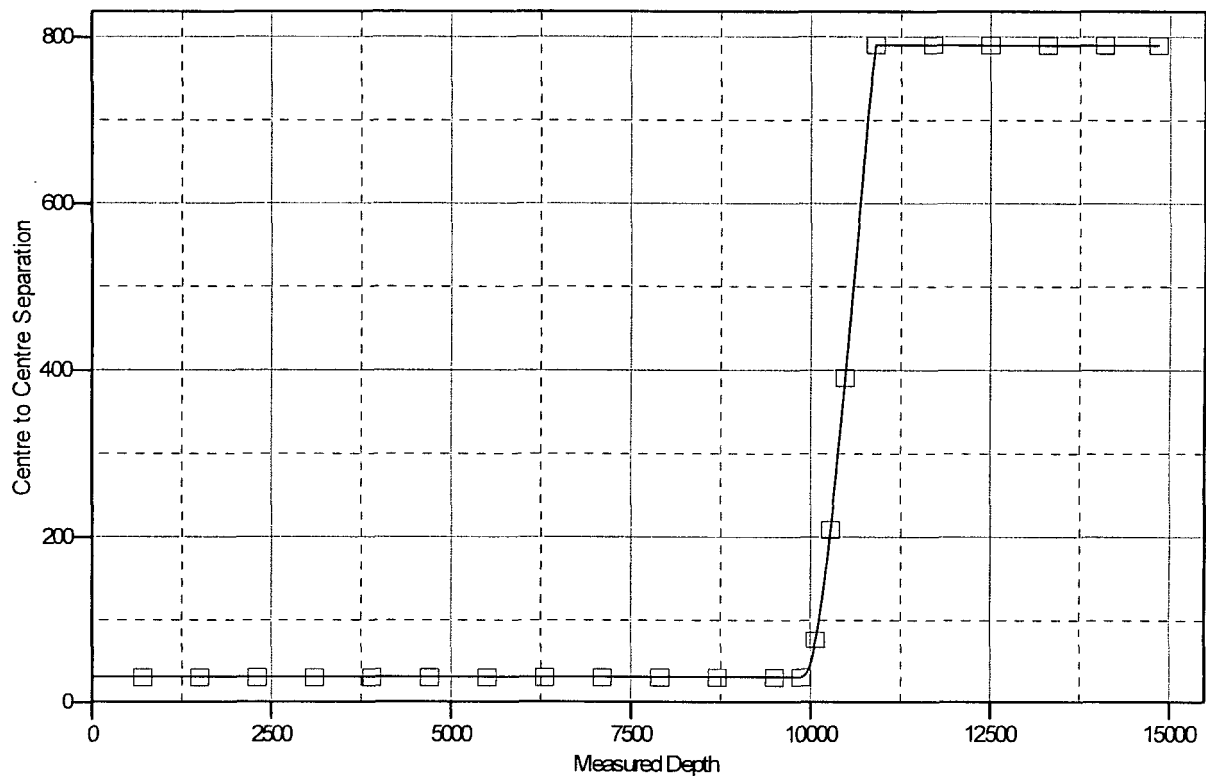
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Smalls Federal 6H

Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30

Grid Convergence at Surface is: 0.46°

Ladder Plot



LEGEND

SmallsFederal 2H, Wellbore #1, Design #1 V0



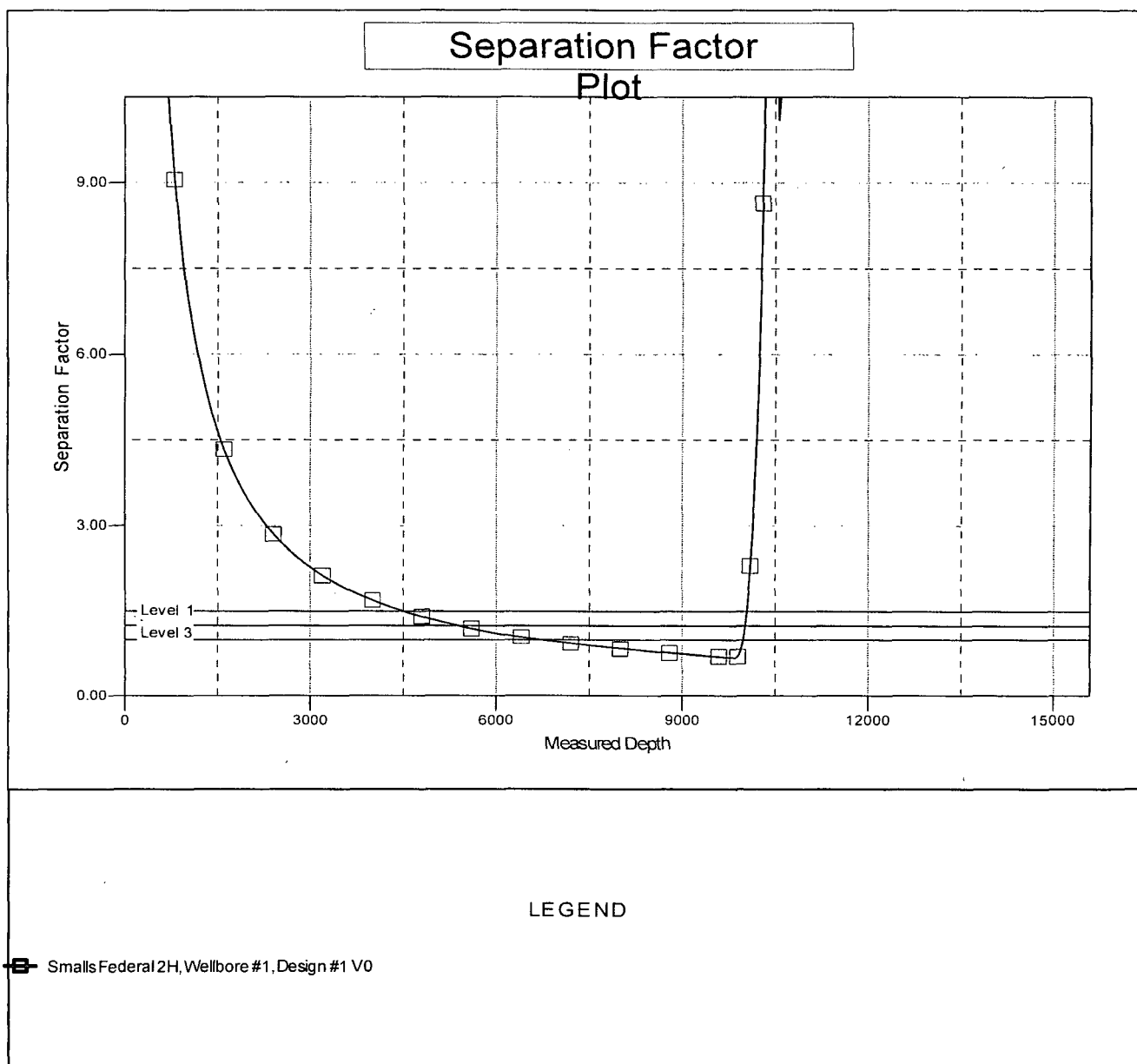
HP
Anticollision Report

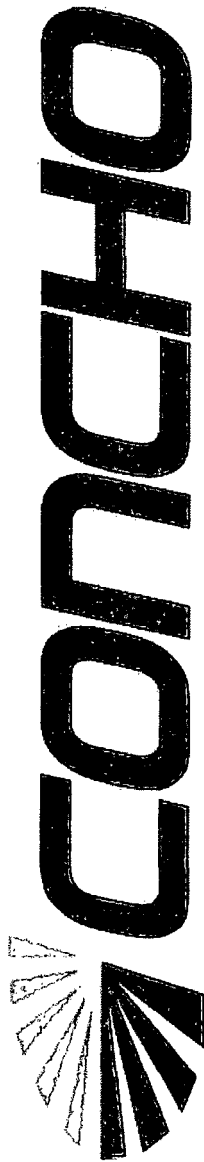


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Reference Well:	Smalls Federal 6H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore:	Wellbore #1	Database:	Compass
Reference Design:	Design #1	Offset TVD Reference:	Offset Datum

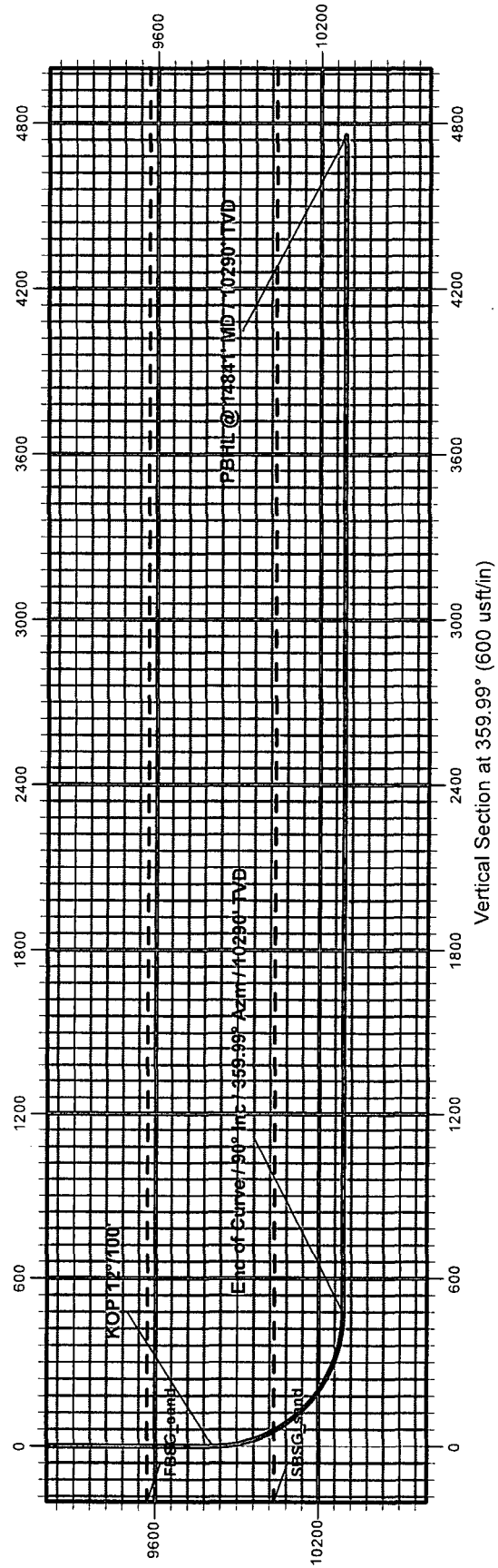
Reference Depths are relative to Well @ 3437.0usft (Ensign #772)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Smalls Federal 6H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.46°





Lea County, NM
Sec 28, T22S, R34E
Smalls Federal 6H
Design #1



Lea County, NM
Sec 28, T22S, R34E
Smalls Federal 6H
Design #1

