



CONCHO

COG Production, LLC

Lea County, NM (NAD 27)

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

Copperhead Fee 21H

Wellbore #1

Plan: Plan #1

Standard Survey Report

29 March, 2017





Integrity Directional Services, LLC

Survey Report



Company:	COG Production, LLC	Local Co-ordinate Reference:	Well Copperhead Fee 21H
Project:	Lea County, NM (NAD 27)	TVD Reference:	KB=25' @ 2953.81ft
Site:	Sec. 30, T 26 S. , R 29 E	MD Reference:	KB=25' @ 2953.81ft
Well:	Copperhead Fee 21H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	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
From:	Map	Easting:	597,099.3000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 1' 12.667 N
		Longitude:	104° 1' 12.131 W
		Grid Convergence:	0.17 °

Well	Copperhead Fee 21H		
Well Position	+N/-S	0.00 ft	Northing: 371,210.7000 usft
	+E/-W	0.00 ft	Easting: 597,099.3000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 1' 12.667 N
		Longitude:	104° 1' 12.131 W
		Ground Level:	2,928.81 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	3/29/2017	7.17	59.80	47,795

Design	Plan #1				
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	183.23	

Survey Tool Program	Date 3/29/2017				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.00	16,793.04	Plan #1 (Wellbore #1)			

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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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
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00



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5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00
9,300.00	0.00	0.00	9,300.00	0.00	0.00	0.00	0.00	0.00	0.00
9,400.00	0.00	0.00	9,400.00	0.00	0.00	0.00	0.00	0.00	0.00
9,500.00	0.00	0.00	9,500.00	0.00	0.00	0.00	0.00	0.00	0.00
9,600.00	0.00	0.00	9,600.00	0.00	0.00	0.00	0.00	0.00	0.00

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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)
9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00
9,800.00	0.00	0.00	9,800.00	0.00	0.00	0.00	0.00	0.00	0.00
9,900.00	0.00	0.00	9,900.00	0.00	0.00	0.00	0.00	0.00	0.00
10,000.00	0.00	0.00	10,000.00	0.00	0.00	0.00	0.00	0.00	0.00
10,100.00	0.00	0.00	10,100.00	0.00	0.00	0.00	0.00	0.00	0.00
10,200.00	0.00	0.00	10,200.00	0.00	0.00	0.00	0.00	0.00	0.00
10,246.55	0.00	0.00	10,246.55	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 12.00									
10,300.00	6.41	204.80	10,299.89	-2.71	-1.25	2.78	12.00	12.00	0.00
10,400.00	18.41	204.80	10,397.37	-22.19	-10.25	22.73	12.00	12.00	0.00
10,500.00	30.41	204.80	10,488.26	-59.64	-27.56	61.10	12.00	12.00	0.00
10,600.00	42.41	204.80	10,568.59	-113.43	-52.41	116.21	12.00	12.00	0.00
10,700.00	54.41	204.80	10,634.85	-181.21	-83.73	185.64	12.00	12.00	0.00
10,800.00	66.41	204.80	10,684.13	-260.00	-120.14	266.36	12.00	12.00	0.00
10,900.00	78.41	204.80	10,714.29	-346.38	-160.05	354.85	12.00	12.00	0.00
11,000.00	90.41	204.80	10,724.00	-436.56	-201.72	447.23	12.00	12.00	0.00
11,000.14	90.43	204.80	10,724.00	-436.69	-201.78	447.36	12.00	12.00	0.00
Start DLS 4.00 TFO -89.89									
11,100.00	90.44	200.81	10,723.25	-528.72	-240.47	541.43	4.00	0.01	-4.00
11,200.00	90.44	196.81	10,722.48	-623.36	-272.70	637.74	4.00	0.00	-4.00
11,300.00	90.44	192.81	10,721.71	-720.02	-298.25	735.68	4.00	0.00	-4.00
11,400.00	90.44	188.80	10,720.94	-818.23	-316.99	834.78	4.00	0.00	-4.00
11,500.00	90.44	184.80	10,720.17	-917.50	-328.84	934.57	4.00	0.00	-4.00
11,600.00	90.44	180.80	10,719.40	-1,017.36	-333.73	1,034.54	4.00	0.00	-4.00
11,615.53	90.43	180.18	10,719.29	-1,032.89	-333.86	1,050.05	4.00	-0.01	-4.00
Start 5177.51 hold at 11615.53 MD									
11,700.00	90.43	180.18	10,718.64	-1,117.35	-334.13	1,134.40	0.00	0.00	0.00
11,800.00	90.43	180.18	10,717.89	-1,217.35	-334.45	1,234.26	0.00	0.00	0.00
11,900.00	90.43	180.18	10,717.13	-1,317.34	-334.77	1,334.11	0.00	0.00	0.00
12,000.00	90.43	180.18	10,716.37	-1,417.34	-335.09	1,433.97	0.00	0.00	0.00
12,100.00	90.43	180.18	10,715.61	-1,517.34	-335.41	1,533.82	0.00	0.00	0.00
12,200.00	90.43	180.18	10,714.85	-1,617.33	-335.73	1,633.68	0.00	0.00	0.00
12,300.00	90.43	180.18	10,714.09	-1,717.33	-336.05	1,733.54	0.00	0.00	0.00
12,400.00	90.43	180.18	10,713.33	-1,817.33	-336.37	1,833.39	0.00	0.00	0.00
12,500.00	90.43	180.18	10,712.57	-1,917.32	-336.69	1,933.25	0.00	0.00	0.00
12,600.00	90.43	180.18	10,711.82	-2,017.32	-337.01	2,033.10	0.00	0.00	0.00
12,700.00	90.43	180.18	10,711.06	-2,117.32	-337.33	2,132.96	0.00	0.00	0.00
12,800.00	90.43	180.18	10,710.30	-2,217.31	-337.65	2,232.81	0.00	0.00	0.00
12,900.00	90.43	180.18	10,709.54	-2,317.31	-337.97	2,332.67	0.00	0.00	0.00
13,000.00	90.43	180.18	10,708.78	-2,417.31	-338.29	2,432.53	0.00	0.00	0.00
13,100.00	90.43	180.18	10,708.02	-2,517.30	-338.61	2,532.38	0.00	0.00	0.00
13,200.00	90.43	180.18	10,707.26	-2,617.30	-338.93	2,632.24	0.00	0.00	0.00
13,300.00	90.43	180.18	10,706.50	-2,717.30	-339.25	2,732.09	0.00	0.00	0.00
13,400.00	90.43	180.18	10,705.75	-2,817.29	-339.57	2,831.95	0.00	0.00	0.00

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Design:	Plan #1	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)
13,500.00	90.43	180.18	10,704.99	-2,917.29	-339.90	2,931.81	0.00	0.00	0.00
13,600.00	90.43	180.18	10,704.23	-3,017.29	-340.22	3,031.66	0.00	0.00	0.00
13,700.00	90.43	180.18	10,703.47	-3,117.28	-340.54	3,131.52	0.00	0.00	0.00
13,800.00	90.43	180.18	10,702.71	-3,217.28	-340.86	3,231.37	0.00	0.00	0.00
13,900.00	90.43	180.18	10,701.95	-3,317.28	-341.18	3,331.23	0.00	0.00	0.00
14,000.00	90.43	180.18	10,701.19	-3,417.27	-341.50	3,431.09	0.00	0.00	0.00
14,100.00	90.43	180.18	10,700.43	-3,517.27	-341.82	3,530.94	0.00	0.00	0.00
14,200.00	90.43	180.18	10,699.68	-3,617.27	-342.14	3,630.80	0.00	0.00	0.00
14,300.00	90.43	180.18	10,698.92	-3,717.26	-342.46	3,730.65	0.00	0.00	0.00
14,400.00	90.43	180.18	10,698.16	-3,817.26	-342.78	3,830.51	0.00	0.00	0.00
14,500.00	90.43	180.18	10,697.40	-3,917.26	-343.10	3,930.36	0.00	0.00	0.00
14,600.00	90.43	180.18	10,696.64	-4,017.25	-343.42	4,030.22	0.00	0.00	0.00
14,700.00	90.43	180.18	10,695.88	-4,117.25	-343.74	4,130.08	0.00	0.00	0.00
14,800.00	90.43	180.18	10,695.12	-4,217.25	-344.06	4,229.93	0.00	0.00	0.00
14,900.00	90.43	180.18	10,694.36	-4,317.24	-344.38	4,329.79	0.00	0.00	0.00
15,000.00	90.43	180.18	10,693.61	-4,417.24	-344.70	4,429.64	0.00	0.00	0.00
15,100.00	90.43	180.18	10,692.85	-4,517.24	-345.02	4,529.50	0.00	0.00	0.00
15,200.00	90.43	180.18	10,692.09	-4,617.23	-345.34	4,629.36	0.00	0.00	0.00
15,300.00	90.43	180.18	10,691.33	-4,717.23	-345.66	4,729.21	0.00	0.00	0.00
15,400.00	90.43	180.18	10,690.57	-4,817.23	-345.98	4,829.07	0.00	0.00	0.00
15,500.00	90.43	180.18	10,689.81	-4,917.22	-346.30	4,928.92	0.00	0.00	0.00
15,600.00	90.43	180.18	10,689.05	-5,017.22	-346.62	5,028.78	0.00	0.00	0.00
15,700.00	90.43	180.18	10,688.29	-5,117.22	-346.94	5,128.63	0.00	0.00	0.00
15,800.00	90.43	180.18	10,687.54	-5,217.21	-347.26	5,228.49	0.00	0.00	0.00
15,900.00	90.43	180.18	10,686.78	-5,317.21	-347.58	5,328.35	0.00	0.00	0.00
16,000.00	90.43	180.18	10,686.02	-5,417.21	-347.90	5,428.20	0.00	0.00	0.00
16,100.00	90.43	180.18	10,685.26	-5,517.20	-348.22	5,528.06	0.00	0.00	0.00
16,200.00	90.43	180.18	10,684.50	-5,617.20	-348.54	5,627.91	0.00	0.00	0.00
16,300.00	90.43	180.18	10,683.74	-5,717.20	-348.86	5,727.77	0.00	0.00	0.00
16,400.00	90.43	180.18	10,682.98	-5,817.19	-349.18	5,827.63	0.00	0.00	0.00
16,500.00	90.43	180.18	10,682.22	-5,917.19	-349.50	5,927.48	0.00	0.00	0.00
16,600.00	90.43	180.18	10,681.46	-6,017.19	-349.82	6,027.34	0.00	0.00	0.00
16,663.17	90.43	180.18	10,680.99	-6,080.36	-350.02	6,090.42	0.00	0.00	0.00
Copperhead Fee 21H LTP									
16,700.00	90.43	180.18	10,680.71	-6,117.18	-350.14	6,127.19	0.00	0.00	0.00
16,793.04	90.43	180.18	10,680.00	-6,210.22	-350.44	6,220.10	0.00	0.00	0.00
TD at 16793.04 - Copperhead Fee 21H BHL									

Company:	COG Production, LLC	Local Co-ordinate Reference:	Well Copperhead Fee 21H
Project:	Lea County, NM (NAD 27)	TVD Reference:	KB=25' @ 2953.81ft
Site:	Sec. 30, T 26 S. , R 29 E	MD Reference:	KB=25' @ 2953.81ft
Well:	Copperhead Fee 21H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Multi User Db

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
Copperhead Fee 21H - plan hits target center - Point	0.00	0.00	10,680.0 0	-6,210.22	-350.44	365,000.4906	596,748.8617	32° 0' 11.218 N	104° 1' 16.410 W
Copperhead Fee 21H - plan misses target center by 0.14ft at 16663.17ft MD (10680.99 TVD, -6080.36 N, -350.02 E) - Point	0.00	0.00	10,680.9 9	-6,080.36	-349.88	365,130.3551	596,749.4167	32° 0' 12.503 N	104° 1' 16.399 W

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,247	10,247	0	0	Start Build 12.00
11,000	10,724	-437	-202	Start DLS 4.00 TFO -89.89
11,616	10,719	-1033	-334	Start 5177.51 hold at 11615.53 MD
16,793	10,680	-6210	-350	TD at 16793.04

Checked By: _____ Approved By: _____ Date: _____