

# **Apollo Operating, LLC**

**Hoagland Multi Well Plan**

**Sec. 4, T3N, R68W**

**Hoagland 45-4D - Slot 45-4D**

**Wellbore #1**

**Plan: Plan #1**

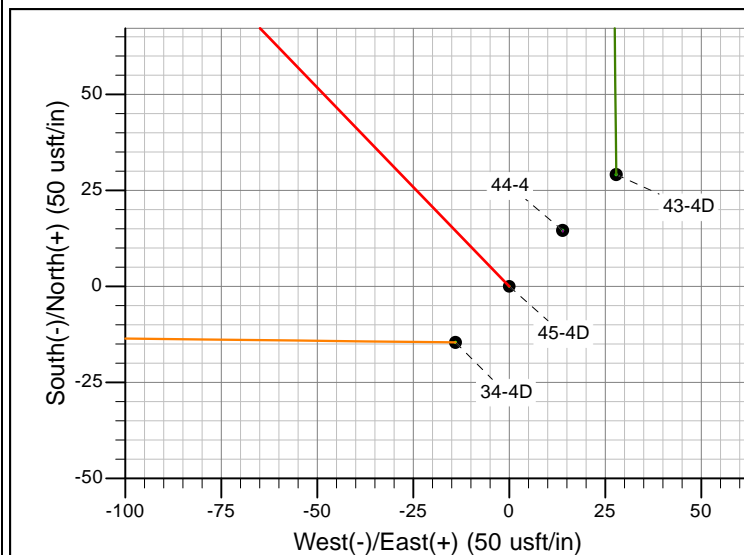
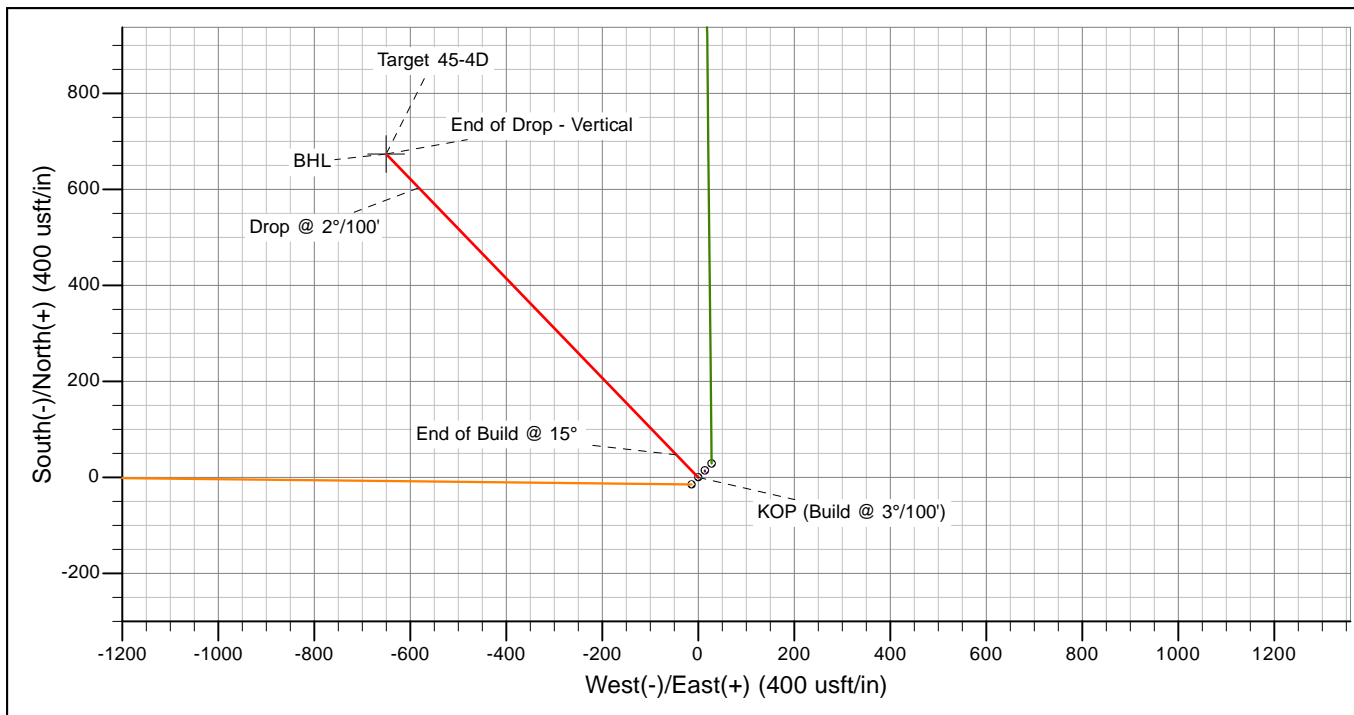
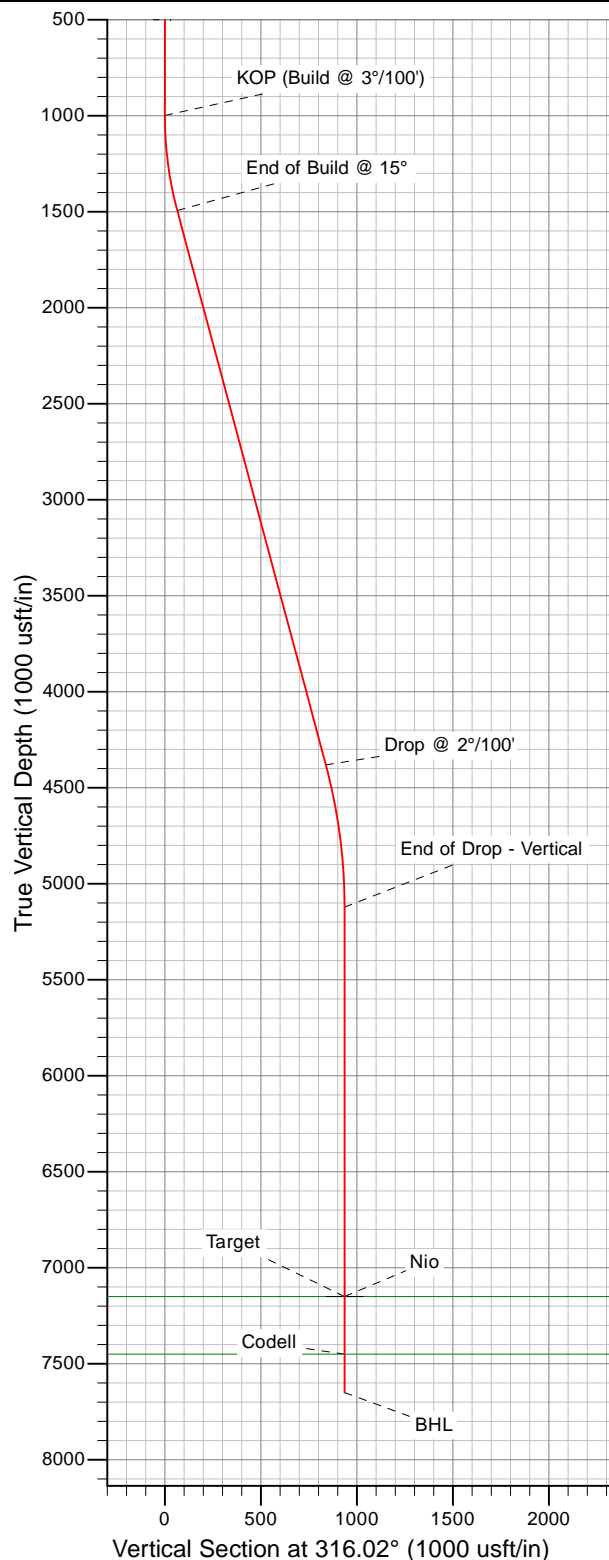
**12 May, 2011**

## **Directional Planning Report**



# Apollo Operating, LLC

Project: Hoagland Multi Well Plan  
 Site: Sec. 4, T3N, R68W  
 Well: Hoagland 45-4D  
 Wellbore: Wellbore #1  
 Design: Plan #1



Azimuths to True North  
 Magnetic North: 8.99°

Magnetic Field  
 Strength: 53034.7snT  
 Dip Angle: 66.89°  
 Date: 5/12/2011  
 Model: IGRF2010



Plan: Plan #1 (Hoagland 45-4D/Wellbore #1)

Created By: Roopa Dattan Date: 12:45, May 12 2011

# Total Directional Services

## Directional Planning Report



<b>Database:</b>	Total	<b>Local Co-ordinate Reference:</b>	Well Hoagland 45-4D - Slot 45-4D
<b>Company:</b>	Apollo Operating, LLC	<b>TVD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Project:</b>	Hoagland Multi Well Plan	<b>MD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Site:</b>	Sec. 4, T3N, R68W	<b>North Reference:</b>	True
<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

<b>Project</b>	Hoagland Multi Well Plan		
<b>Map System:</b>	Universal Transverse Mercator (US Survey Feet)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD83 Colorado - HARN		
<b>Map Zone:</b>	Zone 13N (108 W to 102 W)		

<b>Site</b>	Sec. 4, T3N, R68W		
<b>Site Position:</b>		<b>Northing:</b>	4,455,460.98 m
<b>From:</b>	Lat/Long	<b>Easting:</b>	499,914.95 m
<b>Position Uncertainty:</b>	0.00 <sub>usft</sub>	<b>Slot Radius:</b>	13-3/16 "
		<b>Latitude:</b>	40° 14' 58.560 N
		<b>Longitude:</b>	105° 0' 3.600 W
		<b>Grid Convergence:</b>	0.00 °

Well	Hoagland 45-4D - Slot 45-4D					
Well Position	+N/-S	0.00 usft	Northing:	4,455,452.10 m	Latitude:	40° 14' 58.272 N
	+E/-W	0.00 usft	Easting:	499,906.45 m	Longitude:	105° 0' 3.960 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	5,013.00 usft

<b>Wellbore</b>	Wellbore #1					
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>	
	IGRF2010	5/12/2011	8.99	66.89	53,035	

<b>Design</b>	Plan #1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PLAN	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	316.02

# Total Directional Services

## Directional Planning Report



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<b>Project:</b>	Hoagland Multi Well Plan	<b>MD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Site:</b>	Sec. 4, T3N, R68W	<b>North Reference:</b>	True
<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

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
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,500.00	15.00	316.02	1,494.31	46.83	-45.19	3.00	3.00	0.00	316.02	
4,488.71	15.00	316.02	4,381.18	603.45	-582.34	0.00	0.00	0.00	0.00	
5,238.71	0.00	0.00	5,122.65	673.69	-650.13	2.00	-2.00	0.00	180.00	
7,266.07	0.00	0.00	7,150.00	673.69	-650.13	0.00	0.00	0.00	0.00	Target 45-4D
7,766.07	0.00	0.00	7,650.00	673.69	-650.13	0.00	0.00	0.00	0.00	

# Total Directional Services

## Directional Planning Report



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<b>Company:</b>	Apollo Operating, LLC	<b>TVD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Project:</b>	Hoagland Multi Well Plan	<b>MD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Site:</b>	Sec. 4, T3N, R68W	<b>North Reference:</b>	True
<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

Planned Survey											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	TVD (usft)	Sub Sea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Dogleg Rate (°/100usft)	Comment/Formation
0.00	0.00	0.00	0.00	5,034.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	4,934.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	4,834.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	4,734.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	4,634.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	4,534.00	0.00	0.00	0.00	0.00	0.00	0.00	Surface Casing
600.00	0.00	0.00	600.00	4,434.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	4,334.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	4,234.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	4,134.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	4,034.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP (Build @ 3°/100')
1,100.00	3.00	316.02	1,099.95	3,934.05	1.88	-1.82	2.62	3.00	0.00	3.00	
1,200.00	6.00	316.02	1,199.63	3,834.37	7.53	-7.27	10.46	3.00	0.00	3.00	
1,300.00	9.00	316.02	1,298.77	3,735.23	16.92	-16.33	23.51	3.00	0.00	3.00	
1,400.00	12.00	316.02	1,397.08	3,636.92	30.03	-28.98	41.74	3.00	0.00	3.00	
1,500.00	15.00	316.02	1,494.31	3,539.69	46.83	-45.19	65.08	3.00	0.00	3.00	End of Build @ 15°
1,600.00	15.00	316.02	1,590.90	3,443.10	65.45	-63.16	90.96	0.00	0.00	0.00	
1,700.00	15.00	316.02	1,687.49	3,346.51	84.08	-81.14	116.84	0.00	0.00	0.00	
1,800.00	15.00	316.02	1,784.09	3,249.91	102.70	-99.11	142.72	0.00	0.00	0.00	
1,900.00	15.00	316.02	1,880.68	3,153.32	121.32	-117.08	168.60	0.00	0.00	0.00	
2,000.00	15.00	316.02	1,977.27	3,056.73	139.95	-135.05	194.49	0.00	0.00	0.00	
2,100.00	15.00	316.02	2,073.86	2,960.14	158.57	-153.03	220.37	0.00	0.00	0.00	
2,200.00	15.00	316.02	2,170.46	2,863.54	177.20	-171.00	246.25	0.00	0.00	0.00	

# Total Directional Services

## Directional Planning Report



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<b>Site:</b>	Sec. 4, T3N, R68W	<b>North Reference:</b>	True
<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

Planned Survey											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	TVD (usft)	Sub Sea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Dogleg Rate (°/100usft)	Comment/Formation
2,300.00	15.00	316.02	2,267.05	2,766.95	195.82	-188.97	272.13	0.00	0.00	0.00	
2,400.00	15.00	316.02	2,363.64	2,670.36	214.44	-206.95	298.01	0.00	0.00	0.00	
2,500.00	15.00	316.02	2,460.23	2,573.77	233.07	-224.92	323.90	0.00	0.00	0.00	
2,600.00	15.00	316.02	2,556.83	2,477.17	251.69	-242.89	349.78	0.00	0.00	0.00	
2,700.00	15.00	316.02	2,653.42	2,380.58	270.32	-260.86	375.66	0.00	0.00	0.00	
2,800.00	15.00	316.02	2,750.01	2,283.99	288.94	-278.84	401.54	0.00	0.00	0.00	
2,900.00	15.00	316.02	2,846.60	2,187.40	307.56	-296.81	427.42	0.00	0.00	0.00	
3,000.00	15.00	316.02	2,943.20	2,090.80	326.19	-314.78	453.31	0.00	0.00	0.00	
3,100.00	15.00	316.02	3,039.79	1,994.21	344.81	-332.75	479.19	0.00	0.00	0.00	
3,200.00	15.00	316.02	3,136.38	1,897.62	363.44	-350.73	505.07	0.00	0.00	0.00	
3,300.00	15.00	316.02	3,232.97	1,801.03	382.06	-368.70	530.95	0.00	0.00	0.00	
3,400.00	15.00	316.02	3,329.57	1,704.43	400.68	-386.67	556.83	0.00	0.00	0.00	
3,500.00	15.00	316.02	3,426.16	1,607.84	419.31	-404.65	582.71	0.00	0.00	0.00	
3,600.00	15.00	316.02	3,522.75	1,511.25	437.93	-422.62	608.60	0.00	0.00	0.00	
3,700.00	15.00	316.02	3,619.34	1,414.66	456.56	-440.59	634.48	0.00	0.00	0.00	
3,800.00	15.00	316.02	3,715.94	1,318.06	475.18	-458.56	660.36	0.00	0.00	0.00	
3,900.00	15.00	316.02	3,812.53	1,221.47	493.80	-476.54	686.24	0.00	0.00	0.00	
4,000.00	15.00	316.02	3,909.12	1,124.88	512.43	-494.51	712.12	0.00	0.00	0.00	
4,100.00	15.00	316.02	4,005.72	1,028.28	531.05	-512.48	738.01	0.00	0.00	0.00	
4,200.00	15.00	316.02	4,102.31	931.69	549.68	-530.45	763.89	0.00	0.00	0.00	
4,300.00	15.00	316.02	4,198.90	835.10	568.30	-548.43	789.77	0.00	0.00	0.00	
4,400.00	15.00	316.02	4,295.49	738.51	586.92	-566.40	815.65	0.00	0.00	0.00	
4,488.71	15.00	316.02	4,381.18	652.82	603.45	-582.34	838.61	0.00	0.00	0.00	Drop @ 2°/100'
4,500.00	14.77	316.02	4,392.09	641.91	605.53	-584.36	841.51	-2.00	0.00	2.00	

# Total Directional Services

## Directional Planning Report



<b>Database:</b>	Total	<b>Local Co-ordinate Reference:</b>	Well Hoagland 45-4D - Slot 45-4D
<b>Company:</b>	Apollo Operating, LLC	<b>TVD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Project:</b>	Hoagland Multi Well Plan	<b>MD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Site:</b>	Sec. 4, T3N, R68W	<b>North Reference:</b>	True
<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

Planned Survey											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	TVD (usft)	Sub Sea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Dogleg Rate (°/100usft)	Comment/Formation
4,600.00	12.77	316.02	4,489.21	544.79	622.66	-600.89	865.32	-2.00	0.00	2.00	
4,700.00	10.77	316.02	4,587.10	446.90	637.35	-615.06	885.73	-2.00	0.00	2.00	
4,800.00	8.77	316.02	4,685.64	348.36	649.56	-626.85	902.70	-2.00	0.00	2.00	
4,900.00	6.77	316.02	4,784.72	249.28	659.30	-636.24	916.23	-2.00	0.00	2.00	
5,000.00	4.77	316.02	4,884.21	149.79	666.53	-643.23	926.29	-2.00	0.00	2.00	
5,100.00	2.77	316.02	4,983.99	50.01	671.27	-647.80	932.87	-2.00	0.00	2.00	
5,200.00	0.77	316.02	5,083.93	-49.93	673.50	-649.95	935.97	-2.00	0.00	2.00	
5,238.71	0.00	0.00	5,122.64	-88.64	673.69	-650.13	936.23	-2.00	113.62	2.00	End of Drop - Vertical
5,300.00	0.00	0.00	5,183.93	-149.93	673.69	-650.13	936.23	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,283.93	-249.93	673.69	-650.13	936.23	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,383.93	-349.93	673.69	-650.13	936.23	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,483.93	-449.93	673.69	-650.13	936.23	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,583.93	-549.93	673.69	-650.13	936.23	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,683.93	-649.93	673.69	-650.13	936.23	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,783.93	-749.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,000.00	0.00	0.00	5,883.93	-849.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,100.00	0.00	0.00	5,983.93	-949.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,200.00	0.00	0.00	6,083.93	-1,049.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,300.00	0.00	0.00	6,183.93	-1,149.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,283.93	-1,249.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,383.93	-1,349.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,483.93	-1,449.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,583.93	-1,549.93	673.69	-650.13	936.23	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,683.93	-1,649.93	673.69	-650.13	936.23	0.00	0.00	0.00	

# Total Directional Services

## Directional Planning Report



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<b>Company:</b>	Apollo Operating, LLC	<b>TVD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
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<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

Planned Survey											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	TVD (usft)	Sub Sea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Dogleg Rate (°/100usft)	Comment/Formation
6,900.00	0.00	0.00	6,783.93	-1,749.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,000.00	0.00	0.00	6,883.93	-1,849.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,100.00	0.00	0.00	6,983.93	-1,949.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,200.00	0.00	0.00	7,083.93	-2,049.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,266.07	0.00	0.00	7,150.00	-2,116.00	673.69	-650.13	936.23	0.00	0.00	0.00	Target - Nio
7,300.00	0.00	0.00	7,183.93	-2,149.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,400.00	0.00	0.00	7,283.93	-2,249.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,500.00	0.00	0.00	7,383.93	-2,349.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,566.07	0.00	0.00	7,450.00	-2,416.00	673.69	-650.13	936.23	0.00	0.00	0.00	Codell
7,600.00	0.00	0.00	7,483.93	-2,449.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,700.00	0.00	0.00	7,583.93	-2,549.93	673.69	-650.13	936.23	0.00	0.00	0.00	
7,766.07	0.00	0.00	7,650.00	-2,616.00	673.69	-650.13	936.23	0.00	0.00	0.00	BHL

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
500.00	500.00	Surface Casing	0	0	

Formations				
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)
7,266.07	7,150.00	Nio		0.00
7,566.07	7,450.00	Codell		0.00



# Total Directional Services

## Directional Planning Report



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<b>Project:</b>	Hoagland Multi Well Plan	<b>MD Reference:</b>	Est. KB @ 5034.00usft (Original Well Elev)
<b>Site:</b>	Sec. 4, T3N, R68W	<b>North Reference:</b>	True
<b>Well:</b>	Hoagland 45-4D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Plan #1		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,000.00	1,000.00	0.00	0.00	KOP (Build @ 3°/100')	
1,500.00	1,494.31	46.83	-45.19	End of Build @ 15°	
4,488.71	4,381.18	603.45	-582.34	Drop @ 2°/100'	
5,238.71	5,122.64	673.69	-650.13	End of Drop - Vertical	
7,266.07	7,150.00	673.69	-650.13	Target	
7,766.07	7,650.00	673.69	-650.13	BHL	