

Apollo Operating, LLC

E.L. Minch Multi Well Plan

Sec. 4 T3N, R68W

E.L. Minch 14-4D - Slot 14-4D

Wellbore #1

Plan: Plan #1

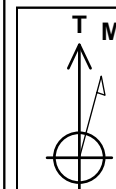
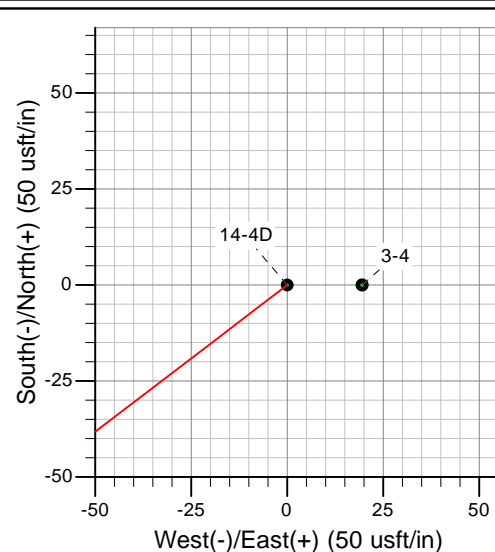
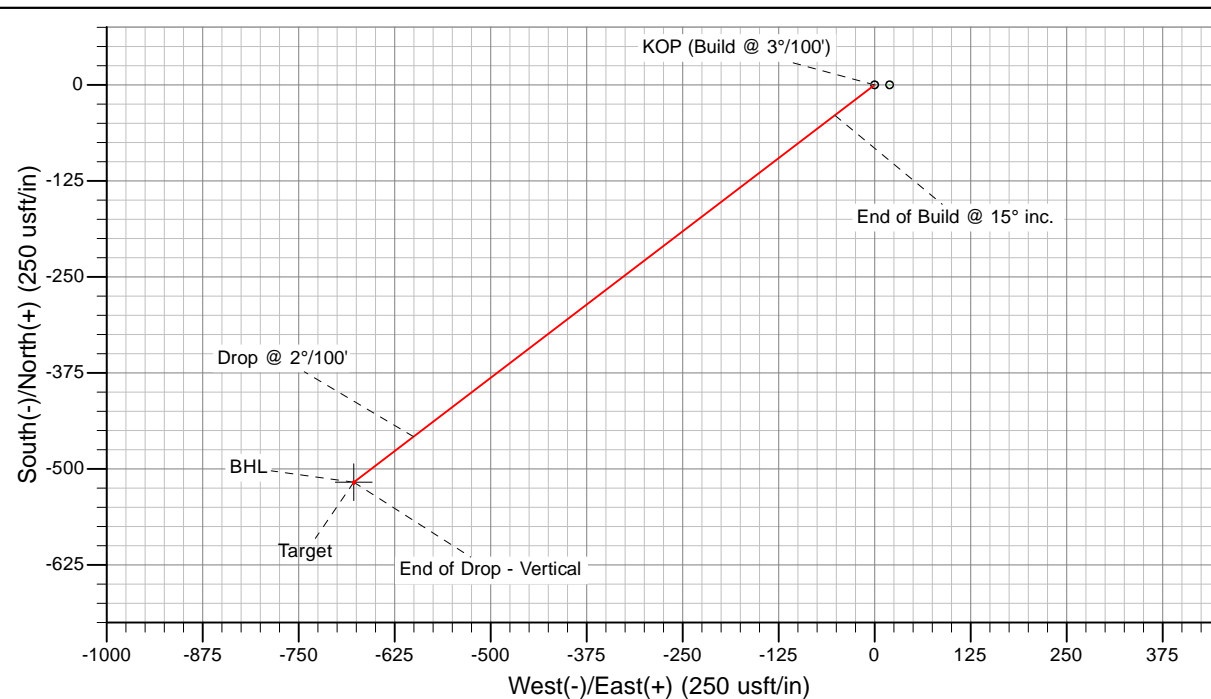
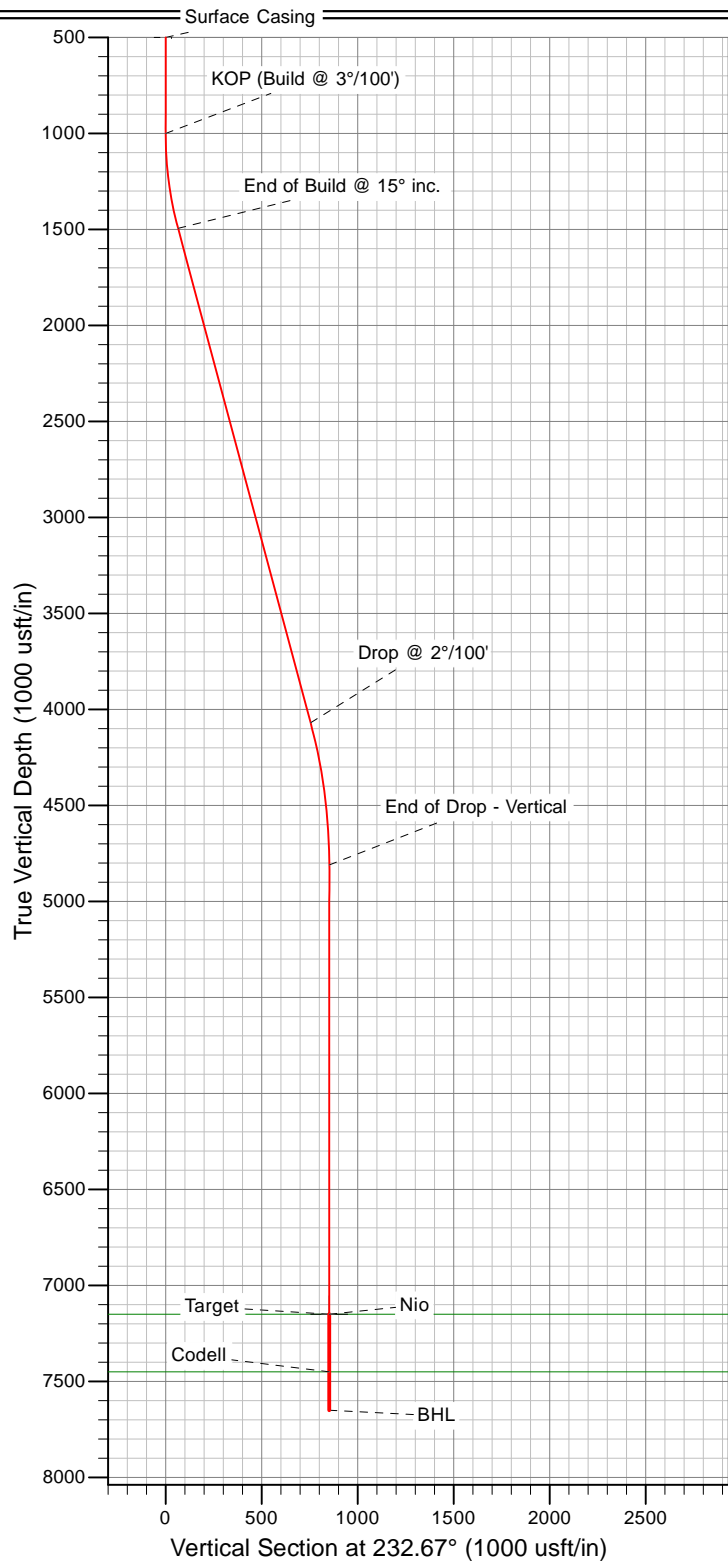
11 May, 2011

Directional Planning Report



Apollo Operating, LLC

Project: E.L. Minch Multi Well Plan
 Site: Sec. 4 T3N, R68W
 Well: E.L. Minch 14-4D
 Wellbore: Wellbore #1
 Design: Plan #1



Azimuths to True North
 Magnetic North: 9.00°

Magnetic Field
 Strength: 53034.0snT
 Dip Angle: 66.89°
 Date: 5/11/2011
 Model: IGRF2010



Plan: Plan #1 (E.L. Minch 14-4D/Wellbore #1)

Created By: Roopa Dattan Date: 15:57, May 11 2011

Total Directional Services

Directional Planning Report



Database:	Total	Local Co-ordinate Reference:	Well E.L. Minch 14-4D - Slot 14-4D
Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Project	E.L. Minch Multi Well Plan		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD83 Colorado - HARN		
Map Zone:	Zone 13N (108 W to 102 W)		

Site	Sec. 4 T3N, R68W		
Site Position:		Northing:	4,455,604.24 m
From:	Lat/Long	Easting:	498,910.55 m
Position Uncertainty:	0.00 _{usft}	Slot Radius:	13-3/16 "
		Latitude:	40° 15' 3.204 N
		Longitude:	105° 0' 46.116 W
		Grid Convergence:	-0.01 °

Well	E.L. Minch 14-4D - Slot 14-4D					
Well Position	+N/-S	0.00 usft	Northing:	4,455,604.24 m	Latitude:	40° 15' 3.204 N
	+E/-W	0.00 usft	Easting:	498,904.60 m	Longitude:	105° 0' 46.368 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	5,061.00 usft

Wellbore	Wellbore #1					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)	
	IGRF2010	5/11/2011	9.00	66.89	53,034	

Design	Plan #1			
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	232.67

Total Directional Services

Directional Planning Report



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Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	232.67	1,494.31	-39.46	-51.75	3.00	3.00	0.00	232.67	
4,166.03	15.00	232.67	4,069.49	-457.90	-600.42	0.00	0.00	0.00	0.00	
4,916.03	0.00	0.00	4,810.95	-517.09	-678.04	2.00	-2.00	0.00	180.00	
7,255.07	0.00	0.00	7,150.00	-517.09	-678.04	0.00	0.00	0.00	0.00	Target
7,755.07	0.00	0.00	7,650.00	-517.09	-678.04	0.00	0.00	0.00	0.00	

Total Directional Services

Directional Planning Report



Database:	Total	Local Co-ordinate Reference:	Well E.L. Minch 14-4D - Slot 14-4D
Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	5,082.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	4,982.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	4,882.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	4,782.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	4,682.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	4,582.00	0.00	0.00	0.00	0.00	0.00	0.00	Surface Casing
600.00	0.00	0.00	600.00	4,482.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	4,382.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	4,282.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	4,182.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	4,082.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP (Build @ 3°/100')
1,100.00	3.00	232.67	1,099.95	3,982.05	-1.59	-2.08	2.62	3.00	0.00	3.00	
1,200.00	6.00	232.67	1,199.63	3,882.37	-6.34	-8.32	10.46	3.00	0.00	3.00	
1,300.00	9.00	232.67	1,298.77	3,783.23	-14.26	-18.70	23.51	3.00	0.00	3.00	
1,400.00	12.00	232.67	1,397.08	3,684.92	-25.31	-33.19	41.74	3.00	0.00	3.00	
1,500.00	15.00	232.67	1,494.31	3,587.69	-39.46	-51.75	65.08	3.00	0.00	3.00	End of Build @ 15° inc.
1,600.00	15.00	232.67	1,590.90	3,491.10	-55.16	-72.33	90.96	0.00	0.00	0.00	
1,700.00	15.00	232.67	1,687.49	3,394.51	-70.85	-92.91	116.84	0.00	0.00	0.00	
1,800.00	15.00	232.67	1,784.09	3,297.91	-86.55	-113.49	142.72	0.00	0.00	0.00	
1,900.00	15.00	232.67	1,880.68	3,201.32	-102.24	-134.07	168.60	0.00	0.00	0.00	
2,000.00	15.00	232.67	1,977.27	3,104.73	-117.94	-154.65	194.49	0.00	0.00	0.00	
2,100.00	15.00	232.67	2,073.86	3,008.14	-133.63	-175.23	220.37	0.00	0.00	0.00	
2,200.00	15.00	232.67	2,170.46	2,911.54	-149.33	-195.81	246.25	0.00	0.00	0.00	

Total Directional Services

Directional Planning Report



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Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	232.67	2,267.05	2,814.95	-165.02	-216.39	272.13	0.00	0.00	0.00	
2,400.00	15.00	232.67	2,363.64	2,718.36	-180.72	-236.97	298.01	0.00	0.00	0.00	
2,500.00	15.00	232.67	2,460.23	2,621.77	-196.41	-257.55	323.90	0.00	0.00	0.00	
2,600.00	15.00	232.67	2,556.83	2,525.17	-212.11	-278.13	349.78	0.00	0.00	0.00	
2,700.00	15.00	232.67	2,653.42	2,428.58	-227.80	-298.71	375.66	0.00	0.00	0.00	
2,800.00	15.00	232.67	2,750.01	2,331.99	-243.50	-319.29	401.54	0.00	0.00	0.00	
2,900.00	15.00	232.67	2,846.60	2,235.40	-259.19	-339.87	427.42	0.00	0.00	0.00	
3,000.00	15.00	232.67	2,943.20	2,138.80	-274.89	-360.45	453.31	0.00	0.00	0.00	
3,100.00	15.00	232.67	3,039.79	2,042.21	-290.58	-381.03	479.19	0.00	0.00	0.00	
3,200.00	15.00	232.67	3,136.38	1,945.62	-306.28	-401.61	505.07	0.00	0.00	0.00	
3,300.00	15.00	232.67	3,232.97	1,849.03	-321.97	-422.19	530.95	0.00	0.00	0.00	
3,400.00	15.00	232.67	3,329.57	1,752.43	-337.67	-442.77	556.83	0.00	0.00	0.00	
3,500.00	15.00	232.67	3,426.16	1,655.84	-353.36	-463.35	582.71	0.00	0.00	0.00	
3,600.00	15.00	232.67	3,522.75	1,559.25	-369.06	-483.93	608.60	0.00	0.00	0.00	
3,700.00	15.00	232.67	3,619.34	1,462.66	-384.75	-504.51	634.48	0.00	0.00	0.00	
3,800.00	15.00	232.67	3,715.94	1,366.06	-400.45	-525.09	660.36	0.00	0.00	0.00	
3,900.00	15.00	232.67	3,812.53	1,269.47	-416.14	-545.67	686.24	0.00	0.00	0.00	
4,000.00	15.00	232.67	3,909.12	1,172.88	-431.84	-566.25	712.12	0.00	0.00	0.00	
4,100.00	15.00	232.67	4,005.72	1,076.28	-447.53	-586.83	738.01	0.00	0.00	0.00	
4,166.03	15.00	232.67	4,069.50	1,012.50	-457.90	-600.42	755.10	0.00	0.00	0.00	Drop @ 2°/100'
4,200.00	14.32	232.67	4,102.36	979.64	-463.11	-607.25	763.69	-2.00	0.00	2.00	
4,300.00	12.32	232.67	4,199.66	882.34	-477.08	-625.57	786.73	-2.00	0.00	2.00	
4,400.00	10.32	232.67	4,297.71	784.29	-488.98	-641.18	806.36	-2.00	0.00	2.00	
4,500.00	8.32	232.67	4,396.39	685.61	-498.80	-654.06	822.56	-2.00	0.00	2.00	

Total Directional Services

Directional Planning Report



Database:	Total	Local Co-ordinate Reference:	Well E.L. Minch 14-4D - Slot 14-4D
Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	6.32	232.67	4,495.57	586.43	-506.53	-664.19	835.30	-2.00	0.00	2.00	
4,700.00	4.32	232.67	4,595.13	486.87	-512.15	-671.56	844.57	-2.00	0.00	2.00	
4,800.00	2.32	232.67	4,694.96	387.04	-515.67	-676.17	850.36	-2.00	0.00	2.00	
4,900.00	0.32	232.67	4,794.93	287.07	-517.06	-678.00	852.67	-2.00	0.00	2.00	
4,916.03	0.00	0.00	4,810.96	271.04	-517.09	-678.04	852.71	-2.00	0.00	2.00	End of Drop - Vertical
5,000.00	0.00	0.00	4,894.93	187.07	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,100.00	0.00	0.00	4,994.93	87.07	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,200.00	0.00	0.00	5,094.93	-12.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,300.00	0.00	0.00	5,194.93	-112.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,294.93	-212.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,394.93	-312.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,494.93	-412.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,594.93	-512.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,694.93	-612.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,794.93	-712.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,000.00	0.00	0.00	5,894.93	-812.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,100.00	0.00	0.00	5,994.93	-912.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,200.00	0.00	0.00	6,094.93	-1,012.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,300.00	0.00	0.00	6,194.93	-1,112.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,294.93	-1,212.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,394.93	-1,312.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,494.93	-1,412.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,594.93	-1,512.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,694.93	-1,612.93	-517.09	-678.04	852.71	0.00	0.00	0.00	

Total Directional Services

Directional Planning Report



Database:	Total	Local Co-ordinate Reference:	Well E.L. Minch 14-4D - Slot 14-4D
Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	6,794.93	-1,712.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,000.00	0.00	0.00	6,894.93	-1,812.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,100.00	0.00	0.00	6,994.93	-1,912.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,200.00	0.00	0.00	7,094.93	-2,012.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,255.07	0.00	0.00	7,150.00	-2,068.00	-517.09	-678.04	852.71	0.00	0.00	0.00	Target - Nio
7,300.00	0.00	0.00	7,194.93	-2,112.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,400.00	0.00	0.00	7,294.93	-2,212.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,500.00	0.00	0.00	7,394.93	-2,312.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,555.07	0.00	0.00	7,450.00	-2,368.00	-517.09	-678.04	852.71	0.00	0.00	0.00	Codell
7,600.00	0.00	0.00	7,494.93	-2,412.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,700.00	0.00	0.00	7,594.93	-2,512.93	-517.09	-678.04	852.71	0.00	0.00	0.00	
7,755.07	0.00	0.00	7,650.00	-2,568.00	-517.09	-678.04	852.71	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 (°)
7,255.07	7,150.00	Nio		0.00
7,555.07	7,450.00	Codell		0.00

Total Directional Services

Directional Planning Report



Database:	Total	Local Co-ordinate Reference:	Well E.L. Minch 14-4D - Slot 14-4D
Company:	Apollo Operating, LLC	TVD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Project:	E.L. Minch Multi Well Plan	MD Reference:	Est. KB @ 5082.00usft (Original Well Elev)
Site:	Sec. 4 T3N, R68W	North Reference:	True
Well:	E.L. Minch 14-4D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	-39.46	-51.75	End of Build @ 15° inc.	
4,166.03	4,069.50	-457.90	-600.42	Drop @ 2°/100'	
4,916.03	4,810.96	-517.09	-678.04	End of Drop - Vertical	
7,255.07	7,150.00	-517.09	-678.04	Target	
7,755.07	7,650.00	-517.09	-678.04	BHL	