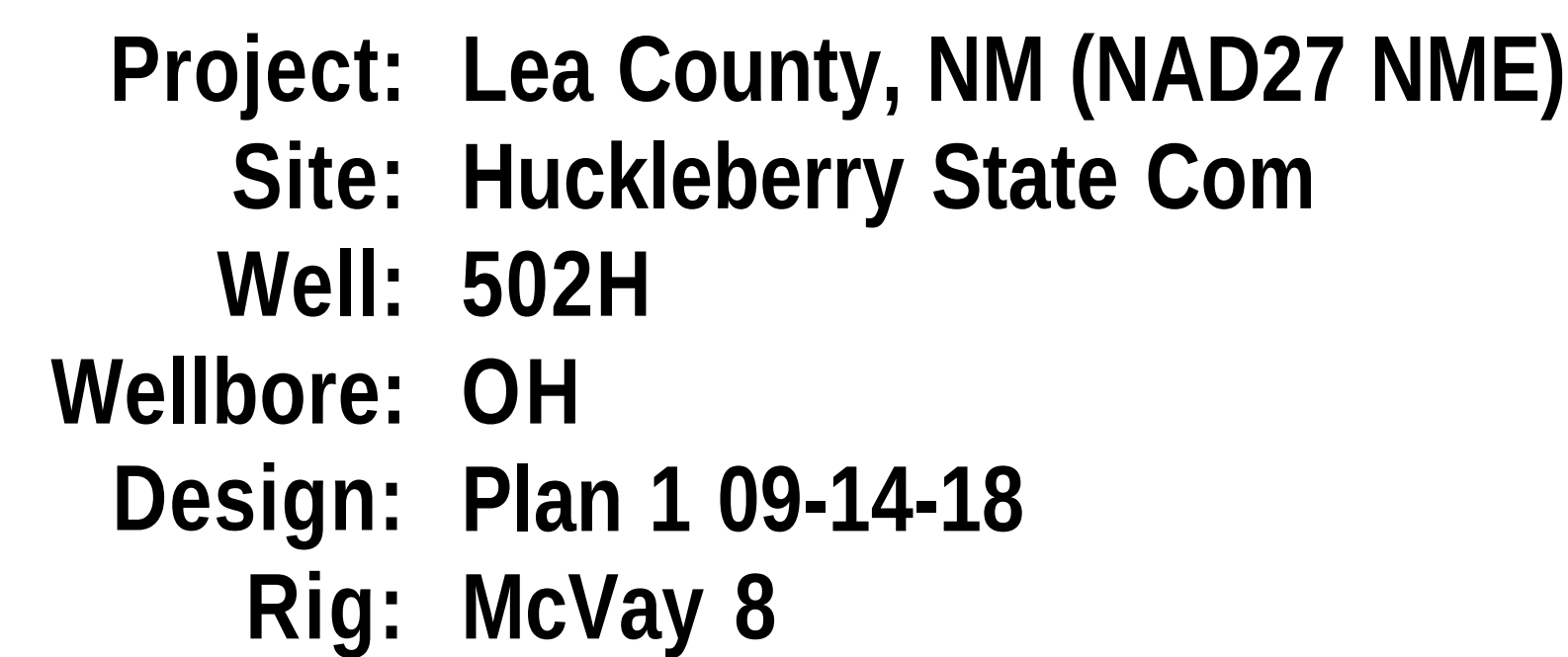
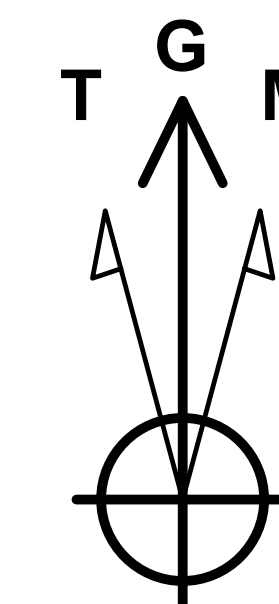


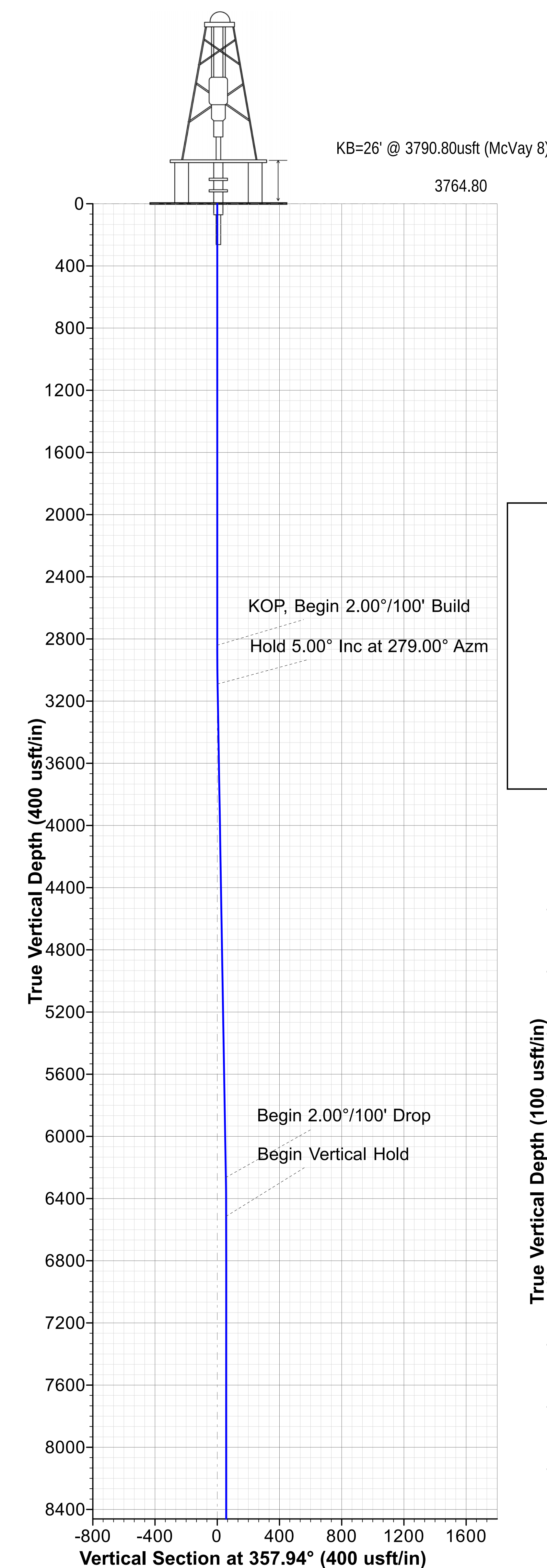


PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.42°
Magnetic North: 6.30°

**Magnetic Field
Strength: 48181.6snT
Dip Angle: 60.29°
Date: 9/13/2018
Model: MVHD**



WELL DETAILS						
			3764.80			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	530679.50	739871.70	32° 27' 23.57523 N	103° 33' 20.42160 W	

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Huckleberry State Com 502H	10980.00	10495.40	-377.20	5411174.90	739494.50	32° 29' 7.45521 N	103° 33' 23.93216 W
FTP - Huckleberry State Com 502H	10980.00	473.60	-298.60	5311153.10	739573.10	32° 27' 28.28306 N	103° 33' 23.86612 W
LTP - Huckleberry State Com 502H	10980.00	10365.40	-376.20	541044.90	739495.50	32° 29' 6.16878 N	103° 33' 23.93153 W

SECTION DETAILS											
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	2840.00	0.00	0.00	2840.00	0.00	0.00	0.00	0.00	0.00		KOP, Begin 2.00°/100' Build
3	3090.00	5.00	279.00	3089.68	1.71	-10.77	2.00	279.00	2.09		Hold 5.00° Inc at 279.00° Azm
4	6277.00	5.00	279.00	6264.56	45.16	-285.11	0.00	0.00	55.37		Begin 2.00°/100' Drop
5	5627.00	0.00	0.00	6514.24	46.86	-295.88	2.00	180.00	57.46		Begin Vertical Hold
6	10480.76	0.00	0.00	10468.00	46.86	-295.88	0.00	0.00	57.46		KOP2, Begin 12.00°/100' Build
7	11229.11	89.80	359.55	10945.46	522.66	-299.58	12.00	359.55	533.08		LP, Hold 89.80° Inc at 359.55° Azm
8	21202.21	89.80	359.55	10980.00	10495.40	-377.20	0.00	0.00	10502.18	BHL - Huckleberry State Com 502H	TD at 21202.21

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well 502H, Grid North

Latitude: 32° 27' 23.57523 N
Longitude: 103° 33' 20.42160 W

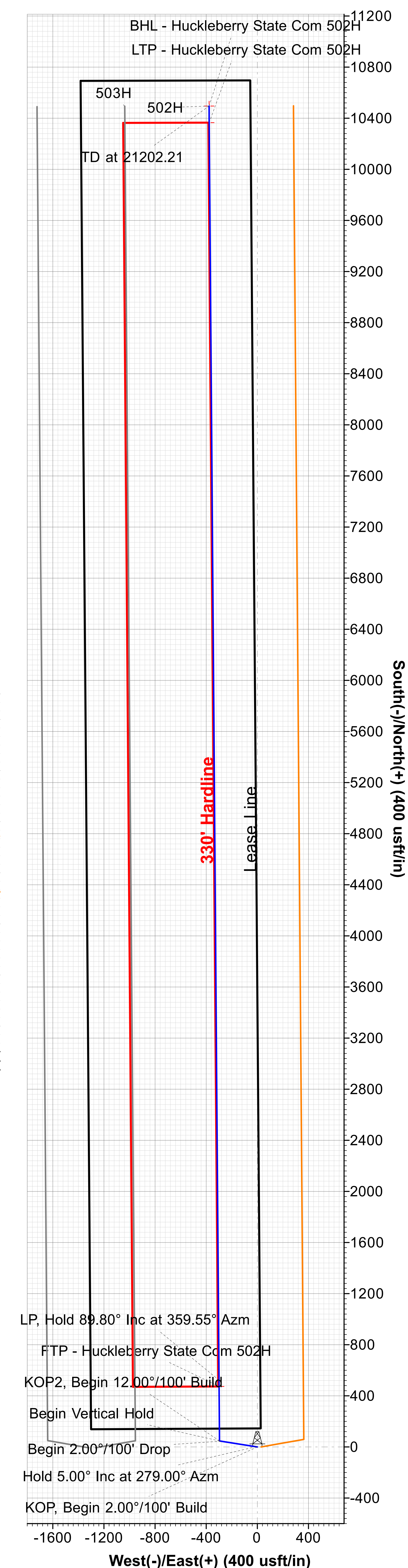
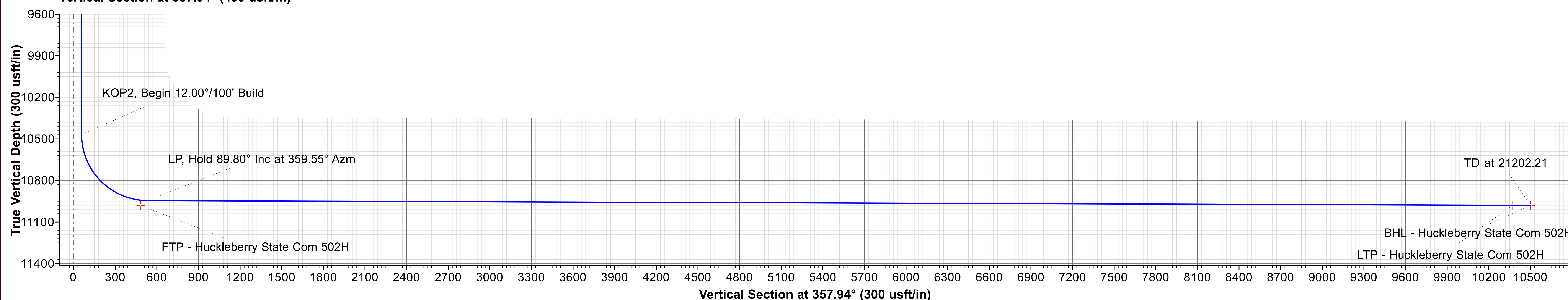
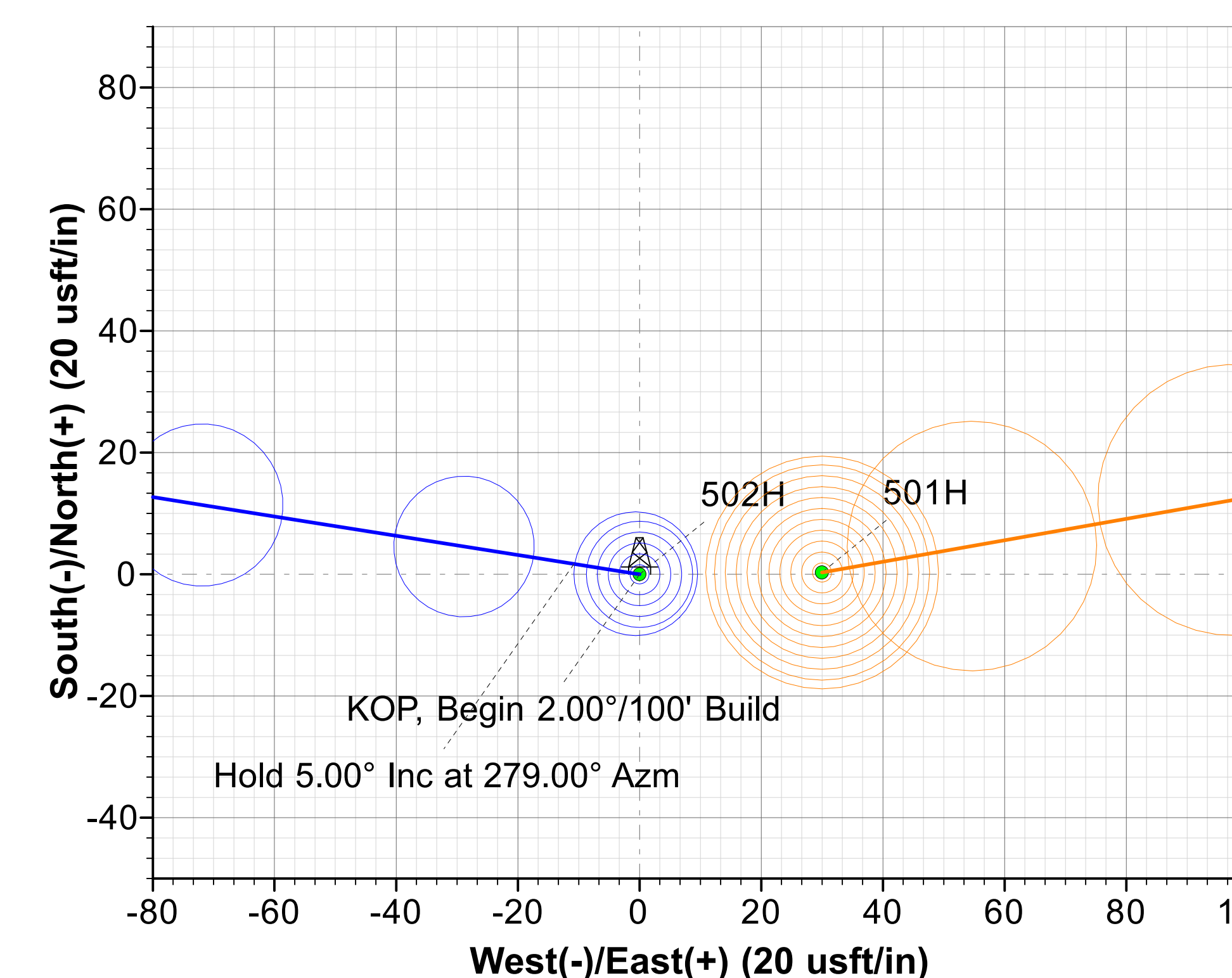
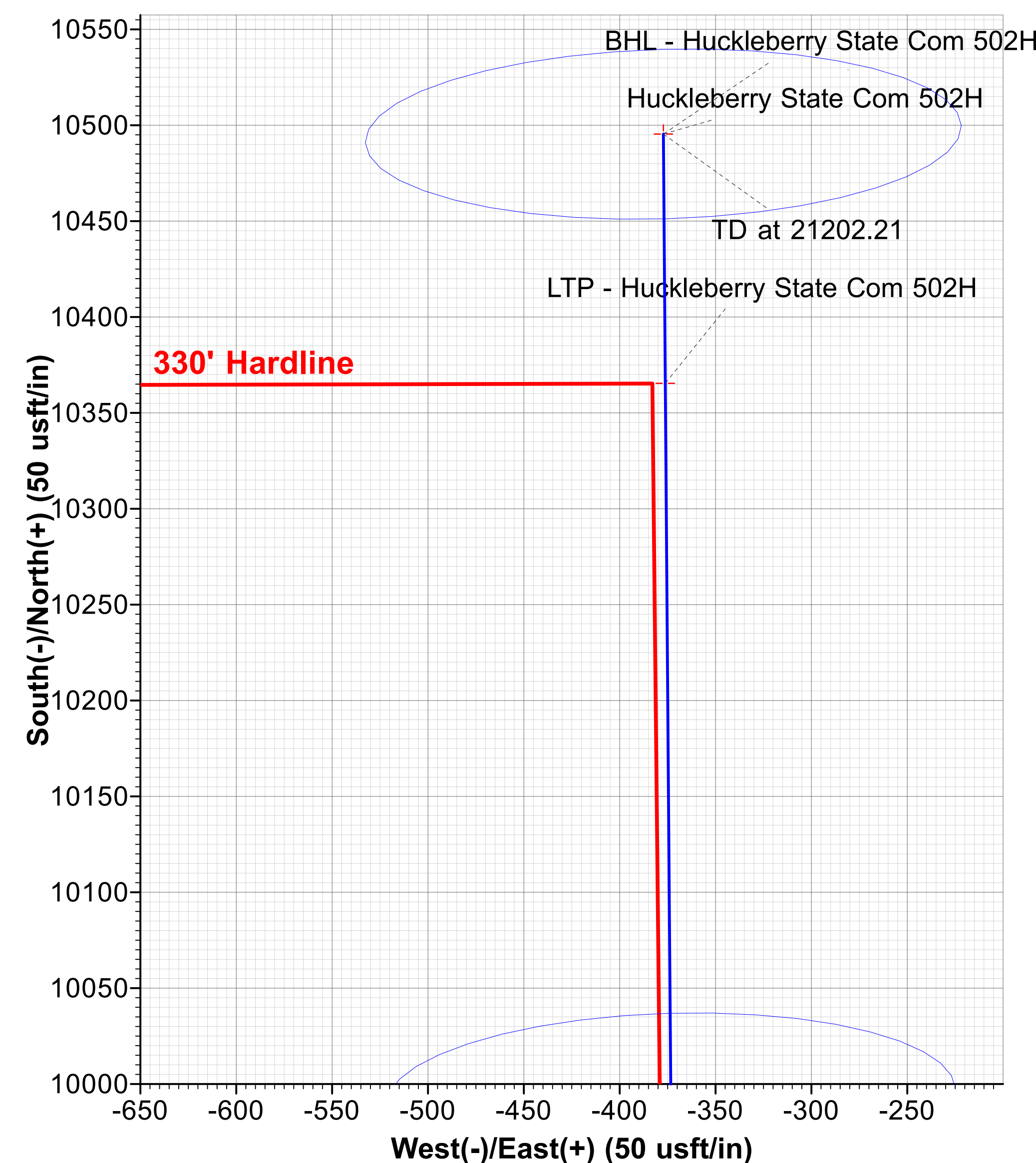
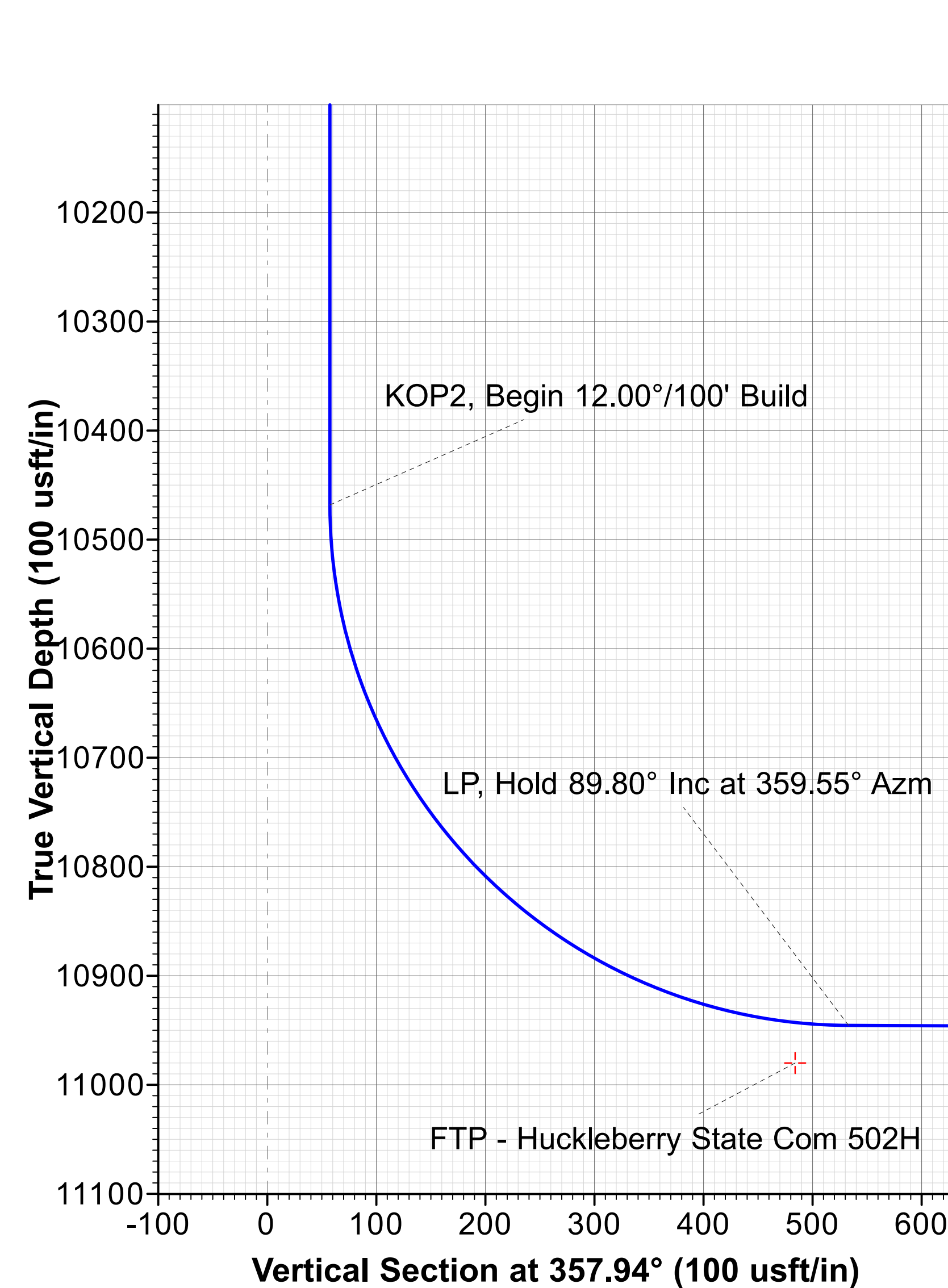
Grid East: 739871.70
Grid North: 530679.50
Scale Factor: 1.000

Geomagnetic Model: MVHD
 Sample Date: 13-Sep-18
 Magnetic Declination: 6.72°
 Dip Angle from Horizontal: 60.29°
 Magnetic Field Strength: 48181.55318126nT

To convert a Magnetic Direction to a Grid Direction, Add 6.30°
 To convert a Magnetic Direction to a True Direction, Add 6.72° East
 To convert a True Direction to a Grid Direction, Subtract 0.42°

LEGEND

- 4H, OH / Job #61199, Plan 3 05-09-17 V0
 — 504H, OH, Plan 1 09-14-18 V0
 — 501H, OH, Plan 1 09-14-18 V0
 — 503H, OH, Plan 1 09-14-18 V0
 — Plan 1 09-14-18





COG Operating LLC

Lea County, NM (NAD27 NME)

Huckleberry State Com

502H

OH

Plan: Plan 1 09-14-18

Standard Planning Report

14 September, 2018



Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

Project	Lea County, NM (NAD27 NME)		
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		Huckleberry State Com			
Site Position:		Northing:	530,679.80 usft	Latitude:	32° 27' 23.57603 N
From:	Map	Easting:	739,901.70 usft	Longitude:	103° 33' 20.07147 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.42 °

Well	502H					
Well Position	+N/-S	-0.30 usft	Northing:	530,679.50 usft	Latitude:	32° 27' 23.57523 N
	+E/-W	-30.00 usft	Easting:	739,871.70 usft	Longitude:	103° 33' 20.42160 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	3,764.80 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	9/13/2018	6.72	60.29	48,181.55318126

Design	Plan 1 09-14-18			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	357.94

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	
2,840.00	0.00	0.00	2,840.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,090.00	5.00	279.00	3,089.68	1.71	-10.77	2.00	2.00	0.00	279.00	
6,277.00	5.00	279.00	6,264.56	45.16	-285.11	0.00	0.00	0.00	0.00	
6,527.00	0.00	0.00	6,514.24	46.86	-295.88	2.00	-2.00	0.00	180.00	
10,480.76	0.00	0.00	10,468.00	46.86	-295.88	0.00	0.00	0.00	0.00	
11,229.11	89.80	359.55	10,945.46	522.66	-299.58	12.00	12.00	-0.06	359.55	
21,202.21	89.80	359.55	10,980.00	10,495.40	-377.20	0.00	0.00	0.00	0.00	BHL - Huckleberry Str

Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

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)
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
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
2,840.00	0.00	0.00	2,840.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 2.00°/100' Build									
2,900.00	1.20	279.00	2,900.00	0.10	-0.62	0.12	2.00	2.00	0.00
3,000.00	3.20	279.00	2,999.92	0.70	-4.41	0.86	2.00	2.00	0.00
3,090.00	5.00	279.00	3,089.68	1.71	-10.77	2.09	2.00	2.00	0.00
Hold 5.00° Inc at 279.00° Azm									
3,100.00	5.00	279.00	3,099.64	1.84	-11.63	2.26	0.00	0.00	0.00
3,200.00	5.00	279.00	3,199.26	3.21	-20.24	3.93	0.00	0.00	0.00
3,300.00	5.00	279.00	3,298.88	4.57	-28.84	5.60	0.00	0.00	0.00
3,400.00	5.00	279.00	3,398.50	5.93	-37.45	7.27	0.00	0.00	0.00
3,500.00	5.00	279.00	3,498.12	7.30	-46.06	8.94	0.00	0.00	0.00
3,600.00	5.00	279.00	3,597.74	8.66	-54.67	10.62	0.00	0.00	0.00
3,700.00	5.00	279.00	3,697.36	10.02	-63.28	12.29	0.00	0.00	0.00
3,800.00	5.00	279.00	3,796.98	11.39	-71.89	13.96	0.00	0.00	0.00
3,900.00	5.00	279.00	3,896.60	12.75	-80.49	15.63	0.00	0.00	0.00
4,000.00	5.00	279.00	3,996.22	14.11	-89.10	17.30	0.00	0.00	0.00
4,100.00	5.00	279.00	4,095.84	15.48	-97.71	18.98	0.00	0.00	0.00
4,200.00	5.00	279.00	4,195.46	16.84	-106.32	20.65	0.00	0.00	0.00
4,300.00	5.00	279.00	4,295.08	18.20	-114.93	22.32	0.00	0.00	0.00
4,400.00	5.00	279.00	4,394.70	19.57	-123.54	23.99	0.00	0.00	0.00
4,500.00	5.00	279.00	4,494.32	20.93	-132.14	25.66	0.00	0.00	0.00
4,600.00	5.00	279.00	4,593.94	22.29	-140.75	27.33	0.00	0.00	0.00
4,700.00	5.00	279.00	4,693.56	23.66	-149.36	29.01	0.00	0.00	0.00
4,800.00	5.00	279.00	4,793.18	25.02	-157.97	30.68	0.00	0.00	0.00
4,900.00	5.00	279.00	4,892.80	26.38	-166.58	32.35	0.00	0.00	0.00

Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

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)	
5,000.00	5.00	279.00	4,992.41	27.75	-175.19	34.02	0.00	0.00	0.00	
5,100.00	5.00	279.00	5,092.03	29.11	-183.79	35.69	0.00	0.00	0.00	
5,200.00	5.00	279.00	5,191.65	30.47	-192.40	37.36	0.00	0.00	0.00	
5,300.00	5.00	279.00	5,291.27	31.84	-201.01	39.04	0.00	0.00	0.00	
5,400.00	5.00	279.00	5,390.89	33.20	-209.62	40.71	0.00	0.00	0.00	
5,500.00	5.00	279.00	5,490.51	34.56	-218.23	42.38	0.00	0.00	0.00	
5,600.00	5.00	279.00	5,590.13	35.93	-226.83	44.05	0.00	0.00	0.00	
5,700.00	5.00	279.00	5,689.75	37.29	-235.44	45.72	0.00	0.00	0.00	
5,800.00	5.00	279.00	5,789.37	38.65	-244.05	47.39	0.00	0.00	0.00	
5,900.00	5.00	279.00	5,888.99	40.02	-252.66	49.07	0.00	0.00	0.00	
6,000.00	5.00	279.00	5,988.61	41.38	-261.27	50.74	0.00	0.00	0.00	
6,100.00	5.00	279.00	6,088.23	42.74	-269.88	52.41	0.00	0.00	0.00	
6,200.00	5.00	279.00	6,187.85	44.11	-278.48	54.08	0.00	0.00	0.00	
6,277.00	5.00	279.00	6,264.56	45.16	-285.11	55.37	0.00	0.00	0.00	
Begin 2.00°/100' Drop										
6,300.00	4.54	279.00	6,287.48	45.46	-287.00	55.74	2.00	-2.00	0.00	
6,400.00	2.54	279.00	6,387.28	46.42	-293.10	56.92	2.00	-2.00	0.00	
6,500.00	0.54	279.00	6,487.24	46.84	-295.75	57.44	2.00	-2.00	0.00	
6,527.00	0.00	0.00	6,514.24	46.86	-295.88	57.46	2.00	-2.00	0.00	
Begin Vertical Hold										
6,600.00	0.00	0.00	6,587.24	46.86	-295.88	57.46	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,687.24	46.86	-295.88	57.46	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,787.24	46.86	-295.88	57.46	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,887.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,000.00	0.00	0.00	6,987.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,100.00	0.00	0.00	7,087.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,200.00	0.00	0.00	7,187.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,300.00	0.00	0.00	7,287.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,400.00	0.00	0.00	7,387.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,500.00	0.00	0.00	7,487.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,600.00	0.00	0.00	7,587.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,700.00	0.00	0.00	7,687.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,800.00	0.00	0.00	7,787.24	46.86	-295.88	57.46	0.00	0.00	0.00	
7,900.00	0.00	0.00	7,887.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,000.00	0.00	0.00	7,987.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,100.00	0.00	0.00	8,087.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,200.00	0.00	0.00	8,187.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,300.00	0.00	0.00	8,287.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,400.00	0.00	0.00	8,387.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,500.00	0.00	0.00	8,487.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,600.00	0.00	0.00	8,587.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,700.00	0.00	0.00	8,687.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,800.00	0.00	0.00	8,787.24	46.86	-295.88	57.46	0.00	0.00	0.00	
8,900.00	0.00	0.00	8,887.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,000.00	0.00	0.00	8,987.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,100.00	0.00	0.00	9,087.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,200.00	0.00	0.00	9,187.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,300.00	0.00	0.00	9,287.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,400.00	0.00	0.00	9,387.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,500.00	0.00	0.00	9,487.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,600.00	0.00	0.00	9,587.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,700.00	0.00	0.00	9,687.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,800.00	0.00	0.00	9,787.24	46.86	-295.88	57.46	0.00	0.00	0.00	
9,900.00	0.00	0.00	9,887.24	46.86	-295.88	57.46	0.00	0.00	0.00	

Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

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)
10,000.00	0.00	0.00	9,987.24	46.86	-295.88	57.46	0.00	0.00	0.00
10,100.00	0.00	0.00	10,087.24	46.86	-295.88	57.46	0.00	0.00	0.00
10,200.00	0.00	0.00	10,187.24	46.86	-295.88	57.46	0.00	0.00	0.00
10,300.00	0.00	0.00	10,287.24	46.86	-295.88	57.46	0.00	0.00	0.00
10,400.00	0.00	0.00	10,387.24	46.86	-295.88	57.46	0.00	0.00	0.00
10,480.76	0.00	0.00	10,468.00	46.86	-295.88	57.46	0.00	0.00	0.00
KOP2, Begin 12.00°/100' Build									
10,500.00	2.31	359.55	10,487.23	47.25	-295.88	57.85	12.00	12.00	0.00
10,525.00	5.31	359.55	10,512.18	48.91	-295.90	59.51	12.00	12.00	0.00
10,550.00	8.31	359.55	10,537.00	51.87	-295.92	62.47	12.00	12.00	0.00
10,575.00	11.31	359.55	10,561.63	56.13	-295.95	66.73	12.00	12.00	0.00
10,600.00	14.31	359.55	10,586.00	61.67	-296.00	72.27	12.00	12.00	0.00
10,625.00	17.31	359.55	10,610.05	68.48	-296.05	79.07	12.00	12.00	0.00
10,650.00	20.31	359.55	10,633.72	76.54	-296.11	87.13	12.00	12.00	0.00
10,675.00	23.31	359.55	10,656.92	85.83	-296.18	96.41	12.00	12.00	0.00
10,700.00	26.31	359.55	10,679.62	96.32	-296.26	106.90	12.00	12.00	0.00
10,725.00	29.31	359.55	10,701.73	107.98	-296.36	118.55	12.00	12.00	0.00
10,750.00	32.31	359.55	10,723.20	120.78	-296.46	131.35	12.00	12.00	0.00
10,775.00	35.31	359.55	10,743.97	134.69	-296.56	145.25	12.00	12.00	0.00
10,800.00	38.31	359.55	10,763.98	149.67	-296.68	160.22	12.00	12.00	0.00
10,825.00	41.31	359.55	10,783.18	165.67	-296.80	176.22	12.00	12.00	0.00
10,850.00	44.31	359.55	10,801.52	182.66	-296.94	193.20	12.00	12.00	0.00
10,875.00	47.31	359.55	10,818.94	200.58	-297.08	211.12	12.00	12.00	0.00
10,900.00	50.31	359.55	10,835.41	219.39	-297.22	229.92	12.00	12.00	0.00
10,925.00	53.31	359.55	10,850.86	239.03	-297.38	249.56	12.00	12.00	0.00
10,950.00	56.31	359.55	10,865.27	259.46	-297.53	269.98	12.00	12.00	0.00
10,975.00	59.31	359.55	10,878.59	280.62	-297.70	291.13	12.00	12.00	0.00
11,000.00	62.31	359.55	10,890.78	302.44	-297.87	312.94	12.00	12.00	0.00
11,025.00	65.31	359.55	10,901.81	324.87	-298.04	335.36	12.00	12.00	0.00
11,050.00	68.31	359.55	10,911.65	347.84	-298.22	358.33	12.00	12.00	0.00
11,075.00	71.31	359.55	10,920.28	371.30	-298.41	381.78	12.00	12.00	0.00
11,100.00	74.31	359.55	10,927.67	395.18	-298.59	405.65	12.00	12.00	0.00
11,125.00	77.31	359.55	10,933.80	419.42	-298.78	429.88	12.00	12.00	0.00
11,150.00	80.31	359.55	10,938.65	443.94	-298.97	454.39	12.00	12.00	0.00
11,175.00	83.31	359.55	10,942.21	468.68	-299.16	479.12	12.00	12.00	0.00
11,200.00	86.31	359.55	10,944.47	493.57	-299.36	504.01	12.00	12.00	0.00
11,225.00	89.31	359.55	10,945.43	518.55	-299.55	528.98	12.00	12.00	0.00
11,229.11	89.80	359.55	10,945.46	522.66	-299.58	533.08	12.00	12.00	0.00
LP, Hold 89.80° Inc at 359.55° Azm									
11,300.00	89.80	359.55	10,945.71	593.55	-300.13	603.95	0.00	0.00	0.00
11,400.00	89.80	359.55	10,946.05	693.55	-300.91	703.91	0.00	0.00	0.00
11,500.00	89.80	359.55	10,946.40	793.54	-301.69	803.87	0.00	0.00	0.00
11,600.00	89.80	359.55	10,946.75	893.54	-302.47	903.82	0.00	0.00	0.00
11,700.00	89.80	359.55	10,947.09	993.53	-303.25	1,003.78	0.00	0.00	0.00
11,800.00	89.80	359.55	10,947.44	1,093.53	-304.03	1,103.74	0.00	0.00	0.00
11,900.00	89.80	359.55	10,947.79	1,193.53	-304.80	1,203.70	0.00	0.00	0.00
12,000.00	89.80	359.55	10,948.13	1,293.52	-305.58	1,303.66	0.00	0.00	0.00
12,100.00	89.80	359.55	10,948.48	1,393.52	-306.36	1,403.62	0.00	0.00	0.00
12,200.00	89.80	359.55	10,948.82	1,493.52	-307.14	1,503.58	0.00	0.00	0.00
12,300.00	89.80	359.55	10,949.17	1,593.51	-307.92	1,603.54	0.00	0.00	0.00
12,400.00	89.80	359.55	10,949.52	1,693.51	-308.70	1,703.50	0.00	0.00	0.00
12,500.00	89.80	359.55	10,949.86	1,793.51	-309.47	1,803.46	0.00	0.00	0.00
12,600.00	89.80	359.55	10,950.21	1,893.50	-310.25	1,903.42	0.00	0.00	0.00

Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

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)
12,700.00	89.80	359.55	10,950.56	1,993.50	-311.03	2,003.38	0.00	0.00	0.00
12,800.00	89.80	359.55	10,950.90	2,093.49	-311.81	2,103.34	0.00	0.00	0.00
12,900.00	89.80	359.55	10,951.25	2,193.49	-312.59	2,203.30	0.00	0.00	0.00
13,000.00	89.80	359.55	10,951.60	2,293.49	-313.37	2,303.26	0.00	0.00	0.00
13,100.00	89.80	359.55	10,951.94	2,393.48	-314.14	2,403.22	0.00	0.00	0.00
13,200.00	89.80	359.55	10,952.29	2,493.48	-314.92	2,503.18	0.00	0.00	0.00
13,300.00	89.80	359.55	10,952.63	2,593.48	-315.70	2,603.14	0.00	0.00	0.00
13,400.00	89.80	359.55	10,952.98	2,693.47	-316.48	2,703.10	0.00	0.00	0.00
13,500.00	89.80	359.55	10,953.33	2,793.47	-317.26	2,803.06	0.00	0.00	0.00
13,600.00	89.80	359.55	10,953.67	2,893.47	-318.03	2,903.02	0.00	0.00	0.00
13,700.00	89.80	359.55	10,954.02	2,993.46	-318.81	3,002.98	0.00	0.00	0.00
13,800.00	89.80	359.55	10,954.37	3,093.46	-319.59	3,102.94	0.00	0.00	0.00
13,900.00	89.80	359.55	10,954.71	3,193.45	-320.37	3,202.90	0.00	0.00	0.00
14,000.00	89.80	359.55	10,955.06	3,293.45	-321.15	3,302.86	0.00	0.00	0.00
14,100.00	89.80	359.55	10,955.40	3,393.45	-321.93	3,402.82	0.00	0.00	0.00
14,200.00	89.80	359.55	10,955.75	3,493.44	-322.70	3,502.78	0.00	0.00	0.00
14,300.00	89.80	359.55	10,956.10	3,593.44	-323.48	3,602.74	0.00	0.00	0.00
14,400.00	89.80	359.55	10,956.44	3,693.44	-324.26	3,702.70	0.00	0.00	0.00
14,500.00	89.80	359.55	10,956.79	3,793.43	-325.04	3,802.66	0.00	0.00	0.00
14,600.00	89.80	359.55	10,957.14	3,893.43	-325.82	3,902.62	0.00	0.00	0.00
14,700.00	89.80	359.55	10,957.48	3,993.43	-326.60	4,002.58	0.00	0.00	0.00
14,800.00	89.80	359.55	10,957.83	4,093.42	-327.37	4,102.54	0.00	0.00	0.00
14,900.00	89.80	359.55	10,958.17	4,193.42	-328.15	4,202.50	0.00	0.00	0.00
15,000.00	89.80	359.55	10,958.52	4,293.41	-328.93	4,302.46	0.00	0.00	0.00
15,100.00	89.80	359.55	10,958.87	4,393.41	-329.71	4,402.42	0.00	0.00	0.00
15,200.00	89.80	359.55	10,959.21	4,493.41	-330.49	4,502.38	0.00	0.00	0.00
15,300.00	89.80	359.55	10,959.56	4,593.40	-331.27	4,602.34	0.00	0.00	0.00
15,400.00	89.80	359.55	10,959.91	4,693.40	-332.04	4,702.30	0.00	0.00	0.00
15,500.00	89.80	359.55	10,960.25	4,793.40	-332.82	4,802.26	0.00	0.00	0.00
15,600.00	89.80	359.55	10,960.60	4,893.39	-333.60	4,902.22	0.00	0.00	0.00
15,700.00	89.80	359.55	10,960.95	4,993.39	-334.38	5,002.18	0.00	0.00	0.00
15,800.00	89.80	359.55	10,961.29	5,093.39	-335.16	5,102.14	0.00	0.00	0.00
15,900.00	89.80	359.55	10,961.64	5,193.38	-335.93	5,202.10	0.00	0.00	0.00
16,000.00	89.80	359.55	10,961.98	5,293.38	-336.71	5,302.06	0.00	0.00	0.00
16,100.00	89.80	359.55	10,962.33	5,393.37	-337.49	5,402.02	0.00	0.00	0.00
16,200.00	89.80	359.55	10,962.68	5,493.37	-338.27	5,501.98	0.00	0.00	0.00
16,300.00	89.80	359.55	10,963.02	5,593.37	-339.05	5,601.94	0.00	0.00	0.00
16,400.00	89.80	359.55	10,963.37	5,693.36	-339.83	5,701.90	0.00	0.00	0.00
16,500.00	89.80	359.55	10,963.72	5,793.36	-340.60	5,801.86	0.00	0.00	0.00
16,600.00	89.80	359.55	10,964.06	5,893.36	-341.38	5,901.82	0.00	0.00	0.00
16,700.00	89.80	359.55	10,964.41	5,993.35	-342.16	6,001.78	0.00	0.00	0.00
16,800.00	89.80	359.55	10,964.75	6,093.35	-342.94	6,101.74	0.00	0.00	0.00
16,900.00	89.80	359.55	10,965.10	6,193.35	-343.72	6,201.69	0.00	0.00	0.00
17,000.00	89.80	359.55	10,965.45	6,293.34	-344.50	6,301.65	0.00	0.00	0.00
17,100.00	89.80	359.55	10,965.79	6,393.34	-345.27	6,401.61	0.00	0.00	0.00
17,200.00	89.80	359.55	10,966.14	6,493.33	-346.05	6,501.57	0.00	0.00	0.00
17,300.00	89.80	359.55	10,966.49	6,593.33	-346.83	6,601.53	0.00	0.00	0.00
17,400.00	89.80	359.55	10,966.83	6,693.33	-347.61	6,701.49	0.00	0.00	0.00
17,500.00	89.80	359.55	10,967.18	6,793.32	-348.39	6,801.45	0.00	0.00	0.00
17,600.00	89.80	359.55	10,967.53	6,893.32	-349.17	6,901.41	0.00	0.00	0.00
17,700.00	89.80	359.55	10,967.87	6,993.32	-349.94	7,001.37	0.00	0.00	0.00
17,800.00	89.80	359.55	10,968.22	7,093.31	-350.72	7,101.33	0.00	0.00	0.00
17,900.00	89.80	359.55	10,968.56	7,193.31	-351.50	7,201.29	0.00	0.00	0.00
18,000.00	89.80	359.55	10,968.91	7,293.31	-352.28	7,301.25	0.00	0.00	0.00

Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

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)	
18,100.00	89.80	359.55	10,969.26	7,393.30	-353.06	7,401.21	0.00	0.00	0.00	
18,200.00	89.80	359.55	10,969.60	7,493.30	-353.83	7,501.17	0.00	0.00	0.00	
18,300.00	89.80	359.55	10,969.95	7,593.29	-354.61	7,601.13	0.00	0.00	0.00	
18,400.00	89.80	359.55	10,970.30	7,693.29	-355.39	7,701.09	0.00	0.00	0.00	
18,500.00	89.80	359.55	10,970.64	7,793.29	-356.17	7,801.05	0.00	0.00	0.00	
18,600.00	89.80	359.55	10,970.99	7,893.28	-356.95	7,901.01	0.00	0.00	0.00	
18,700.00	89.80	359.55	10,971.33	7,993.28	-357.73	8,000.97	0.00	0.00	0.00	
18,800.00	89.80	359.55	10,971.68	8,093.28	-358.50	8,100.93	0.00	0.00	0.00	
18,900.00	89.80	359.55	10,972.03	8,193.27	-359.28	8,200.89	0.00	0.00	0.00	
19,000.00	89.80	359.55	10,972.37	8,293.27	-360.06	8,300.85	0.00	0.00	0.00	
19,100.00	89.80	359.55	10,972.72	8,393.27	-360.84	8,400.81	0.00	0.00	0.00	
19,200.00	89.80	359.55	10,973.07	8,493.26	-361.62	8,500.77	0.00	0.00	0.00	
19,300.00	89.80	359.55	10,973.41	8,593.26	-362.40	8,600.73	0.00	0.00	0.00	
19,400.00	89.80	359.55	10,973.76	8,693.26	-363.17	8,700.69	0.00	0.00	0.00	
19,500.00	89.80	359.55	10,974.11	8,793.25	-363.95	8,800.65	0.00	0.00	0.00	
19,600.00	89.80	359.55	10,974.45	8,893.25	-364.73	8,900.61	0.00	0.00	0.00	
19,700.00	89.80	359.55	10,974.80	8,993.24	-365.51	9,000.57	0.00	0.00	0.00	
19,800.00	89.80	359.55	10,975.14	9,093.24	-366.29	9,100.53	0.00	0.00	0.00	
19,900.00	89.80	359.55	10,975.49	9,193.24	-367.07	9,200.49	0.00	0.00	0.00	
20,000.00	89.80	359.55	10,975.84	9,293.23	-367.84	9,300.45	0.00	0.00	0.00	
20,100.00	89.80	359.55	10,976.18	9,393.23	-368.62	9,400.41	0.00	0.00	0.00	
20,200.00	89.80	359.55	10,976.53	9,493.23	-369.40	9,500.37	0.00	0.00	0.00	
20,300.00	89.80	359.55	10,976.88	9,593.22	-370.18	9,600.33	0.00	0.00	0.00	
20,400.00	89.80	359.55	10,977.22	9,693.22	-370.96	9,700.29	0.00	0.00	0.00	
20,500.00	89.80	359.55	10,977.57	9,793.22	-371.73	9,800.25	0.00	0.00	0.00	
20,600.00	89.80	359.55	10,977.91	9,893.21	-372.51	9,900.21	0.00	0.00	0.00	
20,700.00	89.80	359.55	10,978.26	9,993.21	-373.29	10,000.17	0.00	0.00	0.00	
20,800.00	89.80	359.55	10,978.61	10,093.20	-374.07	10,100.13	0.00	0.00	0.00	
20,900.00	89.80	359.55	10,978.95	10,193.20	-374.85	10,200.09	0.00	0.00	0.00	
21,000.00	89.80	359.55	10,979.30	10,293.20	-375.63	10,300.05	0.00	0.00	0.00	
21,100.00	89.80	359.55	10,979.65	10,393.19	-376.40	10,400.01	0.00	0.00	0.00	
21,202.21	89.80	359.55	10,980.00	10,495.40	-377.20	10,502.18	0.00	0.00	0.00	
TD at 21202.21										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
BHL - Huckleberry State - hit/miss target - Shape - Point	0.00	0.00	10,980.00	10,495.40	-377.20	541,174.90	739,494.50	32° 29' 7.45521 N	103° 33' 23.93216 W	
LTP - Huckleberry State - plan misses target center by 0.45usft at 21072.21usft MD (10979.55 TVD, 10365.40 N, -376.19 E) - Point	0.00	0.00	10,980.00	10,365.40	-376.20	541,044.90	739,495.50	32° 29' 6.16878 N	103° 33' 23.93154 W	
FTP - Huckleberry State - plan misses target center by 37.05usft at 11183.32usft MD (10943.11 TVD, 476.95 N, -299.23 E) - Point	0.00	0.00	10,980.00	473.60	-298.60	531,153.10	739,573.10	32° 27' 28.28306 N	103° 33' 23.86612 W	

Database:	USA Compass	Local Co-ordinate Reference:	Well 502H
Company:	COG Operating LLC	TVD Reference:	KB=26' @ 3790.80usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	KB=26' @ 3790.80usft (McVay 8)
Site:	Huckleberry State Com	North Reference:	Grid
Well:	502H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 09-14-18		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,840.00	2,840.00	0.00	0.00	KOP, Begin 2.00°/100' Build
3,090.00	3,089.68	1.71	-10.77	Hold 5.00° Inc at 279.00° Azm
6,277.00	6,264.56	45.16	-285.11	Begin 2.00°/100' Drop
6,527.00	6,514.24	46.86	-295.88	Begin Vertical Hold
10,480.76	10,468.00	46.86	-295.88	KOP2, Begin 12.00°/100' Build
11,229.11	10,945.46	522.66	-299.58	LP, Hold 89.80° Inc at 359.55° Azm
21,202.21	10,980.00	10,495.40	-377.20	TD at 21202.21