

# **BISON EXPLORATION**

**ARAPAHOE COUNTY, COLORADO (NAD 83)**

**SE NE SEC. 22 T4S R64W 6th P.M.**

**HOULIHAN 4-64 22A 23-24-8**

**ORIGINAL WELLBORE**

**30 March, 2017**

**Plan: PROPOSAL #1**



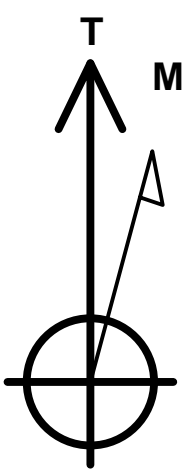
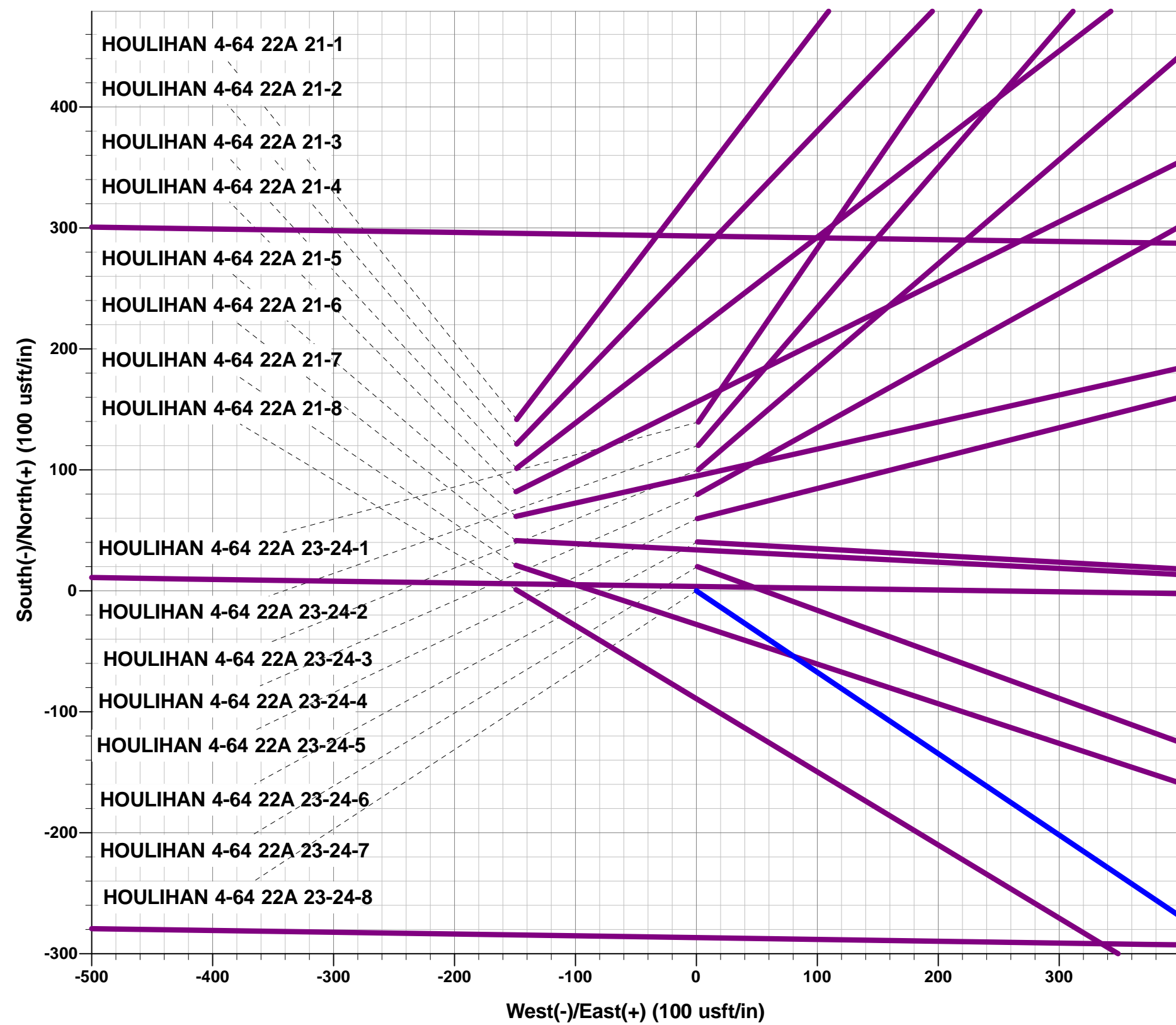
Project: ARAPAHOE COUNTY, COLORADO (NAD 83)  
Site: SE NE SEC. 22 T4S R64W 6th P.M.  
Well: HOULIHAN 4-64 22A 23-24-8  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #1

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Dep	Annotation
0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	SHL: 1913ft FNL & 855ft FEL of Sec 22
100.0	100.0	0.00	0.00	0.0	0.0	0.0	0.0	START NUDGE (2°/100ft BUR)
695.7	700.0	12.00	123.93	-34.9	52.0	54.5	62.6	EOB TO 12° INC
5065.7	5167.8	12.00	123.93	-553.5	822.7	863.4	991.6	END OF TANGENT
5661.4	5767.8	0.00	0.00	-588.4	874.7	918.0	1054.2	EOD TO VERTICAL
6826.4	6932.8	0.00	0.00	-588.4	874.7	918.0	1054.2	KOP (10°/100ft BUR)
7382.5	7693.4	76.06	91.52	-599.9	1309.5	1352.3	1489.2	BEGIN PROD INTERVAL
7399.4	7832.8	90.00	91.52	-603.6	1447.5	1490.2	1627.1	HZ LP *NEW*: 2490ft FNL & 598ft FWL of Sec 23
7399.4	17289.8	90.00	91.51	-853.7	10901.1	10934.5	11084.1	BHL: 2490ft FNL & 460ft FEL of Sec 24

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - HOULIHAN 4-64 22A 23-24-8	6826.4	-588.4	874.7	39.688413	-104.527570
BHL - HOULIHAN 4-64 22A 23-24-8	7399.4	-853.7	10901.1	39.687678	-104.491944
HZ LP *NEW* - HOULIHAN 4-64 22A 23-24-8	7399.4	-603.6	1447.5	39.688371	-104.525535



Azimuths to True North  
Magnetic North: 8.05°

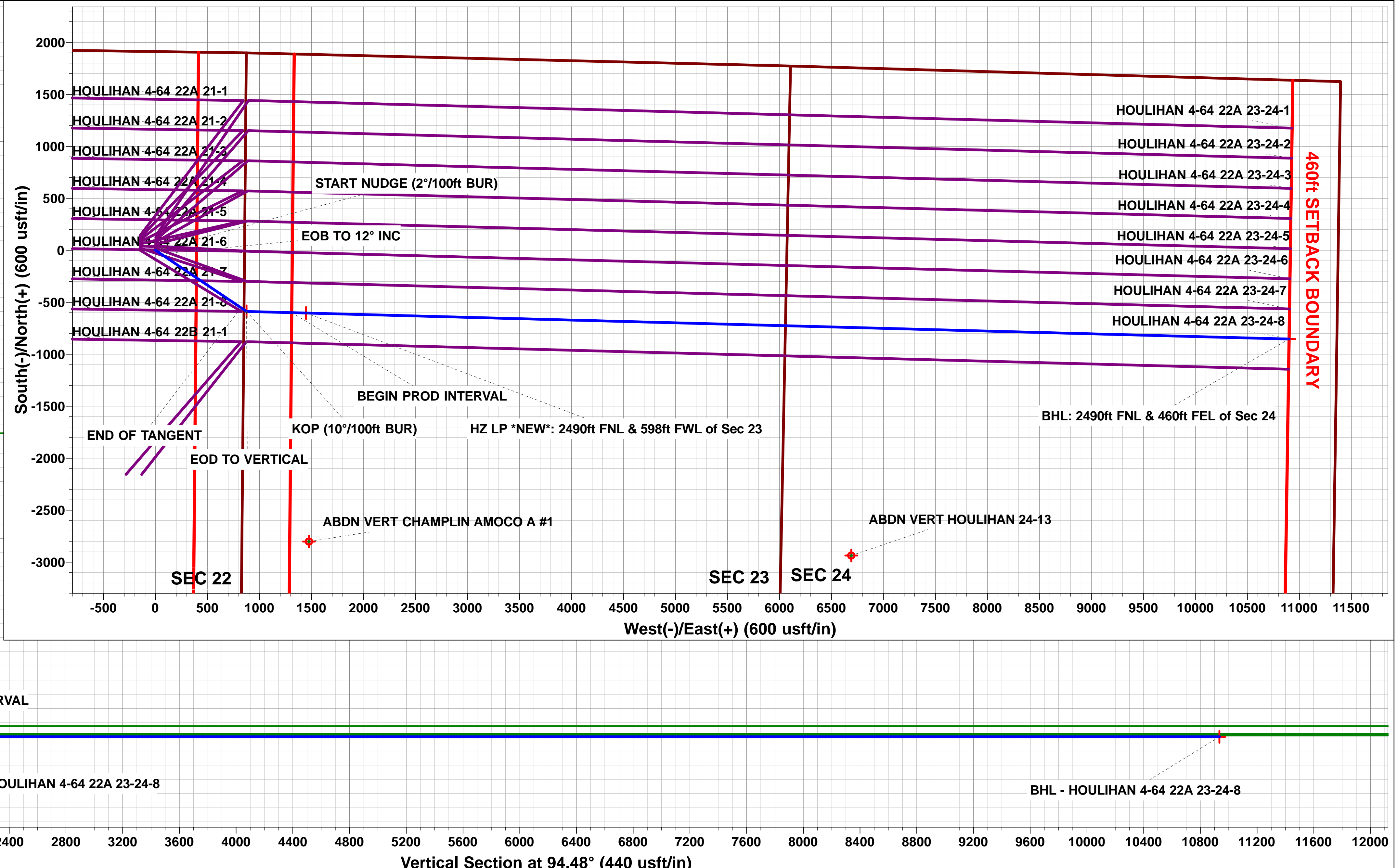
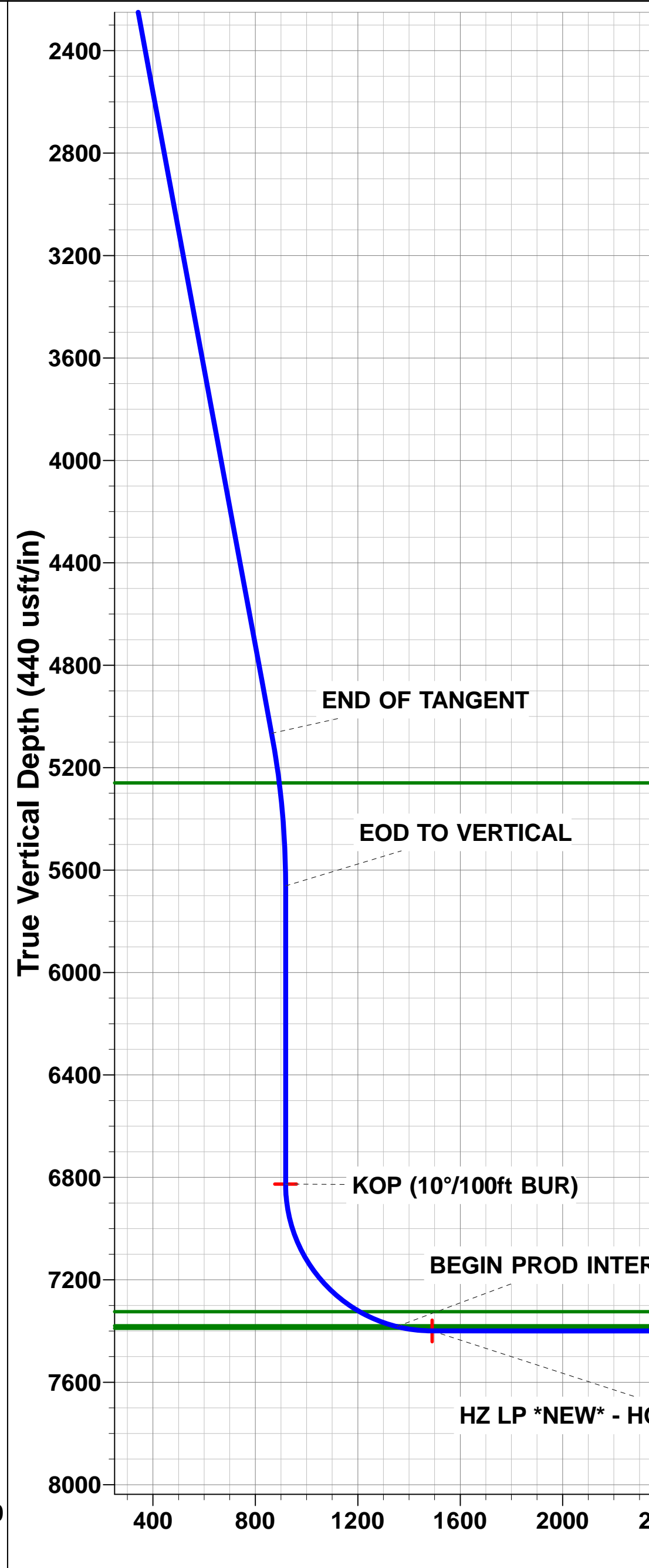
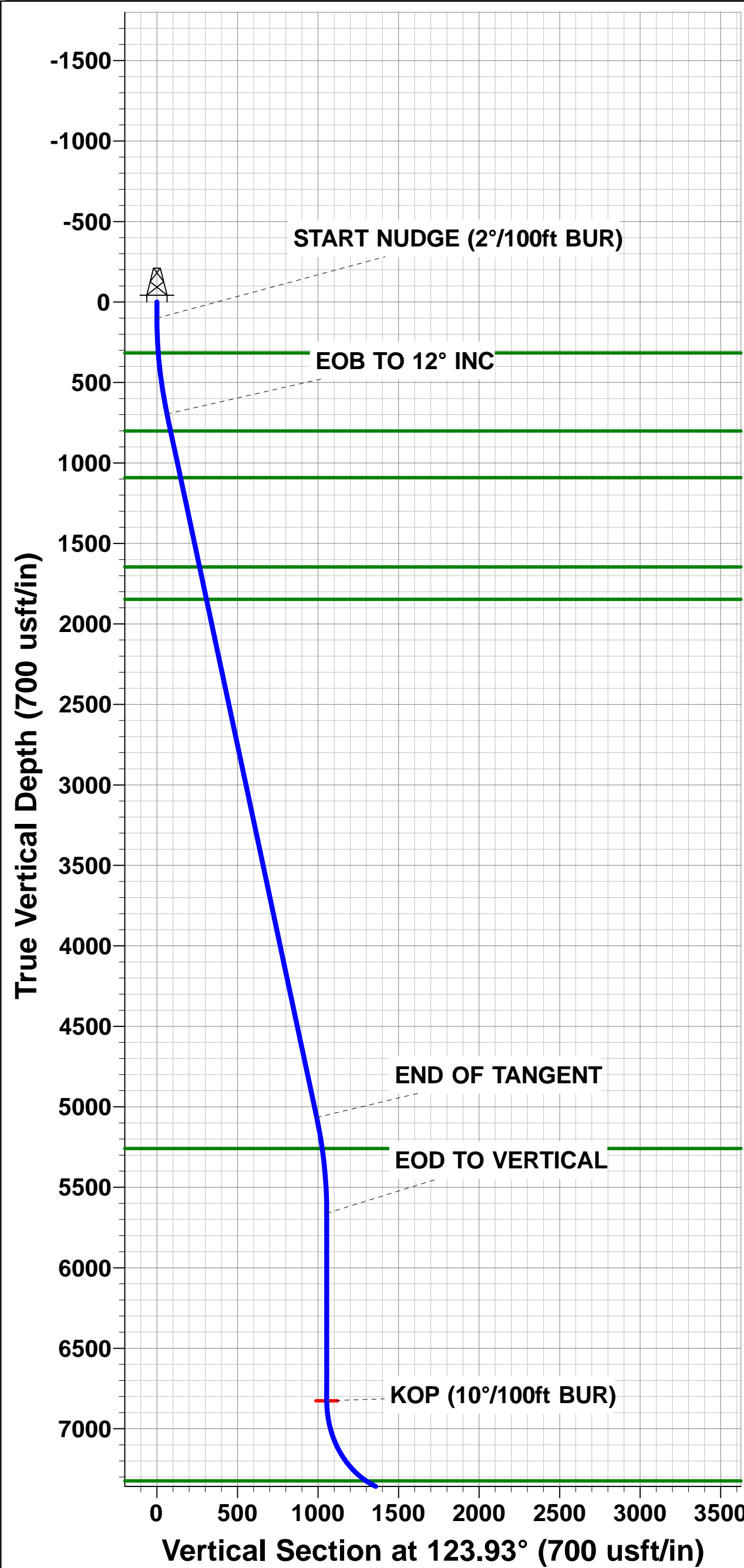
Magnetic Field  
Strength: 52062.7snT  
Dip Angle: 66.33°  
Date: 30/03/2017  
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
316.4	316.6	DENVER
801.4	808.1	UPPER ARAPAHOE
1091.4	1104.6	LOWER ARAPAHOE
1645.4	1671.0	LARAMIE - FOX HILLS
1847.4	1877.5	PIERRE SHALE
5259.4	5364.5	SHANNON SANDSTONE MBR
7324.4	7536.4	SHARON SPRINGS SHALE
7379.4	7681.1	NIOBRARA FORMATION
7389.4	7725.8	NIOBRARA A CHALK

PROPOSED LOCAL COORDINATES:

SHL: 1913ft FNL & 855ft FEL of Sec 22  
BEGIN PROD INT: 2490ft FNL & 460ft FWL of Sec 23  
HZ LP: 2490ft FNL & 598ft FWL of Sec 23  
BHL: 2490ft FNL & 460ft FEL of Sec 24



# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 23-24-8
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Site:</b>	SE NE SEC. 22 T4S R64W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-64 22A 23-24-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

<b>Project</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Central Zone		Using geodetic scale factor

<b>Site</b>	SE NE SEC. 22 T4S R64W 6th P.M.		
<b>Site Position:</b>		<b>Northing:</b>	1,677,817.09 usft
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,272,633.76 usft
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	1.10000ft
		<b>Latitude:</b>	39.690417
		<b>Longitude:</b>	-104.531206
		<b>Grid Convergence:</b>	0.61 °

<b>Well</b>	HOULIHAN 4-64 22A 23-24-8		
<b>Well Position</b>	<b>+N-S</b>	-141.7 usft	<b>Northing:</b>
	<b>+E-W</b>	148.6 usft	<b>Easting:</b>
<b>Position Uncertainty</b>	0.0 usft		<b>Wellhead Elevation:</b>
			<b>Latitude:</b>
			<b>Longitude:</b>
			<b>Ground Level:</b>

<b>Wellbore</b>	ORIGINAL WELLBORE				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	30/03/2017	8.05	66.33	52,063

<b>Design</b>	PROPOSAL #1				
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.0	
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N-S (usft)</b>	<b>+E-W (usft)</b>	<b>Direction (°)</b>	
	7,399.4	0.0	0.0	94.48	

<b>Plan Sections</b>											
MD (usft)	Inc (°)	Azi (°)	Vertical Depth	SS (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	-5,729.4	0.0	0.0	0.00	0.00	0.00	0.00	
100.0	0.00	0.00	100.0	-5,629.4	0.0	0.0	0.00	0.00	0.00	0.00	
700.0	12.00	123.93	695.7	-5,033.7	-34.9	52.0	2.00	2.00	0.00	123.93	
5,167.8	12.00	123.93	5,065.7	-663.7	-553.5	822.7	0.00	0.00	0.00	0.00	
5,767.8	0.00	0.00	5,661.4	-68.0	-588.4	874.7	2.00	-2.00	0.00	180.00	
6,932.8	0.00	0.00	6,826.4	1,097.0	-588.4	874.7	0.00	0.00	0.00	0.00	KOP - HOULIHAN 4
7,832.8	90.00	91.52	7,399.4	1,670.0	-603.6	1,447.5	10.00	10.00	0.00	91.52	
17,289.8	90.00	91.51	7,399.4	1,670.0	-853.7	10,901.1	0.00	0.00	0.00	-93.18	BHL - HOULIHAN 4

<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 23-24-8
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<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Site:</b>	SE NE SEC. 22 T4S R64W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-64 22A 23-24-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

## Planned Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
<b>SHL: 1913ft FNL &amp; 855ft FEL of Sec 22</b>										
0.0	0.00	0.00	0.0	5,729.40	0.0	0.0	0.0	0.00	0.00	0.00
<b>START NUDGE (2°/100ft BUR)</b>										
100.0	0.00	0.00	100.0	5,629.40	0.0	0.0	0.0	0.00	0.00	0.00
200.0	2.00	123.93	200.0	5,529.42	-1.0	1.4	1.5	2.00	2.00	0.00
300.0	4.00	123.93	299.8	5,429.56	-3.9	5.8	6.1	2.00	2.00	0.00
<b>DENVER</b>										
316.6	4.33	123.93	316.4	5,413.00	-4.6	6.8	7.1	2.00	2.00	0.00
400.0	6.00	123.93	399.5	5,329.95	-8.8	13.0	13.7	2.00	2.00	0.00
500.0	8.00	123.93	498.7	5,230.70	-15.6	23.1	24.3	2.00	2.00	0.00
600.0	10.00	123.93	597.5	5,131.93	-24.3	36.1	37.9	2.00	2.00	0.00
<b>EOB TO 12° INC</b>										
700.0	12.00	123.93	695.7	5,033.73	-34.9	52.0	54.5	2.00	2.00	0.00
800.0	12.00	123.93	793.4	4,935.96	-46.5	69.2	72.6	0.00	0.00	0.00
<b>UPPER ARAPAHOE</b>										
808.1	12.00	123.93	801.4	4,928.00	-47.5	70.6	74.1	0.00	0.00	0.00
900.0	12.00	123.93	891.3	4,838.15	-58.2	86.4	90.7	0.00	0.00	0.00
1,000.0	12.00	123.93	989.1	4,740.33	-69.8	103.7	108.8	0.00	0.00	0.00
1,100.0	12.00	123.93	1,086.9	4,642.52	-81.4	121.0	126.9	0.00	0.00	0.00
<b>LOWER ARAPAHOE</b>										
1,104.6	12.00	123.93	1,091.4	4,638.00	-81.9	121.8	127.8	0.00	0.00	0.00
1,200.0	12.00	123.93	1,184.7	4,544.70	-93.0	138.2	145.0	0.00	0.00	0.00
1,300.0	12.00	123.93	1,282.5	4,446.89	-104.6	155.5	163.1	0.00	0.00	0.00
1,400.0	12.00	123.93	1,380.3	4,349.08	-116.2	172.7	181.3	0.00	0.00	0.00
1,500.0	12.00	123.93	1,478.1	4,251.26	-127.8	190.0	199.4	0.00	0.00	0.00
1,600.0	12.00	123.93	1,576.0	4,153.45	-139.4	207.2	217.5	0.00	0.00	0.00
<b>LARAMIE - FOX HILLS</b>										
1,671.0	12.00	123.93	1,645.4	4,084.00	-147.6	219.5	230.3	0.00	0.00	0.00
1,700.0	12.00	123.93	1,673.8	4,055.63	-151.0	224.5	235.6	0.00	0.00	0.00
1,800.0	12.00	123.93	1,771.6	3,957.82	-162.6	241.7	253.7	0.00	0.00	0.00
<b>PIERRE SHALE (BASE FOX HILLS)</b>										
1,877.5	12.00	123.93	1,847.4	3,882.00	-171.6	255.1	267.7	0.00	0.00	0.00
1,900.0	12.00	123.93	1,869.4	3,860.00	-174.2	259.0	271.8	0.00	0.00	0.00
2,000.0	12.00	123.93	1,967.2	3,762.19	-185.8	276.2	289.9	0.00	0.00	0.00
2,100.0	12.00	123.93	2,065.0	3,664.38	-197.4	293.5	308.0	0.00	0.00	0.00
2,200.0	12.00	123.93	2,162.8	3,566.56	-209.0	310.7	326.1	0.00	0.00	0.00
2,300.0	12.00	123.93	2,260.7	3,468.75	-220.6	328.0	344.2	0.00	0.00	0.00
2,400.0	12.00	123.93	2,358.5	3,370.93	-232.2	345.2	362.3	0.00	0.00	0.00
2,500.0	12.00	123.93	2,456.3	3,273.12	-243.8	362.5	380.4	0.00	0.00	0.00
2,600.0	12.00	123.93	2,554.1	3,175.30	-255.4	379.7	398.5	0.00	0.00	0.00
2,700.0	12.00	123.93	2,651.9	3,077.49	-267.1	397.0	416.6	0.00	0.00	0.00
2,800.0	12.00	123.93	2,749.7	2,979.67	-278.7	414.2	434.7	0.00	0.00	0.00
2,900.0	12.00	123.93	2,847.5	2,881.86	-290.3	431.5	452.8	0.00	0.00	0.00
3,000.0	12.00	123.93	2,945.4	2,784.05	-301.9	448.8	471.0	0.00	0.00	0.00
3,100.0	12.00	123.93	3,043.2	2,686.23	-313.5	466.0	489.1	0.00	0.00	0.00
3,200.0	12.00	123.93	3,141.0	2,588.42	-325.1	483.3	507.2	0.00	0.00	0.00
3,300.0	12.00	123.93	3,238.8	2,490.60	-336.7	500.5	525.3	0.00	0.00	0.00
3,400.0	12.00	123.93	3,336.6	2,392.79	-348.3	517.8	543.4	0.00	0.00	0.00
3,500.0	12.00	123.93	3,434.4	2,294.97	-359.9	535.0	561.5	0.00	0.00	0.00
3,600.0	12.00	123.93	3,532.2	2,197.16	-371.5	552.3	579.6	0.00	0.00	0.00
3,700.0	12.00	123.93	3,630.1	2,099.34	-383.1	569.5	597.7	0.00	0.00	0.00
3,800.0	12.00	123.93	3,727.9	2,001.53	-394.7	586.8	615.8	0.00	0.00	0.00
3,900.0	12.00	123.93	3,825.7	1,903.72	-406.3	604.0	633.9	0.00	0.00	0.00



# Planning Report



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<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Site:</b>	SE NE SEC. 22 T4S R64W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-64 22A 23-24-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

## Planned Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,000.0	12.00	123.93	3,923.5	1,805.90	-417.9	621.3	652.0	0.00	0.00	0.00
4,100.0	12.00	123.93	4,021.3	1,708.09	-429.5	638.5	670.1	0.00	0.00	0.00
4,200.0	12.00	123.93	4,119.1	1,610.27	-441.1	655.8	688.2	0.00	0.00	0.00
4,300.0	12.00	123.93	4,216.9	1,512.46	-452.7	673.0	706.3	0.00	0.00	0.00
4,400.0	12.00	123.93	4,314.8	1,414.64	-464.3	690.3	724.4	0.00	0.00	0.00
4,500.0	12.00	123.93	4,412.6	1,316.83	-476.0	707.5	742.5	0.00	0.00	0.00
4,600.0	12.00	123.93	4,510.4	1,219.02	-487.6	724.8	760.6	0.00	0.00	0.00
4,700.0	12.00	123.93	4,608.2	1,121.20	-499.2	742.0	778.8	0.00	0.00	0.00
4,800.0	12.00	123.93	4,706.0	1,023.39	-510.8	759.3	796.9	0.00	0.00	0.00
4,900.0	12.00	123.93	4,803.8	925.57	-522.4	776.6	815.0	0.00	0.00	0.00
5,000.0	12.00	123.93	4,901.6	827.76	-534.0	793.8	833.1	0.00	0.00	0.00
5,100.0	12.00	123.93	4,999.5	729.94	-545.6	811.1	851.2	0.00	0.00	0.00
<b>END OF TANGENT</b>										
5,167.8	12.00	123.93	5,065.7	663.67	-553.5	822.7	863.4	0.00	0.00	0.00
5,200.0	11.36	123.93	5,097.3	632.09	-557.1	828.2	869.1	2.00	-2.00	0.00
5,300.0	9.36	123.93	5,195.7	533.73	-567.1	843.1	884.8	2.00	-2.00	0.00
<b>SHANNON SANDSTONE MBR</b>										
5,364.5	8.07	123.93	5,259.4	470.00	-572.6	851.2	893.3	2.00	-2.00	0.00
5,400.0	7.36	123.93	5,294.6	434.79	-575.2	855.1	897.4	2.00	-2.00	0.00
5,500.0	5.36	123.93	5,394.0	335.41	-581.4	864.3	907.1	2.00	-2.00	0.00
5,600.0	3.36	123.93	5,493.7	235.71	-585.7	870.6	913.7	2.00	-2.00	0.00
5,700.0	1.36	123.93	5,593.6	135.80	-588.0	874.0	917.3	2.00	-2.00	0.00
<b>EOD TO VERTICAL</b>										
5,767.8	0.00	0.00	5,661.4	68.00	-588.4	874.7	918.0	2.00	-2.00	0.00
5,800.0	0.00	0.00	5,693.6	35.80	-588.4	874.7	918.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,793.6	-64.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,000.0	0.00	0.00	5,893.6	-164.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,100.0	0.00	0.00	5,993.6	-264.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,093.6	-364.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,193.6	-464.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,400.0	0.00	0.00	6,293.6	-564.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,393.6	-664.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,493.6	-764.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,593.6	-864.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,693.6	-964.20	-588.4	874.7	918.0	0.00	0.00	0.00
6,900.0	0.00	0.00	6,793.6	-1,064.20	-588.4	874.7	918.0	0.00	0.00	0.00
<b>KOP (10°/100ft BUR)</b>										
6,932.8	0.00	0.00	6,826.4	-1,097.00	-588.4	874.7	918.0	0.00	0.00	0.00
7,000.0	6.72	91.52	6,893.4	-1,164.04	-588.5	878.6	921.9	10.00	10.00	0.00
7,100.0	16.72	91.52	6,991.2	-1,261.84	-589.0	898.9	942.2	10.00	10.00	0.00
7,200.0	26.72	91.52	7,084.0	-1,354.62	-590.0	935.9	979.1	10.00	10.00	0.00
7,300.0	36.72	91.52	7,169.0	-1,439.57	-591.4	988.4	1,031.5	10.00	10.00	0.00
7,400.0	46.72	91.52	7,243.5	-1,514.12	-593.2	1,054.8	1,097.9	10.00	10.00	0.00
7,500.0	56.72	91.52	7,305.4	-1,575.99	-595.3	1,133.2	1,176.2	10.00	10.00	0.00
<b>SHARON SPRINGS SHALE</b>										
7,536.4	60.36	91.52	7,324.4	-1,595.00	-596.1	1,164.2	1,207.2	10.00	10.00	0.00
7,600.0	66.72	91.52	7,352.7	-1,623.31	-597.6	1,221.1	1,264.0	10.00	10.00	0.00
<b>NIORRARA FORMATION</b>										
7,681.1	74.83	91.52	7,379.4	-1,650.00	-599.6	1,297.6	1,340.5	10.00	10.00	0.00
<b>BEGIN PROD INTERVAL</b>										
7,693.4	76.06	91.52	7,382.5	-1,653.08	-599.9	1,309.5	1,352.3	10.00	10.00	0.00
7,700.0	76.72	91.52	7,384.0	-1,654.64	-600.1	1,315.9	1,358.7	10.00	10.00	0.00
<b>NIORRARA A CHALK</b>										

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 23-24-8
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Site:</b>	SE NE SEC. 22 T4S R64W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-64 22A 23-24-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

## Planned Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,725.8	79.30	91.52	7,389.4	-1,660.00	-600.8	1,341.1	1,383.9	10.00	10.00	0.00
7,800.0	86.72	91.52	7,398.4	-1,669.02	-602.7	1,414.7	1,457.4	10.00	10.00	0.00
HZ LP *NEW*: 2490ft FNL & 598ft FWL of Sec 23										
7,832.8	90.00	91.52	7,399.4	-1,669.96	-603.6	1,447.5	1,490.2	10.00	10.00	0.00
7,900.0	90.00	91.52	7,399.4	-1,669.96	-605.4	1,514.6	1,557.3	0.00	0.00	0.00
8,000.0	90.00	91.52	7,399.4	-1,669.96	-608.0	1,614.6	1,657.1	0.00	0.00	0.00
8,100.0	90.00	91.52	7,399.4	-1,669.96	-610.7	1,714.6	1,757.0	0.00	0.00	0.00
8,200.0	90.00	91.52	7,399.4	-1,669.96	-613.3	1,814.5	1,856.9	0.00	0.00	0.00
8,300.0	90.00	91.52	7,399.4	-1,669.96	-616.0	1,914.5	1,956.7	0.00	0.00	0.00
8,400.0	90.00	91.52	7,399.4	-1,669.96	-618.6	2,014.5	2,056.6	0.00	0.00	0.00
8,500.0	90.00	91.52	7,399.4	-1,669.96	-621.3	2,114.4	2,156.5	0.00	0.00	0.00
8,600.0	90.00	91.52	7,399.4	-1,669.96	-623.9	2,214.4	2,256.3	0.00	0.00	0.00
8,700.0	90.00	91.52	7,399.4	-1,669.96	-626.6	2,314.3	2,356.2	0.00	0.00	0.00
8,800.0	90.00	91.52	7,399.4	-1,669.96	-629.2	2,414.3	2,456.1	0.00	0.00	0.00
8,900.0	90.00	91.52	7,399.4	-1,669.96	-631.9	2,514.3	2,555.9	0.00	0.00	0.00
9,000.0	90.00	91.52	7,399.4	-1,669.96	-634.5	2,614.2	2,655.8	0.00	0.00	0.00
9,100.0	90.00	91.52	7,399.4	-1,669.96	-637.2	2,714.2	2,755.7	0.00	0.00	0.00
9,200.0	90.00	91.52	7,399.4	-1,669.96	-639.8	2,814.2	2,855.5	0.00	0.00	0.00
9,300.0	90.00	91.52	7,399.4	-1,669.96	-642.5	2,914.1	2,955.4	0.00	0.00	0.00
9,400.0	90.00	91.52	7,399.4	-1,669.96	-645.1	3,014.1	3,055.3	0.00	0.00	0.00
9,500.0	90.00	91.52	7,399.4	-1,669.96	-647.8	3,114.1	3,155.1	0.00	0.00	0.00
9,600.0	90.00	91.52	7,399.4	-1,669.96	-650.4	3,214.0	3,255.0	0.00	0.00	0.00
9,700.0	90.00	91.52	7,399.4	-1,669.96	-653.1	3,314.0	3,354.9	0.00	0.00	0.00
9,800.0	90.00	91.52	7,399.4	-1,669.96	-655.7	3,414.0	3,454.7	0.00	0.00	0.00
9,900.0	90.00	91.52	7,399.4	-1,669.96	-658.4	3,513.9	3,554.6	0.00	0.00	0.00
10,000.0	90.00	91.52	7,399.4	-1,669.96	-661.0	3,613.9	3,654.5	0.00	0.00	0.00
10,100.0	90.00	91.52	7,399.4	-1,669.96	-663.7	3,713.9	3,754.3	0.00	0.00	0.00
10,200.0	90.00	91.52	7,399.4	-1,669.96	-666.3	3,813.8	3,854.2	0.00	0.00	0.00
10,300.0	90.00	91.52	7,399.4	-1,669.96	-669.0	3,913.8	3,954.1	0.00	0.00	0.00
10,400.0	90.00	91.52	7,399.4	-1,669.96	-671.6	4,013.8	4,053.9	0.00	0.00	0.00
10,500.0	90.00	91.52	7,399.4	-1,669.96	-674.3	4,113.7	4,153.8	0.00	0.00	0.00
10,600.0	90.00	91.52	7,399.4	-1,669.96	-676.9	4,213.7	4,253.7	0.00	0.00	0.00
10,700.0	90.00	91.52	7,399.4	-1,669.96	-679.6	4,313.6	4,353.5	0.00	0.00	0.00
10,800.0	90.00	91.52	7,399.4	-1,669.96	-682.2	4,413.6	4,453.4	0.00	0.00	0.00
10,900.0	90.00	91.52	7,399.4	-1,669.96	-684.9	4,513.6	4,553.3	0.00	0.00	0.00
11,000.0	90.00	91.52	7,399.4	-1,669.96	-687.5	4,613.5	4,653.1	0.00	0.00	0.00
11,100.0	90.00	91.52	7,399.4	-1,669.96	-690.2	4,713.5	4,753.0	0.00	0.00	0.00
11,200.0	90.00	91.52	7,399.4	-1,669.96	-692.8	4,813.5	4,852.9	0.00	0.00	0.00
11,300.0	90.00	91.52	7,399.4	-1,669.96	-695.5	4,913.4	4,952.7	0.00	0.00	0.00
11,400.0	90.00	91.52	7,399.4	-1,669.96	-698.1	5,013.4	5,052.6	0.00	0.00	0.00
11,500.0	90.00	91.52	7,399.4	-1,669.96	-700.8	5,113.4	5,152.5	0.00	0.00	0.00
11,600.0	90.00	91.52	7,399.4	-1,669.96	-703.4	5,213.3	5,252.3	0.00	0.00	0.00
11,700.0	90.00	91.52	7,399.4	-1,669.96	-706.1	5,313.3	5,352.2	0.00	0.00	0.00
11,800.0	90.00	91.52	7,399.4	-1,669.97	-708.7	5,413.3	5,452.1	0.00	0.00	0.00
11,900.0	90.00	91.52	7,399.4	-1,669.97	-711.3	5,513.2	5,551.9	0.00	0.00	0.00
12,000.0	90.00	91.52	7,399.4	-1,669.97	-714.0	5,613.2	5,651.8	0.00	0.00	0.00
12,100.0	90.00	91.52	7,399.4	-1,669.97	-716.6	5,713.2	5,751.7	0.00	0.00	0.00
12,200.0	90.00	91.52	7,399.4	-1,669.97	-719.3	5,813.1	5,851.5	0.00	0.00	0.00
12,300.0	90.00	91.52	7,399.4	-1,669.97	-721.9	5,913.1	5,951.4	0.00	0.00	0.00
12,400.0	90.00	91.52	7,399.4	-1,669.97	-724.6	6,013.1	6,051.3	0.00	0.00	0.00
12,500.0	90.00	91.52	7,399.4	-1,669.97	-727.2	6,113.0	6,151.1	0.00	0.00	0.00
12,600.0	90.00	91.52	7,399.4	-1,669.97	-729.9	6,213.0	6,251.0	0.00	0.00	0.00
12,700.0	90.00	91.52	7,399.4	-1,669.97	-732.5	6,312.9	6,350.9	0.00	0.00	0.00
12,800.0	90.00	91.52	7,399.4	-1,669.97	-735.1	6,412.9	6,450.7	0.00	0.00	0.00

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 23-24-8
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Site:</b>	SE NE SEC. 22 T4S R64W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-64 22A 23-24-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,900.0	90.00	91.52	7,399.4	-1,669.97	-737.8	6,512.9	6,550.6	0.00	0.00	0.00
13,000.0	90.00	91.51	7,399.4	-1,669.97	-740.4	6,612.8	6,650.5	0.00	0.00	0.00
13,100.0	90.00	91.51	7,399.4	-1,669.97	-743.1	6,712.8	6,750.3	0.00	0.00	0.00
13,200.0	90.00	91.51	7,399.4	-1,669.97	-745.7	6,812.8	6,850.2	0.00	0.00	0.00
13,300.0	90.00	91.51	7,399.4	-1,669.97	-748.4	6,912.7	6,950.1	0.00	0.00	0.00
13,400.0	90.00	91.51	7,399.4	-1,669.97	-751.0	7,012.7	7,049.9	0.00	0.00	0.00
13,500.0	90.00	91.51	7,399.4	-1,669.97	-753.7	7,112.7	7,149.8	0.00	0.00	0.00
13,600.0	90.00	91.51	7,399.4	-1,669.97	-756.3	7,212.6	7,249.7	0.00	0.00	0.00
13,700.0	90.00	91.51	7,399.4	-1,669.97	-758.9	7,312.6	7,349.5	0.00	0.00	0.00
13,800.0	90.00	91.51	7,399.4	-1,669.97	-761.6	7,412.6	7,449.4	0.00	0.00	0.00
13,900.0	90.00	91.51	7,399.4	-1,669.98	-764.2	7,512.5	7,549.3	0.00	0.00	0.00
14,000.0	90.00	91.51	7,399.4	-1,669.98	-766.9	7,612.5	7,649.1	0.00	0.00	0.00
14,100.0	90.00	91.51	7,399.4	-1,669.98	-769.5	7,712.5	7,749.0	0.00	0.00	0.00
14,200.0	90.00	91.51	7,399.4	-1,669.98	-772.1	7,812.4	7,848.9	0.00	0.00	0.00
14,300.0	90.00	91.51	7,399.4	-1,669.98	-774.8	7,912.4	7,948.7	0.00	0.00	0.00
14,400.0	90.00	91.51	7,399.4	-1,669.98	-777.4	8,012.4	8,048.6	0.00	0.00	0.00
14,500.0	90.00	91.51	7,399.4	-1,669.98	-780.1	8,112.3	8,148.5	0.00	0.00	0.00
14,600.0	90.00	91.51	7,399.4	-1,669.98	-782.7	8,212.3	8,248.3	0.00	0.00	0.00
14,700.0	90.00	91.51	7,399.4	-1,669.98	-785.4	8,312.2	8,348.2	0.00	0.00	0.00
14,800.0	90.00	91.51	7,399.4	-1,669.98	-788.0	8,412.2	8,448.1	0.00	0.00	0.00
14,900.0	90.00	91.51	7,399.4	-1,669.98	-790.6	8,512.2	8,547.9	0.00	0.00	0.00
15,000.0	90.00	91.51	7,399.4	-1,669.98	-793.3	8,612.1	8,647.8	0.00	0.00	0.00
15,100.0	90.00	91.51	7,399.4	-1,669.98	-795.9	8,712.1	8,747.7	0.00	0.00	0.00
15,200.0	90.00	91.51	7,399.4	-1,669.98	-798.6	8,812.1	8,847.5	0.00	0.00	0.00
15,300.0	90.00	91.51	7,399.4	-1,669.98	-801.2	8,912.0	8,947.4	0.00	0.00	0.00
15,400.0	90.00	91.51	7,399.4	-1,669.98	-803.8	9,012.0	9,047.3	0.00	0.00	0.00
15,500.0	90.00	91.51	7,399.4	-1,669.99	-806.5	9,112.0	9,147.1	0.00	0.00	0.00
15,600.0	90.00	91.51	7,399.4	-1,669.99	-809.1	9,211.9	9,247.0	0.00	0.00	0.00
15,700.0	90.00	91.51	7,399.4	-1,669.99	-811.8	9,311.9	9,346.9	0.00	0.00	0.00
15,800.0	90.00	91.51	7,399.4	-1,669.99	-814.4	9,411.9	9,446.7	0.00	0.00	0.00
15,900.0	90.00	91.51	7,399.4	-1,669.99	-817.0	9,511.8	9,546.6	0.00	0.00	0.00
16,000.0	90.00	91.51	7,399.4	-1,669.99	-819.7	9,611.8	9,646.5	0.00	0.00	0.00
16,100.0	90.00	91.51	7,399.4	-1,669.99	-822.3	9,711.8	9,746.3	0.00	0.00	0.00
16,200.0	90.00	91.51	7,399.4	-1,669.99	-825.0	9,811.7	9,846.2	0.00	0.00	0.00
16,300.0	90.00	91.51	7,399.4	-1,669.99	-827.6	9,911.7	9,946.0	0.00	0.00	0.00
16,400.0	90.00	91.51	7,399.4	-1,669.99	-830.2	10,011.7	10,045.9	0.00	0.00	0.00
16,500.0	90.00	91.51	7,399.4	-1,669.99	-832.9	10,111.6	10,145.8	0.00	0.00	0.00
16,600.0	90.00	91.51	7,399.4	-1,669.99	-835.5	10,211.6	10,245.6	0.00	0.00	0.00
16,700.0	90.00	91.51	7,399.4	-1,669.99	-838.1	10,311.6	10,345.5	0.00	0.00	0.00
16,800.0	90.00	91.51	7,399.4	-1,670.00	-840.8	10,411.5	10,445.4	0.00	0.00	0.00
16,900.0	90.00	91.51	7,399.4	-1,670.00	-843.4	10,511.5	10,545.2	0.00	0.00	0.00
17,000.0	90.00	91.51	7,399.4	-1,670.00	-846.1	10,611.4	10,645.1	0.00	0.00	0.00
17,100.0	90.00	91.51	7,399.4	-1,670.00	-848.7	10,711.4	10,745.0	0.00	0.00	0.00
17,200.0	90.00	91.51	7,399.4	-1,670.00	-851.3	10,811.4	10,844.8	0.00	0.00	0.00
<b>BHL: 2490ft FNL &amp; 460ft FEL of Sec 24</b>										
<b>17,289.8</b>	<b>90.00</b>	<b>91.51</b>	<b>7,399.4</b>	<b>-1,670.00</b>	<b>-853.7</b>	<b>10,901.1</b>	<b>10,934.5</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 23-24-8
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5729.4usft (Original Well Elev)
<b>Site:</b>	SE NE SEC. 22 T4S R64W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HOULIHAN 4-64 22A 23-24-8	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
316.6	316.4	DENVER			
808.1	801.4	UPPER ARAPAHOE			
1,104.6	1,091.4	LOWER ARAPAHOE			
1,671.0	1,645.4	LARAMIE - FOX HILLS			
1,877.5	1,847.4	PIERRE SHALE (BASE FOX HILLS			
5,364.5	5,259.4	SHANNON SANDSTONE MBR			
7,536.4	7,324.4	SHARON SPRINGS SHALE			
7,681.1	7,379.4	NIOBRARA FORMATION			
7,725.8	7,389.4	NIOBRARA A CHALK			

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.0	0.0	0.0	0.0	SHL: 1913ft FNL & 855ft FEL of Sec 22
100.0	100.0	0.0	0.0	START NUDGE (2°/100ft BUR)
700.0	695.7	-34.9	52.0	EOB TO 12° INC
5,167.8	5,065.7	-553.5	822.7	END OF TANGENT
5,767.8	5,661.4	-588.4	874.7	EOD TO VERTICAL
6,932.8	6,826.4	-588.4	874.7	KOP (10°/100ft BUR)
7,693.4	7,382.5	-599.9	1,309.5	BEGIN PROD INTERVAL
7,832.8	7,399.4	-603.6	1,447.5	HZ LP *NEW*: 2490ft FNL & 598ft FWL of Sec 23
17,289.8	7,399.4	-853.7	10,901.1	BHL: 2490ft FNL & 460ft FEL of Sec 24