

# **BISON EXPLORATION**

**ARAPAHOE COUNTY, COLORADO (NAD 83)  
SE NE SEC. 22 T4S R64W 6th P.M.  
HOULIHAN 4-64 22A 21-2**

**ORIGINAL WELLBORE**

**30 March, 2017**

**Plan: PROPOSAL #1**



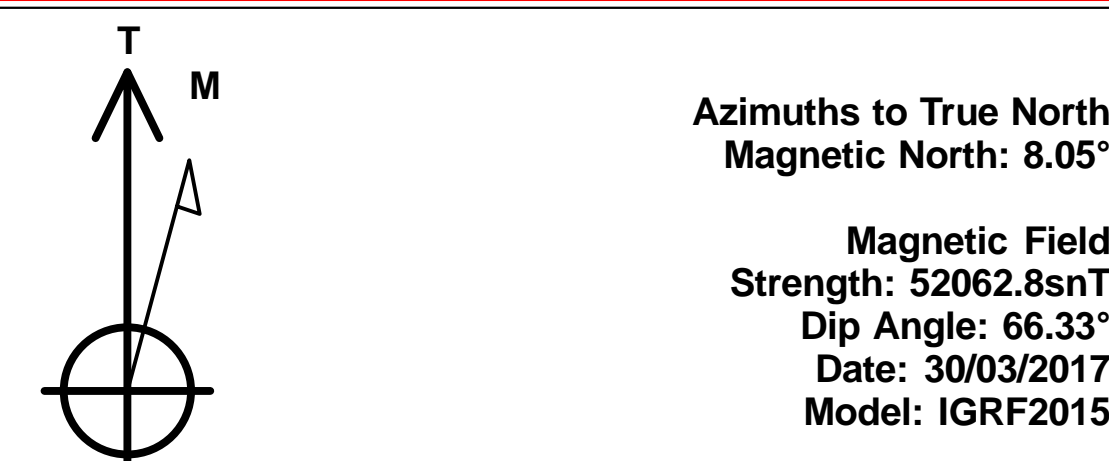
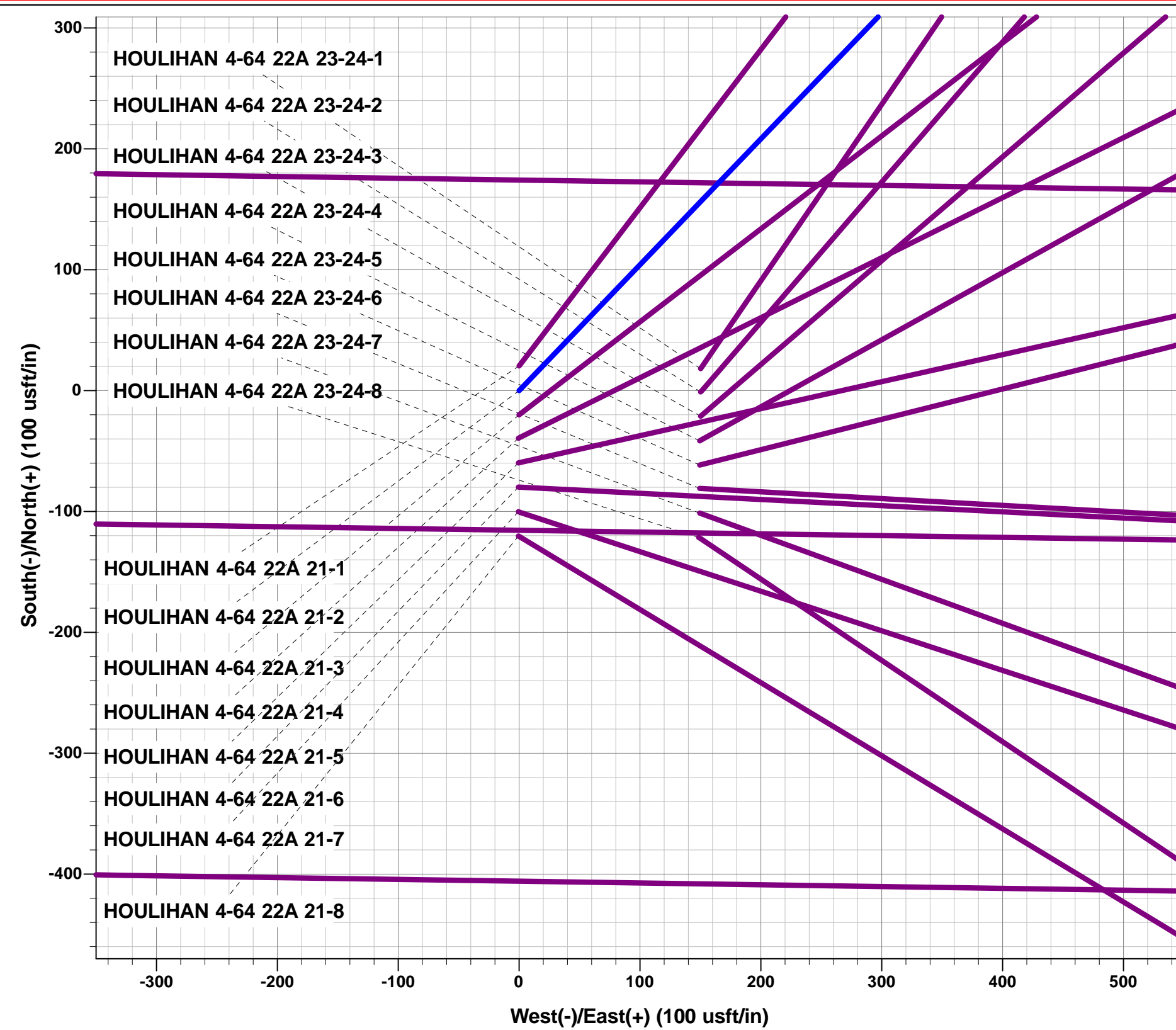
Project: ARAPAHOE COUNTY, COLORADO (NAD 83)  
Site: SE NE SEC. 22 T4S R64W 6th P.M.  
Well: HOULIHAN 4-64 22A 21-2  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #1

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: 1794ft FNL & 1005ft FEL of Sec 22
200.0	200.0	0.00	0.00	0.0	0.0	0.0	0.0	START NUDGE (2°/100ft BUR)
848.0	853.7	13.07	43.85	53.5	51.4	-44.1	74.2	EOB TO 13.07° INC
6359.0	6511.3	13.07	43.85	976.5	938.0	-804.2	1354.0	END OF TANGENT
7007.0	7164.9	0.00	0.00	1030.0	989.4	-848.3	1428.2	EOD TO VERTICAL
7037.0	7194.9	0.00	0.00	1030.0	989.4	-848.3	1428.2	KOP (10°/100ft BUR)
7593.1	7955.7	76.08	270.84	1036.4	554.4	-416.1	1863.3	BEGIN PROD INTERVAL
7610.0	8094.9	90.00	270.84	1038.4	416.5	-279.2	2001.2	HZ LP *NEW*: 750ft FNL & 597.9ft FEL of Sec 22
7610.0	17569.1	90.00	270.84	1177.5	-9056.7	9132.9	11475.4	BHL: 750ft FNL & 460ft FWL of Sec 21

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - HOULIHAN 4-64 22A 21-2	7037.0	1030.0	989.4	39.693189	-104.527690
BHL - HOULIHAN 4-64 21A 21-2	7610.0	1177.5	-9056.7	39.693589	-104.563389
HZ LP *NEW* - HOULIHAN 4-64 22A 21-2	7610.0	1038.4	416.5	39.693212	-104.529726

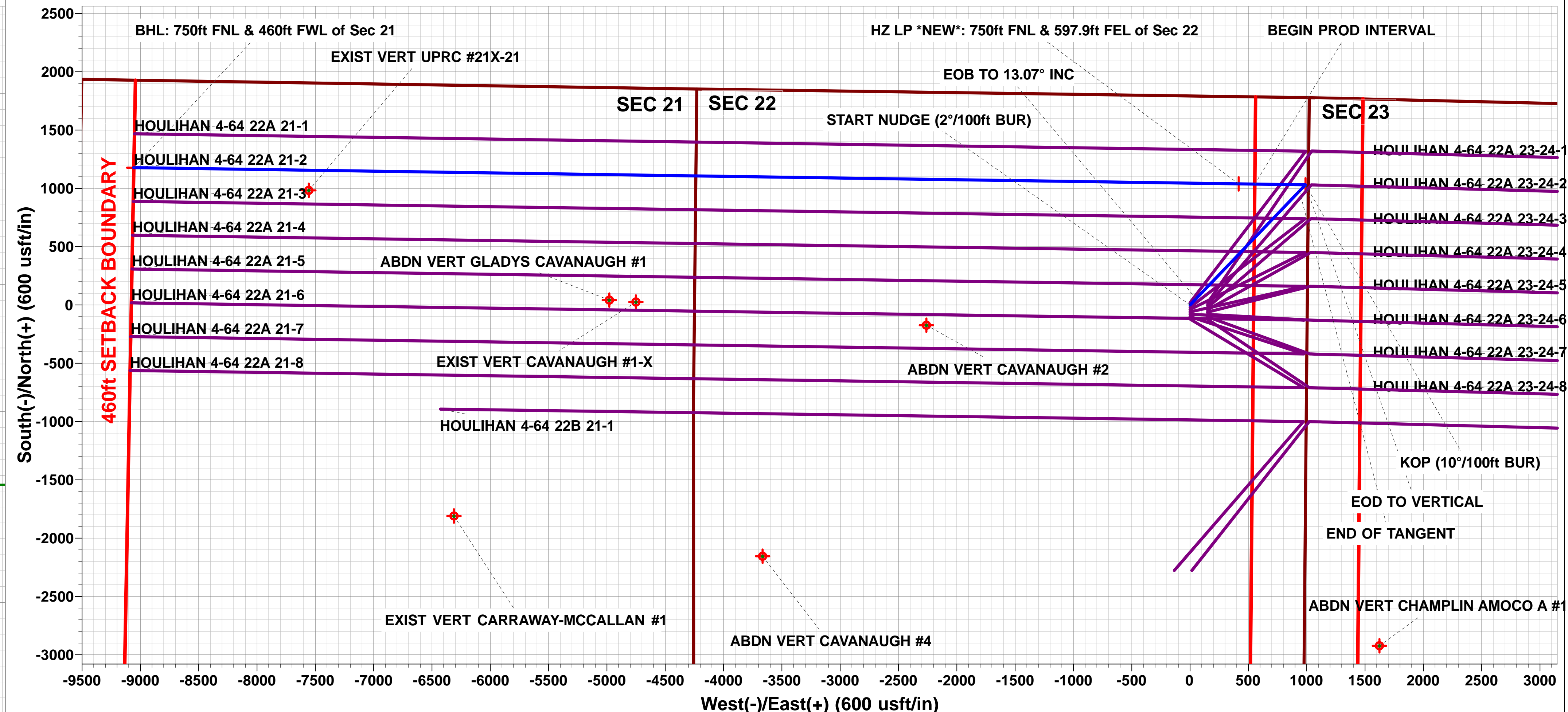
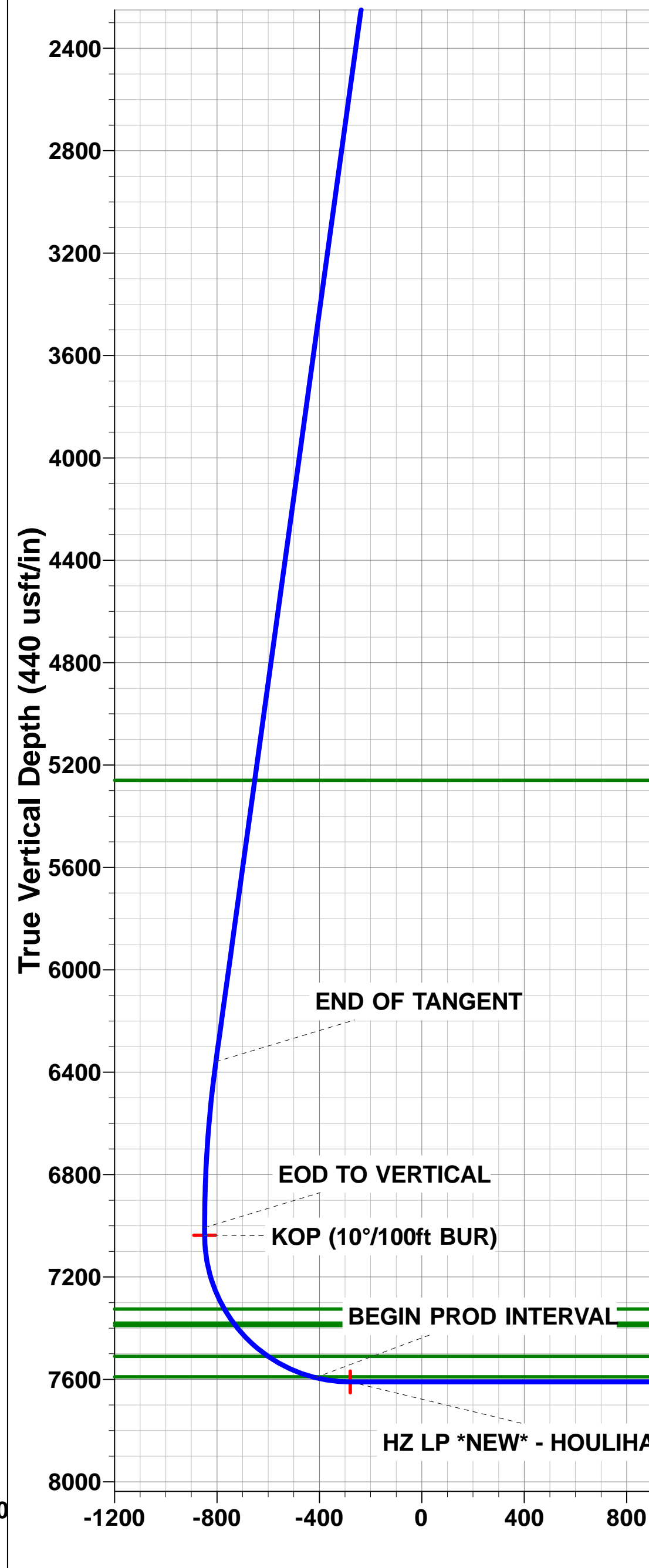
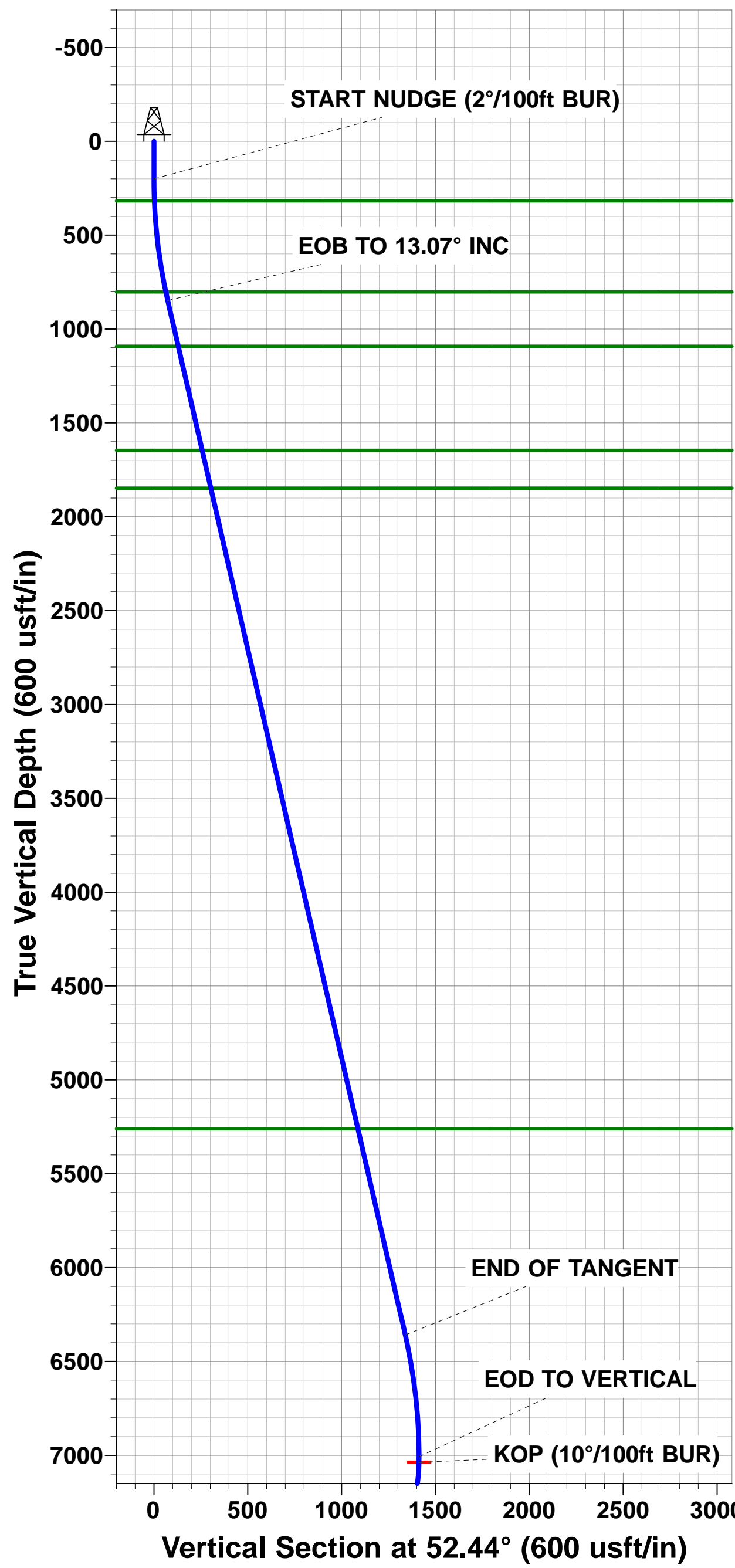


FORMATION TOP DETAILS

TVDPath	MDPath	Formation
317.0	317.0	DENVER
802.0	806.5	UPPER ARAPAHOE
1092.0	1104.1	LOWER ARAPAHOE
1646.0	1672.9	LARAMIE - FOX HILLS
1848.0	1880.3	PIERRE SHALE
5260.0	5383.0	SHANNON SANDSTONE MBR
7325.0	7496.7	SHARON SPRINGS SHALE
7380.0	7562.7	NIOBRARA FORMATION
7390.0	7575.3	NIOBRARA A CHALK
7510.0	7751.4	NIOBRARA B CHALK
7590.0	7943.3	NIOBRARA C CHALK

PROPOSED LOCAL COORDINATES:

SHL: 1794ft FNL & 1005ft FEL of Sec 22  
BEGIN PROD INT: 750ft FNL & 460ft FEL of Sec 22  
HZ LP: 750ft FNL & 597.9ft FEL of Sec 22  
BHL: 750ft FNL & 460ft FWL of Sec 21



# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 21-2
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5730.0usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5730.0usft (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 21-2	<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 21-2		
<b>Well Position</b>	<b>+N/-S</b>	-20.4 usft	<b>Northing:</b>
	<b>+E/-W</b>	0.0 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>
	7,610.0	0.0	0.0	277.41

<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	-5,730.0	0.0	0.0	0.00	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	-5,530.0	0.0	0.0	0.00	0.00	0.00	0.00	
853.7	13.07	43.85	848.0	-4,882.0	53.5	51.4	2.00	2.00	0.00	43.85	
6,511.3	13.07	43.85	6,359.0	629.0	976.5	938.0	0.00	0.00	0.00	0.00	
7,164.9	0.00	0.00	7,007.0	1,277.0	1,030.0	989.4	2.00	-2.00	0.00	180.00	
7,194.9	0.00	0.00	7,037.0	1,307.0	1,030.0	989.4	0.00	0.00	0.00	0.00	KOP - HOULIHAN 4
8,094.9	90.00	270.84	7,610.0	1,880.0	1,038.4	416.5	10.00	10.00	0.00	270.84	
17,569.1	90.00	270.84	7,610.0	1,880.0	1,177.5	-9,056.7	0.00	0.00	0.00	103.74	BHL - HOULIHAN 4

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<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5730.0usft (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 21-2	<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: 1794ft FNL &amp; 1005ft FEL of Sec 22</b>										
0.0	0.00	0.00	0.0	5,730.00	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	5,630.00	0.0	0.0	0.0	0.00	0.00	0.00
<b>START NUDGE (2°/100ft BUR)</b>										
200.0	0.00	0.00	200.0	5,530.00	0.0	0.0	0.0	0.00	0.00	0.00
300.0	2.00	43.85	300.0	5,430.02	1.3	1.2	-1.0	2.00	2.00	0.00
<b>DENVER</b>										
317.0	2.34	43.85	317.0	5,413.00	1.7	1.7	-1.4	2.00	2.00	0.00
400.0	4.00	43.85	399.8	5,330.16	5.0	4.8	-4.1	2.00	2.00	0.00
500.0	6.00	43.85	499.5	5,230.55	11.3	10.9	-9.3	2.00	2.00	0.00
600.0	8.00	43.85	598.7	5,131.30	20.1	19.3	-16.6	2.00	2.00	0.00
700.0	10.00	43.85	697.5	5,032.53	31.4	30.2	-25.9	2.00	2.00	0.00
800.0	12.00	43.85	795.6	4,934.38	45.1	43.4	-37.2	2.00	2.00	0.00
<b>UPPER ARAPAHOE</b>										
806.5	12.13	43.85	802.0	4,928.00	46.1	44.3	-38.0	2.00	2.00	0.00
<b>EOB TO 13.07° INC</b>										
853.7	13.07	43.85	848.0	4,882.00	53.5	51.4	-44.1	2.00	2.00	0.00
900.0	13.07	43.85	893.1	4,836.86	61.1	58.7	-50.3	0.00	0.00	0.00
1,000.0	13.07	43.85	990.6	4,739.45	77.4	74.4	-63.8	0.00	0.00	0.00
1,100.0	13.07	43.85	1,088.0	4,642.04	93.7	90.0	-77.2	0.00	0.00	0.00
<b>LOWER ARAPAHOE</b>										
1,104.1	13.07	43.85	1,092.0	4,638.00	94.4	90.7	-77.8	0.00	0.00	0.00
1,200.0	13.07	43.85	1,185.4	4,544.63	110.0	105.7	-90.6	0.00	0.00	0.00
1,300.0	13.07	43.85	1,282.8	4,447.23	126.4	121.4	-104.1	0.00	0.00	0.00
1,400.0	13.07	43.85	1,380.2	4,349.82	142.7	137.0	-117.5	0.00	0.00	0.00
1,500.0	13.07	43.85	1,477.6	4,252.41	159.0	152.7	-130.9	0.00	0.00	0.00
1,600.0	13.07	43.85	1,575.0	4,155.00	175.3	168.4	-144.4	0.00	0.00	0.00
<b>LARAMIE - FOX HILLS</b>										
1,672.9	13.07	43.85	1,646.0	4,084.00	187.2	179.8	-154.2	0.00	0.00	0.00
1,700.0	13.07	43.85	1,672.4	4,057.59	191.6	184.1	-157.8	0.00	0.00	0.00
1,800.0	13.07	43.85	1,769.8	3,960.18	207.9	199.7	-171.3	0.00	0.00	0.00
<b>PIERRE SHALE (BASE FOX HILLS)</b>										
1,880.3	13.07	43.85	1,848.0	3,882.00	221.0	212.3	-182.0	0.00	0.00	0.00
1,900.0	13.07	43.85	1,867.2	3,862.78	224.2	215.4	-184.7	0.00	0.00	0.00
2,000.0	13.07	43.85	1,964.6	3,765.37	240.5	231.1	-198.1	0.00	0.00	0.00
2,100.0	13.07	43.85	2,062.0	3,667.96	256.9	246.7	-211.6	0.00	0.00	0.00
2,200.0	13.07	43.85	2,159.4	3,570.55	273.2	262.4	-225.0	0.00	0.00	0.00
2,300.0	13.07	43.85	2,256.9	3,473.14	289.5	278.1	-238.4	0.00	0.00	0.00
2,400.0	13.07	43.85	2,354.3	3,375.73	305.8	293.7	-251.9	0.00	0.00	0.00
2,500.0	13.07	43.85	2,451.7	3,278.33	322.1	309.4	-265.3	0.00	0.00	0.00
2,600.0	13.07	43.85	2,549.1	3,180.92	338.4	325.1	-278.7	0.00	0.00	0.00
2,700.0	13.07	43.85	2,646.5	3,083.51	354.7	340.8	-292.2	0.00	0.00	0.00
2,800.0	13.07	43.85	2,743.9	2,986.10	371.0	356.4	-305.6	0.00	0.00	0.00
2,900.0	13.07	43.85	2,841.3	2,888.69	387.4	372.1	-319.0	0.00	0.00	0.00
3,000.0	13.07	43.85	2,938.7	2,791.29	403.7	387.8	-332.5	0.00	0.00	0.00
3,100.0	13.07	43.85	3,036.1	2,693.88	420.0	403.4	-345.9	0.00	0.00	0.00
3,200.0	13.07	43.85	3,133.5	2,596.47	436.3	419.1	-359.4	0.00	0.00	0.00
3,300.0	13.07	43.85	3,230.9	2,499.06	452.6	434.8	-372.8	0.00	0.00	0.00
3,400.0	13.07	43.85	3,328.3	2,401.65	468.9	450.4	-386.2	0.00	0.00	0.00
3,500.0	13.07	43.85	3,425.8	2,304.24	485.2	466.1	-399.7	0.00	0.00	0.00
3,600.0	13.07	43.85	3,523.2	2,206.84	501.5	481.8	-413.1	0.00	0.00	0.00
3,700.0	13.07	43.85	3,620.6	2,109.43	517.9	497.4	-426.5	0.00	0.00	0.00
3,800.0	13.07	43.85	3,718.0	2,012.02	534.2	513.1	-440.0	0.00	0.00	0.00



# Planning Report



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<b>Well:</b>	HOULIHAN 4-64 22A 21-2	<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)
3,900.0	13.07	43.85	3,815.4	1,914.61	550.5	528.8	-453.4	0.00	0.00	0.00
4,000.0	13.07	43.85	3,912.8	1,817.20	566.8	544.5	-466.8	0.00	0.00	0.00
4,100.0	13.07	43.85	4,010.2	1,719.79	583.1	560.1	-480.3	0.00	0.00	0.00
4,200.0	13.07	43.85	4,107.6	1,622.39	599.4	575.8	-493.7	0.00	0.00	0.00
4,300.0	13.07	43.85	4,205.0	1,524.98	615.7	591.5	-507.1	0.00	0.00	0.00
4,400.0	13.07	43.85	4,302.4	1,427.57	632.0	607.1	-520.6	0.00	0.00	0.00
4,500.0	13.07	43.85	4,399.8	1,330.16	648.4	622.8	-534.0	0.00	0.00	0.00
4,600.0	13.07	43.85	4,497.2	1,232.75	664.7	638.5	-547.5	0.00	0.00	0.00
4,700.0	13.07	43.85	4,594.7	1,135.35	681.0	654.1	-560.9	0.00	0.00	0.00
4,800.0	13.07	43.85	4,692.1	1,037.94	697.3	669.8	-574.3	0.00	0.00	0.00
4,900.0	13.07	43.85	4,789.5	940.53	713.6	685.5	-587.8	0.00	0.00	0.00
5,000.0	13.07	43.85	4,886.9	843.12	729.9	701.2	-601.2	0.00	0.00	0.00
5,100.0	13.07	43.85	4,984.3	745.71	746.2	716.8	-614.6	0.00	0.00	0.00
5,200.0	13.07	43.85	5,081.7	648.30	762.5	732.5	-628.1	0.00	0.00	0.00
5,300.0	13.07	43.85	5,179.1	550.90	778.9	748.2	-641.5	0.00	0.00	0.00
<b>SHANNON SANDSTONE MBR</b>										
5,383.0	13.07	43.85	5,260.0	470.00	792.4	761.2	-652.7	0.00	0.00	0.00
5,400.0	13.07	43.85	5,276.5	453.49	795.2	763.8	-654.9	0.00	0.00	0.00
5,500.0	13.07	43.85	5,373.9	356.08	811.5	779.5	-668.4	0.00	0.00	0.00
5,600.0	13.07	43.85	5,471.3	258.67	827.8	795.2	-681.8	0.00	0.00	0.00
5,700.0	13.07	43.85	5,568.7	161.26	844.1	810.8	-695.2	0.00	0.00	0.00
5,800.0	13.07	43.85	5,666.1	63.85	860.4	826.5	-708.7	0.00	0.00	0.00
5,900.0	13.07	43.85	5,763.6	-33.55	876.7	842.2	-722.1	0.00	0.00	0.00
6,000.0	13.07	43.85	5,861.0	-130.96	893.0	857.8	-735.6	0.00	0.00	0.00
6,100.0	13.07	43.85	5,958.4	-228.37	909.4	873.5	-749.0	0.00	0.00	0.00
6,200.0	13.07	43.85	6,055.8	-325.78	925.7	889.2	-762.4	0.00	0.00	0.00
6,300.0	13.07	43.85	6,153.2	-423.19	942.0	904.9	-775.9	0.00	0.00	0.00
6,400.0	13.07	43.85	6,250.6	-520.59	958.3	920.5	-789.3	0.00	0.00	0.00
6,500.0	13.07	43.85	6,348.0	-618.00	974.6	936.2	-802.7	0.00	0.00	0.00
<b>END OF TANGENT</b>										
6,511.3	13.07	43.85	6,359.0	-629.00	976.5	938.0	-804.2	0.00	0.00	0.00
6,600.0	11.30	43.85	6,445.7	-715.71	990.0	950.9	-815.4	2.00	-2.00	0.00
6,700.0	9.30	43.85	6,544.1	-814.09	1,002.8	963.3	-826.0	2.00	-2.00	0.00
6,800.0	7.30	43.85	6,643.0	-913.04	1,013.3	973.3	-834.6	2.00	-2.00	0.00
6,900.0	5.30	43.85	6,742.4	-1,012.43	1,021.2	980.9	-841.1	2.00	-2.00	0.00
7,000.0	3.30	43.85	6,842.1	-1,112.14	1,026.6	986.1	-845.5	2.00	-2.00	0.00
7,100.0	1.30	43.85	6,942.1	-1,212.06	1,029.5	988.9	-847.9	2.00	-2.00	0.00
<b>EOD TO VERTICAL</b>										
7,164.9	0.00	0.00	7,007.0	-1,277.00	1,030.0	989.4	-848.3	2.00	-2.00	0.00
<b>KOP (10°/100ft BUR)</b>										
7,194.9	0.00	0.00	7,037.0	-1,307.00	1,030.0	989.4	-848.3	0.00	0.00	0.00
7,200.0	0.51	270.84	7,042.1	-1,312.05	1,030.0	989.4	-848.3	10.00	10.00	0.00
7,300.0	10.51	270.84	7,141.5	-1,411.47	1,030.1	979.8	-838.8	10.00	10.00	0.00
7,400.0	20.51	270.84	7,237.7	-1,507.70	1,030.5	953.1	-812.3	10.00	10.00	0.00
<b>SHARON SPRINGS SHALE</b>										
7,496.7	30.18	270.84	7,325.0	-1,595.00	1,031.1	911.8	-771.2	10.00	10.00	0.00
7,500.0	30.51	270.84	7,327.8	-1,597.84	1,031.2	910.1	-769.6	10.00	10.00	0.00
<b>NIORRARA FORMATION</b>										
7,562.7	36.77	270.84	7,380.0	-1,650.00	1,031.7	875.4	-735.1	10.00	10.00	0.00
<b>NIORRARA A CHALK</b>										
7,575.3	38.03	270.84	7,390.0	-1,660.00	1,031.8	867.8	-727.5	10.00	10.00	0.00
7,600.0	40.51	270.84	7,409.1	-1,679.15	1,032.0	852.1	-711.9	10.00	10.00	0.00
7,700.0	50.51	270.84	7,479.1	-1,749.14	1,033.1	780.9	-641.2	10.00	10.00	0.00

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 21-2
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5730.0usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5730.0usft (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 21-2	<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>NIORARA B CHALK</b>										
7,751.4	55.64	270.84	7,510.0	-1,780.00	1,033.7	739.8	-600.4	10.00	10.00	0.00
7,800.0	60.51	270.84	7,535.7	-1,805.70	1,034.3	698.6	-559.4	10.00	10.00	0.00
7,900.0	70.51	270.84	7,577.1	-1,847.11	1,035.6	607.7	-469.1	10.00	10.00	0.00
<b>NIORARA C CHALK</b>										
7,943.3	74.83	270.84	7,590.0	-1,860.00	1,036.2	566.4	-428.1	10.00	10.00	0.00
<b>BEGIN PROD INTERVAL</b>										
7,955.7	76.08	270.84	7,593.1	-1,863.12	1,036.4	554.4	-416.1	10.00	10.00	0.00
8,000.0	80.51	270.84	7,602.1	-1,872.11	1,037.0	511.0	-373.0	10.00	10.00	0.00
<b>HZ LP *NEW*: 750ft FNL &amp; 597.9ft FEL of Sec 22</b>										
8,094.9	90.00	270.84	7,610.0	-1,879.96	1,038.4	416.5	-279.2	10.00	10.00	0.00
8,100.0	90.00	270.84	7,610.0	-1,879.96	1,038.5	411.5	-274.1	0.00	0.00	0.00
8,200.0	90.00	270.84	7,610.0	-1,879.96	1,039.9	311.5	-174.8	0.00	0.00	0.00
8,300.0	90.00	270.84	7,610.0	-1,879.96	1,041.4	211.5	-75.4	0.00	0.00	0.00
8,400.0	90.00	270.84	7,610.0	-1,879.96	1,042.9	111.5	23.9	0.00	0.00	0.00
8,500.0	90.00	270.84	7,610.0	-1,879.96	1,044.3	11.5	123.2	0.00	0.00	0.00
8,600.0	90.00	270.84	7,610.0	-1,879.96	1,045.8	-88.5	222.6	0.00	0.00	0.00
8,700.0	90.00	270.84	7,610.0	-1,879.96	1,047.3	-188.5	321.9	0.00	0.00	0.00
8,800.0	90.00	270.84	7,610.0	-1,879.96	1,048.7	-288.5	421.3	0.00	0.00	0.00
8,900.0	90.00	270.84	7,610.0	-1,879.96	1,050.2	-388.5	520.6	0.00	0.00	0.00
9,000.0	90.00	270.84	7,610.0	-1,879.96	1,051.7	-488.5	620.0	0.00	0.00	0.00
9,100.0	90.00	270.84	7,610.0	-1,879.96	1,053.1	-588.4	719.3	0.00	0.00	0.00
9,200.0	90.00	270.84	7,610.0	-1,879.96	1,054.6	-688.4	818.7	0.00	0.00	0.00
9,300.0	90.00	270.84	7,610.0	-1,879.96	1,056.1	-788.4	918.0	0.00	0.00	0.00
9,400.0	90.00	270.84	7,610.0	-1,879.96	1,057.5	-888.4	1,017.3	0.00	0.00	0.00
9,500.0	90.00	270.84	7,610.0	-1,879.96	1,059.0	-988.4	1,116.7	0.00	0.00	0.00
9,600.0	90.00	270.84	7,610.0	-1,879.96	1,060.5	-1,088.4	1,216.0	0.00	0.00	0.00
9,700.0	90.00	270.84	7,610.0	-1,879.96	1,061.9	-1,188.4	1,315.4	0.00	0.00	0.00
9,800.0	90.00	270.84	7,610.0	-1,879.96	1,063.4	-1,288.4	1,414.7	0.00	0.00	0.00
9,900.0	90.00	270.84	7,610.0	-1,879.96	1,064.9	-1,388.4	1,514.1	0.00	0.00	0.00
10,000.0	90.00	270.84	7,610.0	-1,879.96	1,066.3	-1,488.3	1,613.4	0.00	0.00	0.00
10,100.0	90.00	270.84	7,610.0	-1,879.96	1,067.8	-1,588.3	1,712.7	0.00	0.00	0.00
10,200.0	90.00	270.84	7,610.0	-1,879.96	1,069.3	-1,688.3	1,812.1	0.00	0.00	0.00
10,300.0	90.00	270.84	7,610.0	-1,879.96	1,070.7	-1,788.3	1,911.4	0.00	0.00	0.00
10,400.0	90.00	270.84	7,610.0	-1,879.96	1,072.2	-1,888.3	2,010.8	0.00	0.00	0.00
10,500.0	90.00	270.84	7,610.0	-1,879.96	1,073.7	-1,988.3	2,110.1	0.00	0.00	0.00
10,600.0	90.00	270.84	7,610.0	-1,879.96	1,075.1	-2,088.3	2,209.5	0.00	0.00	0.00
10,700.0	90.00	270.84	7,610.0	-1,879.96	1,076.6	-2,188.3	2,308.8	0.00	0.00	0.00
10,800.0	90.00	270.84	7,610.0	-1,879.96	1,078.1	-2,288.3	2,408.2	0.00	0.00	0.00
10,900.0	90.00	270.84	7,610.0	-1,879.96	1,079.5	-2,388.2	2,507.5	0.00	0.00	0.00
11,000.0	90.00	270.84	7,610.0	-1,879.96	1,081.0	-2,488.2	2,606.8	0.00	0.00	0.00
11,100.0	90.00	270.84	7,610.0	-1,879.96	1,082.5	-2,588.2	2,706.2	0.00	0.00	0.00
11,200.0	90.00	270.84	7,610.0	-1,879.96	1,083.9	-2,688.2	2,805.5	0.00	0.00	0.00
11,300.0	90.00	270.84	7,610.0	-1,879.96	1,085.4	-2,788.2	2,904.9	0.00	0.00	0.00
11,400.0	90.00	270.84	7,610.0	-1,879.96	1,086.9	-2,888.2	3,004.2	0.00	0.00	0.00
11,500.0	90.00	270.84	7,610.0	-1,879.96	1,088.3	-2,988.2	3,103.6	0.00	0.00	0.00
11,600.0	90.00	270.84	7,610.0	-1,879.96	1,089.8	-3,088.2	3,202.9	0.00	0.00	0.00
11,700.0	90.00	270.84	7,610.0	-1,879.96	1,091.3	-3,188.2	3,302.2	0.00	0.00	0.00
11,800.0	90.00	270.84	7,610.0	-1,879.96	1,092.7	-3,288.2	3,401.6	0.00	0.00	0.00
11,900.0	90.00	270.84	7,610.0	-1,879.96	1,094.2	-3,388.1	3,500.9	0.00	0.00	0.00
12,000.0	90.00	270.84	7,610.0	-1,879.96	1,095.7	-3,488.1	3,600.3	0.00	0.00	0.00
12,100.0	90.00	270.84	7,610.0	-1,879.97	1,097.1	-3,588.1	3,699.6	0.00	0.00	0.00
12,200.0	90.00	270.84	7,610.0	-1,879.97	1,098.6	-3,688.1	3,799.0	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 21-2
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5730.0usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5730.0usft (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 21-2	<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)
12,300.0	90.00	270.84	7,610.0	-1,879.97	1,100.1	-3,788.1	3,898.3	0.00	0.00	0.00
12,400.0	90.00	270.84	7,610.0	-1,879.97	1,101.5	-3,888.1	3,997.7	0.00	0.00	0.00
12,500.0	90.00	270.84	7,610.0	-1,879.97	1,103.0	-3,988.1	4,097.0	0.00	0.00	0.00
12,600.0	90.00	270.84	7,610.0	-1,879.97	1,104.5	-4,088.1	4,196.3	0.00	0.00	0.00
12,700.0	90.00	270.84	7,610.0	-1,879.97	1,106.0	-4,188.1	4,295.7	0.00	0.00	0.00
12,800.0	90.00	270.84	7,610.0	-1,879.97	1,107.4	-4,288.0	4,395.0	0.00	0.00	0.00
12,900.0	90.00	270.84	7,610.0	-1,879.97	1,108.9	-4,388.0	4,494.4	0.00	0.00	0.00
13,000.0	90.00	270.84	7,610.0	-1,879.97	1,110.4	-4,488.0	4,593.7	0.00	0.00	0.00
13,100.0	90.00	270.84	7,610.0	-1,879.97	1,111.8	-4,588.0	4,693.1	0.00	0.00	0.00
13,200.0	90.00	270.84	7,610.0	-1,879.97	1,113.3	-4,688.0	4,792.4	0.00	0.00	0.00
13,300.0	90.00	270.84	7,610.0	-1,879.97	1,114.8	-4,788.0	4,891.8	0.00	0.00	0.00
13,400.0	90.00	270.84	7,610.0	-1,879.97	1,116.2	-4,888.0	4,991.1	0.00	0.00	0.00
13,500.0	90.00	270.84	7,610.0	-1,879.97	1,117.7	-4,988.0	5,090.4	0.00	0.00	0.00
13,600.0	90.00	270.84	7,610.0	-1,879.97	1,119.2	-5,088.0	5,189.8	0.00	0.00	0.00
13,700.0	90.00	270.84	7,610.0	-1,879.97	1,120.6	-5,187.9	5,289.1	0.00	0.00	0.00
13,800.0	90.00	270.84	7,610.0	-1,879.97	1,122.1	-5,287.9	5,388.5	0.00	0.00	0.00
13,900.0	90.00	270.84	7,610.0	-1,879.97	1,123.6	-5,387.9	5,487.8	0.00	0.00	0.00
14,000.0	90.00	270.84	7,610.0	-1,879.97	1,125.0	-5,487.9	5,587.2	0.00	0.00	0.00
14,100.0	90.00	270.84	7,610.0	-1,879.97	1,126.5	-5,587.9	5,686.5	0.00	0.00	0.00
14,200.0	90.00	270.84	7,610.0	-1,879.98	1,128.0	-5,687.9	5,785.8	0.00	0.00	0.00
14,300.0	90.00	270.84	7,610.0	-1,879.98	1,129.4	-5,787.9	5,885.2	0.00	0.00	0.00
14,400.0	90.00	270.84	7,610.0	-1,879.98	1,130.9	-5,887.9	5,984.5	0.00	0.00	0.00
14,500.0	90.00	270.84	7,610.0	-1,879.98	1,132.4	-5,987.9	6,083.9	0.00	0.00	0.00
14,600.0	90.00	270.84	7,610.0	-1,879.98	1,133.8	-6,087.8	6,183.2	0.00	0.00	0.00
14,700.0	90.00	270.84	7,610.0	-1,879.98	1,135.3	-6,187.8	6,282.6	0.00	0.00	0.00
14,800.0	90.00	270.84	7,610.0	-1,879.98	1,136.8	-6,287.8	6,381.9	0.00	0.00	0.00
14,900.0	90.00	270.84	7,610.0	-1,879.98	1,138.3	-6,387.8	6,481.3	0.00	0.00	0.00
15,000.0	90.00	270.84	7,610.0	-1,879.98	1,139.7	-6,487.8	6,580.6	0.00	0.00	0.00
15,100.0	90.00	270.84	7,610.0	-1,879.98	1,141.2	-6,587.8	6,679.9	0.00	0.00	0.00
15,200.0	90.00	270.84	7,610.0	-1,879.98	1,142.7	-6,687.8	6,779.3	0.00	0.00	0.00
15,300.0	90.00	270.84	7,610.0	-1,879.98	1,144.1	-6,787.8	6,878.6	0.00	0.00	0.00
15,400.0	90.00	270.84	7,610.0	-1,879.98	1,145.6	-6,887.8	6,978.0	0.00	0.00	0.00
15,500.0	90.00	270.84	7,610.0	-1,879.98	1,147.1	-6,987.8	7,077.3	0.00	0.00	0.00
15,600.0	90.00	270.84	7,610.0	-1,879.98	1,148.5	-7,087.7	7,176.7	0.00	0.00	0.00
15,700.0	90.00	270.84	7,610.0	-1,879.98	1,150.0	-7,187.7	7,276.0	0.00	0.00	0.00
15,800.0	90.00	270.84	7,610.0	-1,879.99	1,151.5	-7,287.7	7,375.4	0.00	0.00	0.00
15,900.0	90.00	270.84	7,610.0	-1,879.99	1,152.9	-7,387.7	7,474.7	0.00	0.00	0.00
16,000.0	90.00	270.84	7,610.0	-1,879.99	1,154.4	-7,487.7	7,574.0	0.00	0.00	0.00
16,100.0	90.00	270.84	7,610.0	-1,879.99	1,155.9	-7,587.7	7,673.4	0.00	0.00	0.00
16,200.0	90.00	270.84	7,610.0	-1,879.99	1,157.3	-7,687.7	7,772.7	0.00	0.00	0.00
16,300.0	90.00	270.84	7,610.0	-1,879.99	1,158.8	-7,787.7	7,872.1	0.00	0.00	0.00
16,400.0	90.00	270.84	7,610.0	-1,879.99	1,160.3	-7,887.7	7,971.4	0.00	0.00	0.00
16,500.0	90.00	270.84	7,610.0	-1,879.99	1,161.8	-7,987.6	8,070.8	0.00	0.00	0.00
16,600.0	90.00	270.84	7,610.0	-1,879.99	1,163.2	-8,087.6	8,170.1	0.00	0.00	0.00
16,700.0	90.00	270.84	7,610.0	-1,879.99	1,164.7	-8,187.6	8,269.4	0.00	0.00	0.00
16,800.0	90.00	270.84	7,610.0	-1,879.99	1,166.2	-8,287.6	8,368.8	0.00	0.00	0.00
16,900.0	90.00	270.84	7,610.0	-1,879.99	1,167.6	-8,387.6	8,468.1	0.00	0.00	0.00
17,000.0	90.00	270.84	7,610.0	-1,880.00	1,169.1	-8,487.6	8,567.5	0.00	0.00	0.00
17,100.0	90.00	270.84	7,610.0	-1,880.00	1,170.6	-8,587.6	8,666.8	0.00	0.00	0.00
17,200.0	90.00	270.84	7,610.0	-1,880.00	1,172.0	-8,687.6	8,766.2	0.00	0.00	0.00
17,300.0	90.00	270.84	7,610.0	-1,880.00	1,173.5	-8,787.6	8,865.5	0.00	0.00	0.00
17,400.0	90.00	270.84	7,610.0	-1,880.00	1,175.0	-8,887.5	8,964.9	0.00	0.00	0.00
17,500.0	90.00	270.84	7,610.0	-1,880.00	1,176.5	-8,987.5	9,064.2	0.00	0.00	0.00
BHL: 750ft FNL & 460ft FWL of Sec 21										

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HOULIHAN 4-64 22A 21-2
<b>Company:</b>	BISON EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5730.0usft (Original Well Elev)
<b>Project:</b>	ARAPAHOE COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5730.0usft (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 21-2	<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)
17,569.1	90.00	270.84	7,610.0	-1,880.00	1,177.5	-9,056.7	9,132.9	0.00	0.00	0.00

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
317.0	317.0	DENVER				
806.5	802.0	UPPER ARAPAHOE				
1,104.1	1,092.0	LOWER ARAPAHOE				
1,672.9	1,646.0	LARAMIE - FOX HILLS				
1,880.3	1,848.0	PIERRE SHALE (BASE FOX HILLS				
5,383.0	5,260.0	SHANNON SANDSTONE MBR				
7,496.7	7,325.0	SHARON SPRINGS SHALE				
7,562.7	7,380.0	NIOBRARA FORMATION				
7,575.3	7,390.0	NIOBRARA A CHALK				
7,751.4	7,510.0	NIOBRARA B CHALK				
7,943.3	7,590.0	NIOBRARA C 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: 1794ft FNL & 1005ft FEL of Sec 22
200.0	200.0	0.0	0.0	START NUDGE (2°/100ft BUR)
853.7	848.0	53.5	51.4	EOB TO 13.07° INC
6,511.3	6,359.0	976.5	938.0	END OF TANGENT
7,164.9	7,007.0	1,030.0	989.4	EOD TO VERTICAL
7,194.9	7,037.0	1,030.0	989.4	KOP (10°/100ft BUR)
7,955.7	7,593.1	1,036.4	554.4	BEGIN PROD INTERVAL
8,094.9	7,610.0	1,038.4	416.5	HZ LP *NEW*: 750ft FNL & 597.9ft FEL of Sec 22
17,569.1	7,610.0	1,177.5	-9,056.7	BHL: 750ft FNL & 460ft FWL of Sec 21