

BISON EXPLORATION

**ARAPAHOE COUNTY, COLORADO (NAD 83)
SE NE SEC. 22 T4S R64W 6th P.M.
HOULIHAN 4-64 22A 23-24-7**

ORIGINAL WELLBORE

30 March, 2017

Plan: PROPOSAL #1



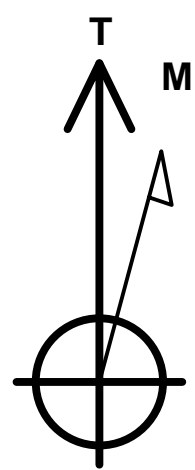
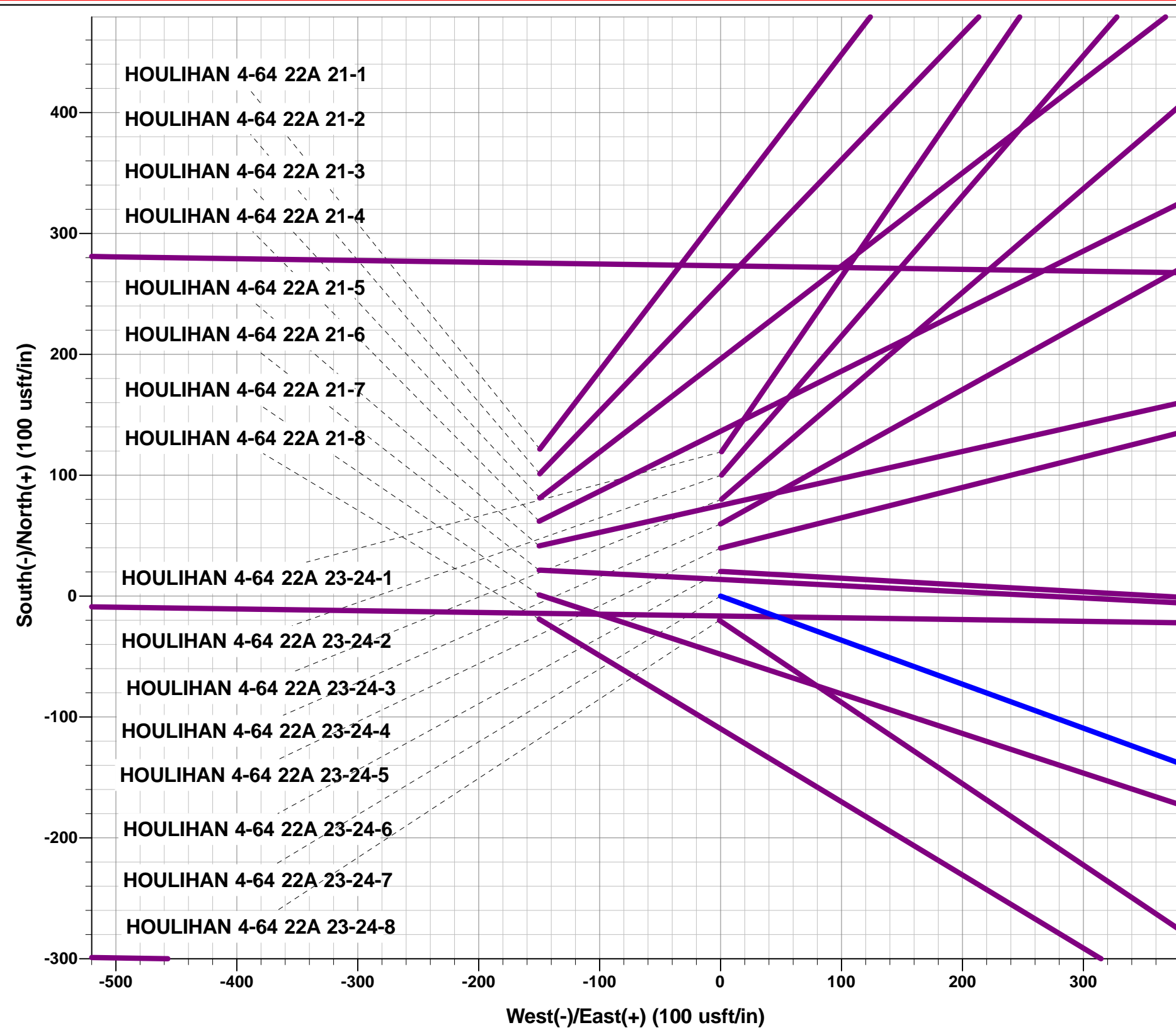
Project: ARAPAHOE COUNTY, COLORADO (NAD 83)
Site: SE NE SEC. 22 T4S R64W 6th P.M.
Well: HOULIHAN 4-64 22A 23-24-7
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

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: 1893ft FNL & 855ft 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)
795.6	800.0	12.00	110.00	-21.4	58.8	59.9	62.6	EOB TO 12° INC
4596.8	4686.1	12.00	110.00	-297.8	818.1	832.8	870.6	END OF TANGENT
5192.4	5286.1	0.00	0.00	-319.2	876.9	892.7	933.2	EOD TO VERTICAL
7037.4	7131.1	0.00	0.00	-319.2	876.9	892.7	933.2	KOP (10°/100ft BUR)
7593.5	7891.7	76.06	91.52	-330.7	1311.7	1327.5	1368.2	BEGIN PROD INTERVAL
7610.4	8031.1	90.00	91.52	-334.4	1449.7	1465.5	1506.1	HZ LP *NEW*: 2200ft FNL & 598ft FWL of Sec 23
7610.4	17489.4	90.00	91.51	-584.5	10904.6	10920.3	10964.4	BHL: 220ft FNL & 460ft FEL of Sec 24

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - HOULIHAN 4-64 22A 23-24-7	7037.4	-319.2	876.9	39.689207	-104.527559
BHL - HOULIHAN 4-64 22A 23-24-7	7610.4	-584.5	10904.6	39.688472	-104.491928
HZ LP *NEW* - HOULIHAN 4-64 22A 23-24-7	7610.4	-334.4	1449.7	39.689165	-104.525524



Azimuths to True North
Magnetic North: 8.05°

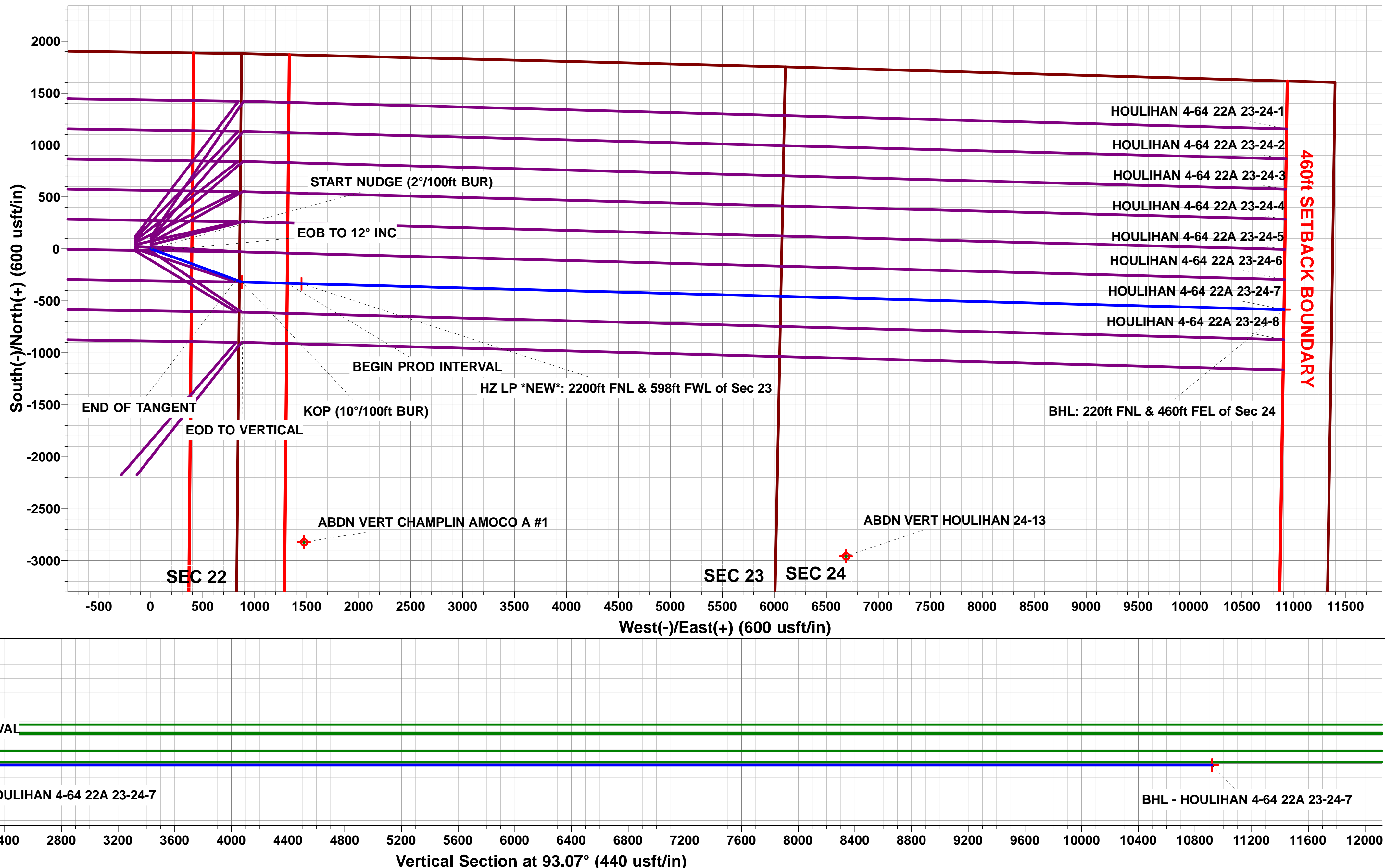
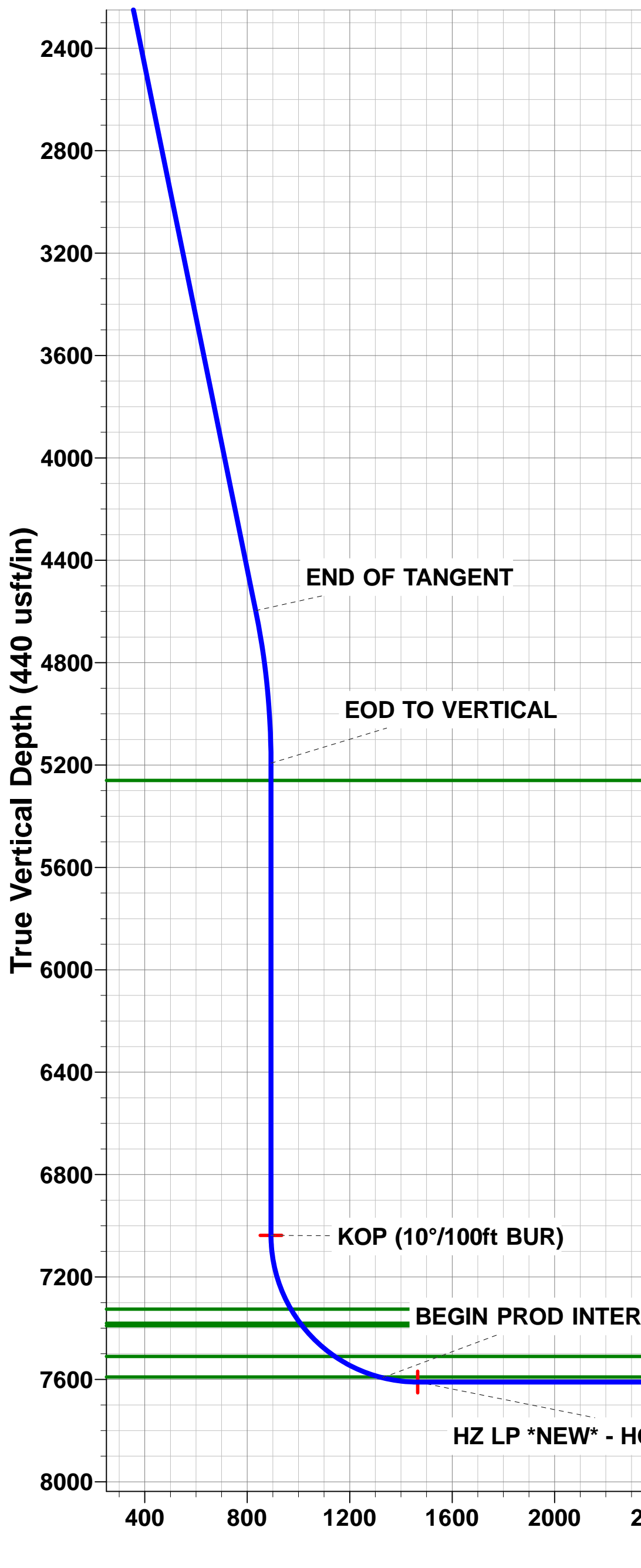
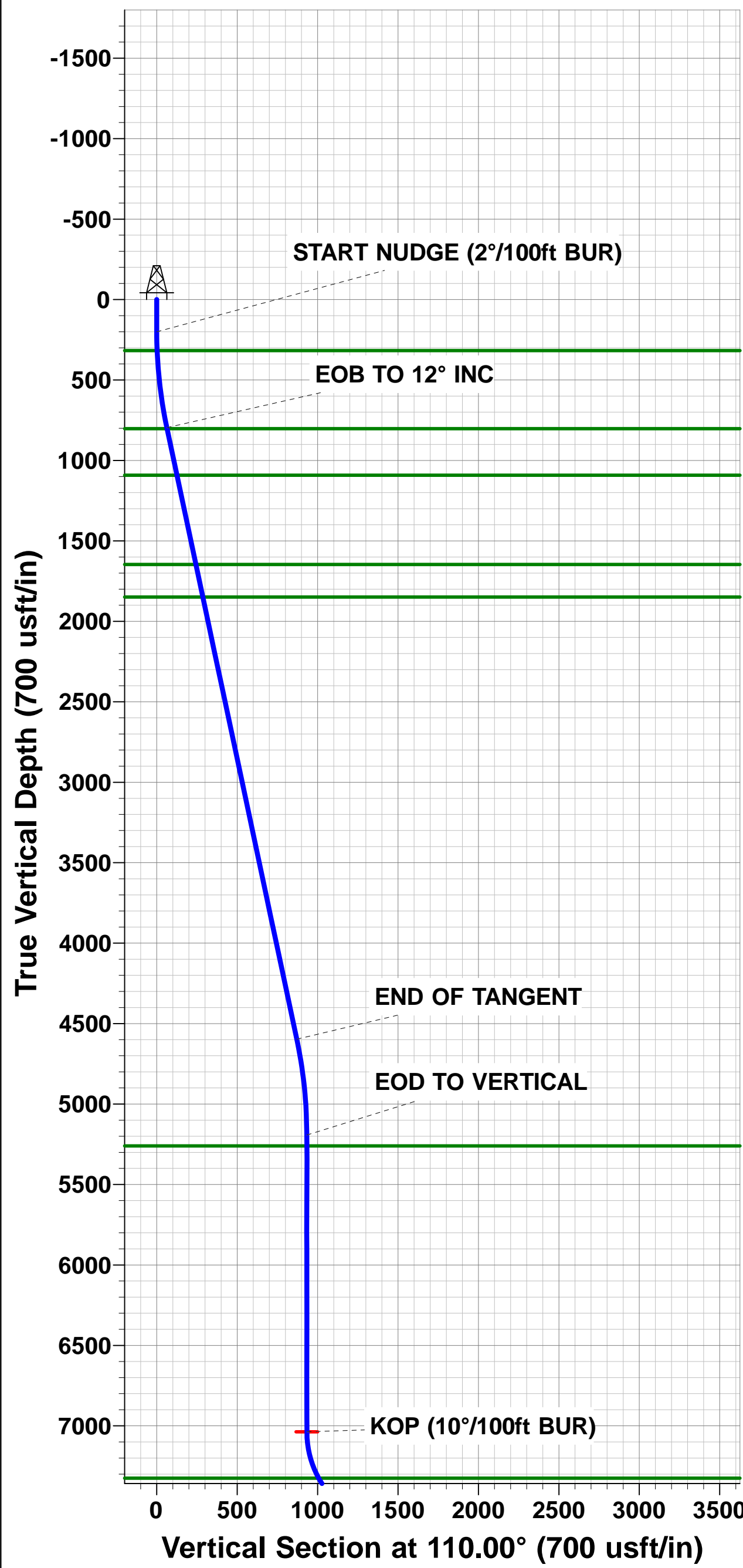
Magnetic Field
Strength: 52062.8snT
Dip Angle: 66.33°
Date: 30/03/2017
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
317.4	317.4	DENVER
802.4	806.9	UPPER ARAPAHOE
1092.4	1103.4	LOWER ARAPAHOE
1646.4	1669.8	LARAMIE - FOX HILLS
1848.4	1876.3	PIERRE SHALE
5260.4	5354.1	SHANNON SANDSTONE MBR
7325.4	7432.8	SHARON SPRINGS SHALE
7380.4	7498.8	NIOBRARA FORMATION
7390.4	7511.4	NIOBRARA A CHALK
7510.4	7687.5	NIOBRARA B CHALK
7590.4	7879.4	NIOBRARA C CHALK

PROPOSED LOCAL COORDINATES:

SHL: 1893ft FNL & 855ft FEL of Sec 22
BEGIN PROD INT: 2200ft FNL & 460ft FWL of Sec 23
HZ LP: 2200ft FNL & 598ft FWL of Sec 23
BHL: 2200ft FNL & 460ft FEL of Sec 24



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HOULIHAN 4-64 22A 23-24-7
Company:	BISON EXPLORATION	TVD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Project:	ARAPAHOE COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Site:	SE NE SEC. 22 T4S R64W 6th P.M.	North Reference:	True
Well:	HOULIHAN 4-64 22A 23-24-7	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

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

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

Well	HOULIHAN 4-64 22A 23-24-7		
Well Position	+N-S	-121.7 usft	Northing:
	+E-W	149.4 usft	Easting:
Position Uncertainty	0.0 usft		Wellhead Elevation:
			Latitude:
			Longitude:
			Ground Level:

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

Design	PROPOSAL #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)
	7,610.4	0.0	0.0	93.07

Plan Sections											
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	-5,730.4	0.0	0.0	0.00	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	-5,530.4	0.0	0.0	0.00	0.00	0.00	0.00	
800.0	12.00	110.00	795.6	-4,934.8	-21.4	58.8	2.00	2.00	0.00	110.00	
4,686.1	12.00	110.00	4,596.8	-1,133.6	-297.8	818.1	0.00	0.00	0.00	0.00	
5,286.1	0.00	0.00	5,192.4	-538.0	-319.2	876.9	2.00	-2.00	0.00	180.00	
7,131.1	0.00	0.00	7,037.4	1,307.0	-319.2	876.9	0.00	0.00	0.00	0.00	KOP - HOULIHAN 4
8,031.1	90.00	91.52	7,610.4	1,880.0	-334.4	1,449.7	10.00	10.00	0.00	91.52	
17,489.4	90.00	91.51	7,610.4	1,880.0	-584.5	10,904.6	0.00	0.00	0.00	-93.06	BHL - HOULIHAN 4

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Well:	HOULIHAN 4-64 22A 23-24-7	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)
SHL: 1893ft FNL & 855ft FEL of Sec 22										
0.0	0.00	0.00	0.0	5,730.40	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	5,630.40	0.0	0.0	0.0	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
200.0	0.00	0.00	200.0	5,530.40	0.0	0.0	0.0	0.00	0.00	0.00
300.0	2.00	110.00	300.0	5,430.42	-0.6	1.6	1.7	2.00	2.00	0.00
DENVER										
317.4	2.35	110.00	317.4	5,413.00	-0.8	2.3	2.3	2.00	2.00	0.00
400.0	4.00	110.00	399.8	5,330.56	-2.4	6.6	6.7	2.00	2.00	0.00
500.0	6.00	110.00	499.5	5,230.95	-5.4	14.7	15.0	2.00	2.00	0.00
600.0	8.00	110.00	598.7	5,131.70	-9.5	26.2	26.7	2.00	2.00	0.00
700.0	10.00	110.00	697.5	5,032.93	-14.9	40.9	41.6	2.00	2.00	0.00
EOB TO 12° INC										
800.0	12.00	110.00	795.6	4,934.76	-21.4	58.8	59.9	2.00	2.00	0.00
UPPER ARAPAHOE										
806.9	12.00	110.00	802.4	4,928.00	-21.9	60.2	61.3	0.00	0.00	0.00
900.0	12.00	110.00	893.4	4,836.96	-28.5	78.4	79.8	0.00	0.00	0.00
1,000.0	12.00	110.00	991.3	4,739.15	-35.6	97.9	99.7	0.00	0.00	0.00
1,100.0	12.00	110.00	1,089.1	4,641.33	-42.7	117.4	119.6	0.00	0.00	0.00
LOWER ARAPAHOE										
1,103.4	12.00	110.00	1,092.4	4,638.00	-43.0	118.1	120.2	0.00	0.00	0.00
1,200.0	12.00	110.00	1,186.9	4,543.52	-49.9	137.0	139.4	0.00	0.00	0.00
1,300.0	12.00	110.00	1,284.7	4,445.70	-57.0	156.5	159.3	0.00	0.00	0.00
1,400.0	12.00	110.00	1,382.5	4,347.89	-64.1	176.1	179.2	0.00	0.00	0.00
1,500.0	12.00	110.00	1,480.3	4,250.07	-71.2	195.6	199.1	0.00	0.00	0.00
1,600.0	12.00	110.00	1,578.1	4,152.26	-78.3	215.1	219.0	0.00	0.00	0.00
LARAMIE - FOX HILLS										
1,669.8	12.00	110.00	1,646.4	4,084.00	-83.3	228.8	232.9	0.00	0.00	0.00
1,700.0	12.00	110.00	1,676.0	4,054.45	-85.4	234.7	238.9	0.00	0.00	0.00
1,800.0	12.00	110.00	1,773.8	3,956.63	-92.5	254.2	258.8	0.00	0.00	0.00
PIERRE SHALE (BASE FOX HILLS)										
1,876.3	12.00	110.00	1,848.4	3,882.00	-98.0	269.1	274.0	0.00	0.00	0.00
1,900.0	12.00	110.00	1,871.6	3,858.82	-99.6	273.7	278.7	0.00	0.00	0.00
2,000.0	12.00	110.00	1,969.4	3,761.00	-106.8	293.3	298.6	0.00	0.00	0.00
2,100.0	12.00	110.00	2,067.2	3,663.19	-113.9	312.8	318.5	0.00	0.00	0.00
2,200.0	12.00	110.00	2,165.0	3,565.37	-121.0	332.4	338.4	0.00	0.00	0.00
2,300.0	12.00	110.00	2,262.8	3,467.56	-128.1	351.9	358.2	0.00	0.00	0.00
2,400.0	12.00	110.00	2,360.7	3,369.74	-135.2	371.4	378.1	0.00	0.00	0.00
2,500.0	12.00	110.00	2,458.5	3,271.93	-142.3	391.0	398.0	0.00	0.00	0.00
2,600.0	12.00	110.00	2,556.3	3,174.11	-149.4	410.5	417.9	0.00	0.00	0.00
2,700.0	12.00	110.00	2,654.1	3,076.30	-156.5	430.0	437.8	0.00	0.00	0.00
2,800.0	12.00	110.00	2,751.9	2,978.48	-163.7	449.6	457.7	0.00	0.00	0.00
2,900.0	12.00	110.00	2,849.7	2,880.67	-170.8	469.1	477.6	0.00	0.00	0.00
3,000.0	12.00	110.00	2,947.5	2,782.85	-177.9	488.7	497.5	0.00	0.00	0.00
3,100.0	12.00	110.00	3,045.4	2,685.04	-185.0	508.2	517.4	0.00	0.00	0.00
3,200.0	12.00	110.00	3,143.2	2,587.23	-192.1	527.7	537.3	0.00	0.00	0.00
3,300.0	12.00	110.00	3,241.0	2,489.41	-199.2	547.3	557.1	0.00	0.00	0.00
3,400.0	12.00	110.00	3,338.8	2,391.60	-206.3	566.8	577.0	0.00	0.00	0.00
3,500.0	12.00	110.00	3,436.6	2,293.78	-213.4	586.3	596.9	0.00	0.00	0.00
3,600.0	12.00	110.00	3,534.4	2,195.97	-220.5	605.9	616.8	0.00	0.00	0.00
3,700.0	12.00	110.00	3,632.2	2,098.15	-227.7	625.4	636.7	0.00	0.00	0.00
3,800.0	12.00	110.00	3,730.1	2,000.34	-234.8	645.0	656.6	0.00	0.00	0.00
3,900.0	12.00	110.00	3,827.9	1,902.52	-241.9	664.5	676.5	0.00	0.00	0.00

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Wellbore:	ORIGINAL WELLBORE		
Design:	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	110.00	3,925.7	1,804.71	-249.0	684.0	696.4	0.00	0.00	0.00
4,100.0	12.00	110.00	4,023.5	1,706.89	-256.1	703.6	716.3	0.00	0.00	0.00
4,200.0	12.00	110.00	4,121.3	1,609.08	-263.2	723.1	736.2	0.00	0.00	0.00
4,300.0	12.00	110.00	4,219.1	1,511.26	-270.3	742.6	756.0	0.00	0.00	0.00
4,400.0	12.00	110.00	4,316.9	1,413.45	-277.4	762.2	775.9	0.00	0.00	0.00
4,500.0	12.00	110.00	4,414.8	1,315.64	-284.6	781.7	795.8	0.00	0.00	0.00
4,600.0	12.00	110.00	4,512.6	1,217.82	-291.7	801.3	815.7	0.00	0.00	0.00
END OF TANGENT										
4,686.1	12.00	110.00	4,596.8	1,133.64	-297.8	818.1	832.8	0.00	0.00	0.00
4,700.0	11.72	110.00	4,610.4	1,120.00	-298.8	820.8	835.6	2.00	-2.00	0.00
4,800.0	9.72	110.00	4,708.7	1,021.75	-305.1	838.2	853.4	2.00	-2.00	0.00
4,900.0	7.72	110.00	4,807.5	922.91	-310.3	852.5	867.9	2.00	-2.00	0.00
5,000.0	5.72	110.00	4,906.8	823.60	-314.3	863.5	879.1	2.00	-2.00	0.00
5,100.0	3.72	110.00	5,006.5	723.95	-317.1	871.2	886.9	2.00	-2.00	0.00
5,200.0	1.72	110.00	5,106.3	624.07	-318.8	875.7	891.5	2.00	-2.00	0.00
EOD TO VERTICAL										
5,286.1	0.00	0.00	5,192.4	538.00	-319.2	876.9	892.7	2.00	-2.00	0.00
5,300.0	0.00	0.00	5,206.3	524.08	-319.2	876.9	892.7	0.00	0.00	0.00
SHANNON SANDSTONE MBR										
5,354.1	0.00	0.00	5,260.4	470.00	-319.2	876.9	892.7	0.00	0.00	0.00
5,400.0	0.00	0.00	5,306.3	424.08	-319.2	876.9	892.7	0.00	0.00	0.00
5,500.0	0.00	0.00	5,406.3	324.08	-319.2	876.9	892.7	0.00	0.00	0.00
5,600.0	0.00	0.00	5,506.3	224.08	-319.2	876.9	892.7	0.00	0.00	0.00
5,700.0	0.00	0.00	5,606.3	124.08	-319.2	876.9	892.7	0.00	0.00	0.00
5,800.0	0.00	0.00	5,706.3	24.08	-319.2	876.9	892.7	0.00	0.00	0.00
5,900.0	0.00	0.00	5,806.3	-75.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,000.0	0.00	0.00	5,906.3	-175.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,100.0	0.00	0.00	6,006.3	-275.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,200.0	0.00	0.00	6,106.3	-375.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,300.0	0.00	0.00	6,206.3	-475.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,400.0	0.00	0.00	6,306.3	-575.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,500.0	0.00	0.00	6,406.3	-675.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,600.0	0.00	0.00	6,506.3	-775.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,700.0	0.00	0.00	6,606.3	-875.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,800.0	0.00	0.00	6,706.3	-975.92	-319.2	876.9	892.7	0.00	0.00	0.00
6,900.0	0.00	0.00	6,806.3	-1,075.92	-319.2	876.9	892.7	0.00	0.00	0.00
7,000.0	0.00	0.00	6,906.3	-1,175.92	-319.2	876.9	892.7	0.00	0.00	0.00
7,100.0	0.00	0.00	7,006.3	-1,275.92	-319.2	876.9	892.7	0.00	0.00	0.00
KOP (10°/100ft BUR)										
7,131.1	0.00	0.00	7,037.4	-1,307.00	-319.2	876.9	892.7	0.00	0.00	0.00
7,200.0	6.89	91.52	7,106.2	-1,375.76	-319.3	881.0	896.9	10.00	10.00	0.00
7,300.0	16.89	91.52	7,203.9	-1,473.48	-319.9	901.6	917.4	10.00	10.00	0.00
7,400.0	26.89	91.52	7,296.6	-1,566.16	-320.8	938.8	954.7	10.00	10.00	0.00
SHARON SPRINGS SHALE										
7,432.8	30.18	91.52	7,325.4	-1,595.00	-321.3	954.5	970.3	10.00	10.00	0.00
NIORRARA FORMATION										
7,498.8	36.77	91.52	7,380.4	-1,650.00	-322.2	990.9	1,006.7	10.00	10.00	0.00
7,500.0	36.89	91.52	7,381.4	-1,650.95	-322.2	991.6	1,007.4	10.00	10.00	0.00
NIORRARA A CHALK										
7,511.4	38.03	91.52	7,390.4	-1,660.00	-322.4	998.5	1,014.3	10.00	10.00	0.00
7,600.0	46.89	91.52	7,455.7	-1,725.30	-324.0	1,058.2	1,074.1	10.00	10.00	0.00
NIORRARA B CHALK										
7,687.5	55.64	91.52	7,510.4	-1,780.00	-325.8	1,126.4	1,142.3	10.00	10.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HOULIHAN 4-64 22A 23-24-7
Company:	BISON EXPLORATION	TVD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Project:	ARAPAHOE COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Site:	SE NE SEC. 22 T4S R64W 6th P.M.	North Reference:	True
Well:	HOULIHAN 4-64 22A 23-24-7	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)
7,700.0	56.89	91.52	7,517.3	-1,786.93	-326.1	1,136.8	1,152.6	10.00	10.00	0.00
7,800.0	66.89	91.52	7,564.4	-1,833.99	-328.4	1,224.9	1,240.7	10.00	10.00	0.00
NIORARA C CHALK										
7,879.4	74.83	91.52	7,590.4	-1,860.00	-330.4	1,299.8	1,315.6	10.00	10.00	0.00
BEGIN PROD INTERVAL										
7,891.7	76.06	91.52	7,593.5	-1,863.09	-330.7	1,311.7	1,327.5	10.00	10.00	0.00
7,900.0	76.89	91.52	7,595.4	-1,865.03	-331.0	1,319.8	1,335.6	10.00	10.00	0.00
8,000.0	86.89	91.52	7,609.5	-1,879.12	-333.6	1,418.6	1,434.4	10.00	10.00	0.00
HZ LP *NEW*: 2200ft FNL & 598ft FWL of Sec 23										
8,031.1	90.00	91.52	7,610.4	-1,879.96	-334.4	1,449.7	1,465.5	10.00	10.00	0.00
8,100.0	90.00	91.52	7,610.4	-1,879.96	-336.2	1,518.6	1,534.4	0.00	0.00	0.00
8,200.0	90.00	91.52	7,610.4	-1,879.96	-338.9	1,618.5	1,634.3	0.00	0.00	0.00
8,300.0	90.00	91.52	7,610.4	-1,879.96	-341.5	1,718.5	1,734.3	0.00	0.00	0.00
8,400.0	90.00	91.52	7,610.4	-1,879.96	-344.2	1,818.4	1,834.3	0.00	0.00	0.00
8,500.0	90.00	91.52	7,610.4	-1,879.96	-346.8	1,918.4	1,934.2	0.00	0.00	0.00
8,600.0	90.00	91.52	7,610.4	-1,879.96	-349.5	2,018.4	2,034.2	0.00	0.00	0.00
8,700.0	90.00	91.52	7,610.4	-1,879.96	-352.1	2,118.3	2,134.2	0.00	0.00	0.00
8,800.0	90.00	91.52	7,610.4	-1,879.96	-354.8	2,218.3	2,234.1	0.00	0.00	0.00
8,900.0	90.00	91.52	7,610.4	-1,879.96	-357.4	2,318.3	2,334.1	0.00	0.00	0.00
9,000.0	90.00	91.52	7,610.4	-1,879.96	-360.1	2,418.2	2,434.0	0.00	0.00	0.00
9,100.0	90.00	91.52	7,610.4	-1,879.96	-362.7	2,518.2	2,534.0	0.00	0.00	0.00
9,200.0	90.00	91.52	7,610.4	-1,879.96	-365.4	2,618.2	2,634.0	0.00	0.00	0.00
9,300.0	90.00	91.52	7,610.4	-1,879.96	-368.0	2,718.1	2,733.9	0.00	0.00	0.00
9,400.0	90.00	91.52	7,610.4	-1,879.96	-370.7	2,818.1	2,833.9	0.00	0.00	0.00
9,500.0	90.00	91.52	7,610.4	-1,879.96	-373.3	2,918.1	2,933.9	0.00	0.00	0.00
9,600.0	90.00	91.52	7,610.4	-1,879.96	-376.0	3,018.0	3,033.8	0.00	0.00	0.00
9,700.0	90.00	91.52	7,610.4	-1,879.96	-378.6	3,118.0	3,133.8	0.00	0.00	0.00
9,800.0	90.00	91.52	7,610.4	-1,879.96	-381.3	3,218.0	3,233.8	0.00	0.00	0.00
9,900.0	90.00	91.52	7,610.4	-1,879.96	-383.9	3,317.9	3,333.7	0.00	0.00	0.00
10,000.0	90.00	91.52	7,610.4	-1,879.96	-386.6	3,417.9	3,433.7	0.00	0.00	0.00
10,100.0	90.00	91.52	7,610.4	-1,879.96	-389.2	3,517.9	3,533.6	0.00	0.00	0.00
10,200.0	90.00	91.52	7,610.4	-1,879.96	-391.9	3,617.8	3,633.6	0.00	0.00	0.00
10,300.0	90.00	91.52	7,610.4	-1,879.96	-394.5	3,717.8	3,733.6	0.00	0.00	0.00
10,400.0	90.00	91.52	7,610.4	-1,879.96	-397.2	3,817.7	3,833.5	0.00	0.00	0.00
10,500.0	90.00	91.52	7,610.4	-1,879.96	-399.8	3,917.7	3,933.5	0.00	0.00	0.00
10,600.0	90.00	91.52	7,610.4	-1,879.96	-402.5	4,017.7	4,033.5	0.00	0.00	0.00
10,700.0	90.00	91.52	7,610.4	-1,879.96	-405.1	4,117.6	4,133.4	0.00	0.00	0.00
10,800.0	90.00	91.52	7,610.4	-1,879.96	-407.8	4,217.6	4,233.4	0.00	0.00	0.00
10,900.0	90.00	91.52	7,610.4	-1,879.96	-410.4	4,317.6	4,333.3	0.00	0.00	0.00
11,000.0	90.00	91.52	7,610.4	-1,879.96	-413.1	4,417.5	4,433.3	0.00	0.00	0.00
11,100.0	90.00	91.52	7,610.4	-1,879.96	-415.7	4,517.5	4,533.3	0.00	0.00	0.00
11,200.0	90.00	91.52	7,610.4	-1,879.96	-418.4	4,617.5	4,633.2	0.00	0.00	0.00
11,300.0	90.00	91.52	7,610.4	-1,879.96	-421.0	4,717.4	4,733.2	0.00	0.00	0.00
11,400.0	90.00	91.52	7,610.4	-1,879.96	-423.7	4,817.4	4,833.2	0.00	0.00	0.00
11,500.0	90.00	91.52	7,610.4	-1,879.96	-426.3	4,917.4	4,933.1	0.00	0.00	0.00
11,600.0	90.00	91.52	7,610.4	-1,879.96	-429.0	5,017.3	5,033.1	0.00	0.00	0.00
11,700.0	90.00	91.52	7,610.4	-1,879.96	-431.6	5,117.3	5,133.1	0.00	0.00	0.00
11,800.0	90.00	91.52	7,610.4	-1,879.96	-434.2	5,217.3	5,233.0	0.00	0.00	0.00
11,900.0	90.00	91.52	7,610.4	-1,879.96	-436.9	5,317.2	5,333.0	0.00	0.00	0.00
12,000.0	90.00	91.52	7,610.4	-1,879.97	-439.5	5,417.2	5,432.9	0.00	0.00	0.00
12,100.0	90.00	91.52	7,610.4	-1,879.97	-442.2	5,517.1	5,532.9	0.00	0.00	0.00
12,200.0	90.00	91.52	7,610.4	-1,879.97	-444.8	5,617.1	5,632.9	0.00	0.00	0.00
12,300.0	90.00	91.52	7,610.4	-1,879.97	-447.5	5,717.1	5,732.8	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HOULIHAN 4-64 22A 23-24-7
Company:	BISON EXPLORATION	TVD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Project:	ARAPAHOE COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Site:	SE NE SEC. 22 T4S R64W 6th P.M.	North Reference:	True
Well:	HOULIHAN 4-64 22A 23-24-7	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)
12,400.0	90.00	91.52	7,610.4	-1,879.97	-450.1	5,817.0	5,832.8	0.00	0.00	0.00
12,500.0	90.00	91.52	7,610.4	-1,879.97	-452.8	5,917.0	5,932.8	0.00	0.00	0.00
12,600.0	90.00	91.52	7,610.4	-1,879.97	-455.4	6,017.0	6,032.7	0.00	0.00	0.00
12,700.0	90.00	91.52	7,610.4	-1,879.97	-458.1	6,116.9	6,132.7	0.00	0.00	0.00
12,800.0	90.00	91.52	7,610.4	-1,879.97	-460.7	6,216.9	6,232.7	0.00	0.00	0.00
12,900.0	90.00	91.52	7,610.4	-1,879.97	-463.3	6,316.9	6,332.6	0.00	0.00	0.00
13,000.0	90.00	91.51	7,610.4	-1,879.97	-466.0	6,416.8	6,432.6	0.00	0.00	0.00
13,100.0	90.00	91.51	7,610.4	-1,879.97	-468.6	6,516.8	6,532.5	0.00	0.00	0.00
13,200.0	90.00	91.51	7,610.4	-1,879.97	-471.3	6,616.8	6,632.5	0.00	0.00	0.00
13,300.0	90.00	91.51	7,610.4	-1,879.97	-473.9	6,716.7	6,732.5	0.00	0.00	0.00
13,400.0	90.00	91.51	7,610.4	-1,879.97	-476.6	6,816.7	6,832.4	0.00	0.00	0.00
13,500.0	90.00	91.51	7,610.4	-1,879.97	-479.2	6,916.7	6,932.4	0.00	0.00	0.00
13,600.0	90.00	91.51	7,610.4	-1,879.97	-481.8	7,016.6	7,032.4	0.00	0.00	0.00
13,700.0	90.00	91.51	7,610.4	-1,879.97	-484.5	7,116.6	7,132.3	0.00	0.00	0.00
13,800.0	90.00	91.51	7,610.4	-1,879.97	-487.1	7,216.6	7,232.3	0.00	0.00	0.00
13,900.0	90.00	91.51	7,610.4	-1,879.97	-489.8	7,316.5	7,332.2	0.00	0.00	0.00
14,000.0	90.00	91.51	7,610.4	-1,879.97	-492.4	7,416.5	7,432.2	0.00	0.00	0.00
14,100.0	90.00	91.51	7,610.4	-1,879.98	-495.1	7,516.5	7,532.2	0.00	0.00	0.00
14,200.0	90.00	91.51	7,610.4	-1,879.98	-497.7	7,616.4	7,632.1	0.00	0.00	0.00
14,300.0	90.00	91.51	7,610.4	-1,879.98	-500.3	7,716.4	7,732.1	0.00	0.00	0.00
14,400.0	90.00	91.51	7,610.4	-1,879.98	-503.0	7,816.3	7,832.1	0.00	0.00	0.00
14,500.0	90.00	91.51	7,610.4	-1,879.98	-505.6	7,916.3	7,932.0	0.00	0.00	0.00
14,600.0	90.00	91.51	7,610.4	-1,879.98	-508.3	8,016.3	8,032.0	0.00	0.00	0.00
14,700.0	90.00	91.51	7,610.4	-1,879.98	-510.9	8,116.2	8,132.0	0.00	0.00	0.00
14,800.0	90.00	91.51	7,610.4	-1,879.98	-513.5	8,216.2	8,231.9	0.00	0.00	0.00
14,900.0	90.00	91.51	7,610.4	-1,879.98	-516.2	8,316.2	8,331.9	0.00	0.00	0.00
15,000.0	90.00	91.51	7,610.4	-1,879.98	-518.8	8,416.1	8,431.8	0.00	0.00	0.00
15,100.0	90.00	91.51	7,610.4	-1,879.98	-521.5	8,516.1	8,531.8	0.00	0.00	0.00
15,200.0	90.00	91.51	7,610.4	-1,879.98	-524.1	8,616.1	8,631.8	0.00	0.00	0.00
15,300.0	90.00	91.51	7,610.4	-1,879.98	-526.7	8,716.0	8,731.7	0.00	0.00	0.00
15,400.0	90.00	91.51	7,610.4	-1,879.98	-529.4	8,816.0	8,831.7	0.00	0.00	0.00
15,500.0	90.00	91.51	7,610.4	-1,879.98	-532.0	8,916.0	8,931.7	0.00	0.00	0.00
15,600.0	90.00	91.51	7,610.4	-1,879.98	-534.7	9,015.9	9,031.6	0.00	0.00	0.00
15,700.0	90.00	91.51	7,610.4	-1,879.99	-537.3	9,115.9	9,131.6	0.00	0.00	0.00
15,800.0	90.00	91.51	7,610.4	-1,879.99	-539.9	9,215.9	9,231.5	0.00	0.00	0.00
15,900.0	90.00	91.51	7,610.4	-1,879.99	-542.6	9,315.8	9,331.5	0.00	0.00	0.00
16,000.0	90.00	91.51	7,610.4	-1,879.99	-545.2	9,415.8	9,431.5	0.00	0.00	0.00
16,100.0	90.00	91.51	7,610.4	-1,879.99	-547.9	9,515.8	9,531.4	0.00	0.00	0.00
16,200.0	90.00	91.51	7,610.4	-1,879.99	-550.5	9,615.7	9,631.4	0.00	0.00	0.00
16,300.0	90.00	91.51	7,610.4	-1,879.99	-553.1	9,715.7	9,731.4	0.00	0.00	0.00
16,400.0	90.00	91.51	7,610.4	-1,879.99	-555.8	9,815.6	9,831.3	0.00	0.00	0.00
16,500.0	90.00	91.51	7,610.4	-1,879.99	-558.4	9,915.6	9,931.3	0.00	0.00	0.00
16,600.0	90.00	91.51	7,610.4	-1,879.99	-561.0	10,015.6	10,031.3	0.00	0.00	0.00
16,700.0	90.00	91.51	7,610.4	-1,879.99	-563.7	10,115.5	10,131.2	0.00	0.00	0.00
16,800.0	90.00	91.51	7,610.4	-1,879.99	-566.3	10,215.5	10,231.2	0.00	0.00	0.00
16,900.0	90.00	91.51	7,610.4	-1,879.99	-569.0	10,315.5	10,331.1	0.00	0.00	0.00
17,000.0	90.00	91.51	7,610.4	-1,880.00	-571.6	10,415.4	10,431.1	0.00	0.00	0.00
17,100.0	90.00	91.51	7,610.4	-1,880.00	-574.2	10,515.4	10,531.1	0.00	0.00	0.00
17,200.0	90.00	91.51	7,610.4	-1,880.00	-576.9	10,615.4	10,631.0	0.00	0.00	0.00
17,300.0	90.00	91.51	7,610.4	-1,880.00	-579.5	10,715.3	10,731.0	0.00	0.00	0.00
17,400.0	90.00	91.51	7,610.4	-1,880.00	-582.1	10,815.3	10,831.0	0.00	0.00	0.00
BHL: 220ft FNL & 460ft FEL of Sec 24										
17,489.4	90.00	91.51	7,610.4	-1,880.00	-584.5	10,904.6	10,920.3	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HOULIHAN 4-64 22A 23-24-7
Company:	BISON EXPLORATION	TVD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Project:	ARAPAHOE COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5730.4usft (Original Well Elev)
Site:	SE NE SEC. 22 T4S R64W 6th P.M.	North Reference:	True
Well:	HOULIHAN 4-64 22A 23-24-7	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
317.4	317.4	DENVER			
806.9	802.4	UPPER ARAPAHOE			
1,103.4	1,092.4	LOWER ARAPAHOE			
1,669.8	1,646.4	LARAMIE - FOX HILLS			
1,876.3	1,848.4	PIERRE SHALE (BASE FOX HILLS			
5,354.1	5,260.4	SHANNON SANDSTONE MBR			
7,432.8	7,325.4	SHARON SPRINGS SHALE			
7,498.8	7,380.4	NIOBRARA FORMATION			
7,511.4	7,390.4	NIOBRARA A CHALK			
7,687.5	7,510.4	NIOBRARA B CHALK			
7,879.4	7,590.4	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: 1893ft FNL & 855ft FEL of Sec 22
200.0	200.0	0.0	0.0	START NUDGE (2°/100ft BUR)
800.0	795.6	-21.4	58.8	EOB TO 12° INC
4,686.1	4,596.8	-297.8	818.1	END OF TANGENT
5,286.1	5,192.4	-319.2	876.9	EOD TO VERTICAL
7,131.1	7,037.4	-319.2	876.9	KOP (10°/100ft BUR)
7,891.7	7,593.5	-330.7	1,311.7	BEGIN PROD INTERVAL
8,031.1	7,610.4	-334.4	1,449.7	HZ LP *NEW*: 2200ft FNL & 598ft FWL of Sec 23
17,489.4	7,610.4	-584.5	10,904.6	BHL: 220ft FNL & 460ft FEL of Sec 24