

**PHOENIX**  
TECHNOLOGY SERVICES



## **XTO**

**Harrison County, WV  
Bogess A PAD  
North Unit 7H**

**Main Wellbore**

**Design: 7H AS Drilled Surveys**

# **Standard Survey Report**

**18 May, 2015**





PHX  
Survey Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well North Unit 7H
<b>Company:</b>	XTO	<b>TVD Reference:</b>	K8@23 @ 1205.0usft
<b>Project:</b>	Harrison County, WV	<b>MD Reference:</b>	K8@23 @ 1205.0usft
<b>Site:</b>	Bogges A PAD	<b>North Reference:</b>	True
<b>Well:</b>	North Unit 7H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Main Wellbore		
<b>Design:</b>	7H AS Drilled Surveys		

<b>Project</b>	Harrison County, WV		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	West Virginia North 4701		

<b>Site</b>	Bogges A PAD		
<b>Site Position:</b>		<b>Northing:</b>	320,323.00 usft
<b>From:</b>	Map	<b>Easting:</b>	1,749,542.00 usft
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "
		<b>Latitude:</b>	39.38
		<b>Longitude:</b>	-80.39
		<b>Grid Convergence:</b>	-0.57 °

<b>Well</b>	North Unit 7H		
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b> 320,323.00 usft
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b> 1,749,542.00 usft
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b>	0.0 usft
		<b>Latitude:</b>	39° 22' 33.907 N
		<b>Longitude:</b>	80° 23' 9.591 W
		<b>Ground Level:</b>	1,183.0 usft

<b>Wellbore</b>	Main Wellbore				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	4/21/2015	-8.98	66.80	52,519

<b>Design</b>	7H AS Drilled Surveys		
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**Audit Notes:**

<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<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>	
	0.0	0.0	0.0	307.40	

<b>Survey Program</b>	<b>Date</b>	5/18/2015			
<b>From (')</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
0.00	4,959.0	Bogges A North Unit 7H Gyro (Main Wellb)	Javins Gyros	Surface Read Out Inertial Gyroscope	
0.00	13,166.0	PHX MWD Surveys (Main Wellbore)	PHX+MWD+HDGM	PHX+OWSG MWD + HDGM	

<b>Survey</b>											
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>Subsea Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.0	0.00	0.00	0.0	-1,205.0	0.0	0.0	0.0	0.00	0.00	0.00	
59.0	0.73	31.20	59.0	-1,146.0	0.3	0.2	0.0	1.24	1.24	0.00	
109.0	0.78	34.60	109.0	-1,096.0	0.9	0.6	0.1	0.13	0.10	6.80	
159.0	0.91	30.70	159.0	-1,046.0	1.5	0.9	0.2	0.28	0.26	-7.80	
209.0	0.59	4.20	209.0	-996.0	2.1	1.2	0.3	0.93	-0.64	-53.00	
259.0	0.53	351.90	259.0	-946.0	2.6	1.2	0.6	0.27	-0.12	-24.60	
309.0	0.35	323.50	309.0	-896.0	2.9	1.0	1.0	0.56	-0.36	-56.80	
359.0	0.33	311.10	359.0	-846.0	3.1	0.8	1.2	0.15	-0.04	-24.80	





**PHX**  
Survey Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well North Unit 7H
Company:	XTO	TVD Reference:	KB@23 @ 1205.0usft
Project:	Harrison County, WV	MD Reference:	KB@23 @ 1205.0usft
Site:	Bogges A PAD	North Reference:	True
Well:	North Unit 7H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	7HAS Drilled Surveys		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
409.0	0.31	296.20	409.0	-796.0	3.3	0.6	1.5	0.17	-0.04	-29.80
459.0	0.33	313.30	459.0	-746.0	3.5	0.4	1.8	0.19	0.04	34.20
509.0	0.33	322.30	509.0	-696.0	3.7	0.2	2.1	0.10	0.00	18.00
559.0	0.35	328.90	559.0	-646.0	3.9	0.0	2.4	0.09	0.04	13.20
609.0	0.33	337.30	609.0	-596.0	4.2	-0.1	2.6	0.11	-0.04	16.80
659.0	0.17	232.60	659.0	-546.0	4.3	-0.2	2.8	0.82	-0.32	-209.40
709.0	0.20	200.70	709.0	-496.0	4.1	-0.3	2.8	0.21	0.06	-63.80
759.0	0.43	168.40	759.0	-446.0	3.9	-0.3	2.6	0.56	0.46	-64.60
809.0	0.48	173.60	809.0	-396.0	3.5	-0.3	2.3	0.13	0.10	10.40
859.0	0.50	161.00	859.0	-346.0	3.1	-0.2	2.0	0.22	0.04	-25.20
909.0	0.49	176.50	909.0	-296.0	2.7	-0.1	1.7	0.27	-0.02	31.00
959.0	0.33	173.60	959.0	-246.0	2.3	0.0	1.4	0.32	-0.32	-5.80
1,009.0	0.36	175.60	1,009.0	-196.0	2.0	0.0	1.2	0.06	0.06	4.00
1,059.0	0.67	158.80	1,059.0	-146.0	1.6	0.1	0.9	0.68	0.82	-33.60
1,109.0	0.70	147.60	1,109.0	-96.0	1.0	0.4	0.3	0.27	0.06	-22.40
1,159.0	0.65	102.30	1,159.0	-46.0	0.7	0.8	-0.2	1.04	-0.10	-90.60
1,209.0	0.52	71.50	1,209.0	4.0	0.7	1.3	-0.6	0.67	-0.26	-61.60
1,259.0	0.54	59.90	1,259.0	54.0	0.9	1.7	-0.8	0.22	0.04	-23.20
1,309.0	0.37	2.40	1,309.0	104.0	1.2	1.9	-0.8	0.92	-0.34	-115.00
1,359.0	0.41	335.50	1,359.0	154.0	1.5	1.9	-0.6	0.37	0.08	-53.80
1,409.0	0.34	334.50	1,408.9	203.9	1.8	1.7	-0.3	0.14	-0.14	-2.00
1,459.0	0.43	326.30	1,458.9	253.9	2.1	1.6	0.0	0.21	0.18	-16.40
1,509.0	0.38	322.60	1,508.9	303.9	2.4	1.4	0.4	0.11	-0.10	-7.40
1,559.0	0.45	312.60	1,558.9	353.9	2.7	1.1	0.7	0.20	0.14	-20.00
1,609.0	0.45	307.30	1,608.9	403.9	2.9	0.8	1.1	0.08	0.00	-10.60
1,659.0	0.43	290.10	1,658.9	453.9	3.1	0.5	1.5	0.27	-0.04	-34.40
1,709.0	0.45	261.00	1,708.9	503.9	3.1	0.1	1.8	0.44	0.04	-58.20
1,759.0	0.43	226.70	1,758.9	553.9	3.0	-0.2	2.0	0.52	-0.04	-68.60
1,809.0	0.43	212.60	1,808.9	603.9	2.7	-0.5	2.0	0.21	0.00	-28.20
1,859.0	0.43	197.40	1,858.9	653.9	2.3	-0.6	1.9	0.23	0.00	-30.40
1,909.0	0.38	50.60	1,908.9	703.9	2.3	-0.5	1.8	1.55	-0.10	-293.60
1,959.0	0.47	21.50	1,958.9	753.9	2.6	-0.3	1.8	0.46	0.18	-58.20
2,009.0	0.52	328.80	2,008.9	803.9	3.0	-0.4	2.1	0.88	0.10	-105.40
2,059.0	0.53	276.10	2,058.9	853.9	3.2	-0.7	2.5	0.93	0.02	-105.40
2,109.0	0.51	246.10	2,108.9	903.9	3.1	-1.2	2.8	0.54	-0.04	-60.00
2,159.0	0.49	238.30	2,158.9	953.9	2.9	-1.6	3.0	0.14	-0.04	-15.60
2,209.0	0.36	182.90	2,208.9	1,003.9	2.6	-1.7	3.0	0.82	-0.26	-110.80
2,259.0	0.35	175.70	2,258.9	1,053.9	2.3	-1.7	2.8	0.09	-0.02	-14.40
2,309.0	0.32	77.50	2,308.9	1,103.9	2.2	-1.6	2.6	1.01	-0.06	-196.40
2,359.0	0.43	13.50	2,358.9	1,153.9	2.4	-1.4	2.6	0.82	0.22	-128.00
2,409.0	0.47	2.70	2,408.9	1,203.9	2.8	-1.4	2.8	0.19	0.08	-21.60
2,459.0	0.52	330.20	2,458.9	1,253.9	3.2	-1.5	3.1	0.56	0.10	-65.00



**PHX**  
Survey Report



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Project:	Harrison County, WV	MD Reference:	KB@23 @ 1205.0usft
Site:	Bogges A PAD	North Reference:	True
Well:	North Unit 7H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	7H AS Drilled Surveys		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,509.0	0.55	334.30	2,508.9	1,303.9	3.6	-1.7	3.5	0.10	0.06	8.20
2,559.0	0.55	329.70	2,558.9	1,353.9	4.0	-1.9	4.0	0.09	0.00	-9.20
2,609.0	0.55	323.00	2,608.9	1,403.9	4.4	-2.2	4.4	0.13	0.00	-13.40
2,659.0	0.53	280.30	2,658.9	1,453.9	4.7	-2.5	4.9	0.79	-0.04	-85.40
2,709.0	0.21	242.80	2,708.9	1,503.9	4.7	-2.8	5.1	0.77	-0.64	-75.00
2,759.0	0.08	97.20	2,758.9	1,553.9	4.6	-2.9	5.1	0.56	-0.26	-291.20
2,809.0	0.40	341.20	2,808.9	1,603.9	4.8	-2.9	5.2	0.88	0.64	-232.00
2,859.0	0.37	298.50	2,858.9	1,653.9	5.0	-3.1	5.5	0.56	-0.06	-85.40
2,909.0	0.51	294.10	2,908.9	1,703.9	5.2	-3.5	5.9	0.29	0.28	-8.80
2,959.0	0.16	240.10	2,958.9	1,753.9	5.3	-3.7	6.2	0.87	-0.70	-108.00
3,009.0	0.40	150	3,008.9	1,803.9	5.4	-3.8	6.3	1.00	0.48	242.80
3,059.0	0.40	354.50	3,058.9	1,853.9	5.7	-3.8	6.5	0.10	0.00	-14.00
3,109.0	0.50	330.50	3,108.9	1,903.9	6.1	-3.9	6.8	0.42	0.20	-48.00
3,159.0	0.59	300.50	3,158.9	1,953.9	6.4	-4.2	7.3	0.59	0.18	-60.00
3,209.0	0.28	265.50	3,208.9	2,003.9	6.5	-4.6	7.8	0.79	-0.62	-70.00
3,259.0	0.32	151.10	3,258.9	2,053.9	6.7	-4.7	7.8	0.98	0.08	219.20
3,309.0	0.47	357.60	3,308.9	2,103.9	7.0	-4.6	8.0	0.38	0.30	-35.00
3,359.0	0.59	355.30	3,358.9	2,153.9	7.5	-4.7	8.3	0.24	0.24	-4.60
3,409.0	0.70	328.90	3,408.9	2,203.9	8.0	-4.9	8.7	0.63	0.22	-52.80
3,459.0	0.29	295.00	3,458.9	2,253.9	8.3	-5.1	9.1	0.97	-0.82	-67.80
3,509.0	0.49	356.00	3,508.9	2,303.9	8.6	-5.3	9.4	0.86	0.40	122.00
3,559.0	0.55	300.40	3,558.9	2,353.9	8.9	-5.5	9.8	0.98	0.12	-111.20
3,609.0	0.29	295.20	3,608.9	2,403.9	9.1	-5.8	10.1	0.53	-0.52	-10.40
3,659.0	0.84	315.20	3,658.9	2,453.9	9.3	-6.1	10.5	0.76	0.70	40.00
3,709.0	0.86	298.40	3,708.9	2,503.9	9.7	-6.6	11.1	0.38	0.04	-33.60
3,759.0	0.87	337.10	3,758.9	2,553.9	10.1	-6.9	11.6	0.88	0.02	77.40
3,809.0	0.56	304.00	3,808.9	2,603.9	10.5	-7.2	12.1	0.73	-0.22	-66.20
3,859.0	0.71	327.30	3,858.9	2,653.9	10.9	-7.6	12.7	0.59	0.30	46.60
3,909.0	0.53	276.50	3,908.9	2,703.9	11.2	-8.0	13.1	1.11	-0.36	-101.60
3,959.0	0.58	274.10	3,958.9	2,753.9	11.2	-8.5	13.6	0.11	0.10	-4.80
4,009.0	0.53	264.60	4,008.9	2,803.9	11.2	-9.0	13.9	0.21	-0.10	-19.00
4,059.0	0.92	272.80	4,058.9	2,853.9	11.2	-9.6	14.4	0.81	0.78	16.40
4,109.0	0.73	306.60	4,108.9	2,903.9	11.4	-10.3	15.1	1.03	-0.38	67.60
4,159.0	0.53	293.90	4,158.9	2,953.9	11.7	-10.7	15.6	0.49	-0.40	-25.40
4,209.0	0.80	295.80	4,208.9	3,003.9	11.9	-11.3	16.2	0.54	0.54	3.80
4,259.0	0.55	304.80	4,258.8	3,053.8	12.2	-11.8	16.8	0.54	-0.50	18.00
4,309.0	1.07	281.90	4,308.8	3,103.8	12.5	-12.4	17.4	1.21	1.04	-45.80
4,359.0	0.55	247.60	4,358.8	3,153.8	12.5	-13.1	18.0	1.38	-1.04	-68.60
4,409.0	0.89	263.90	4,408.8	3,203.8	12.3	-13.7	18.4	0.79	0.68	32.60
4,459.0	1.01	299.80	4,458.8	3,253.8	12.5	-14.5	19.1	1.19	0.24	71.80
4,509.0	0.98	306.70	4,508.8	3,303.8	13.0	-15.2	20.0	0.25	-0.06	13.80
4,559.0	1.24	283.00	4,558.8	3,353.8	13.4	-16.1	20.9	1.04	0.52	-47.40
4,609.0	0.92	276.50	4,608.8	3,403.8	13.5	-17.0	21.7	0.68	-0.64	-13.00





PHX  
Survey Report



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Company:	XTO	TVD Reference:	KB@23 @ 1205.0usft
Project:	Harrison County, WV	MD Reference:	KB@23 @ 1205.0usft
Site:	Bogges A PAD	North Reference:	True
Well:	North Unit 7H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	7H AS Drilled Surveys		

Survey											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,659.0	0.80	280.90	4,658.8	3,453.8	13.6	-17.7	22.4	0.27	-0.24	8.80	
4,709.0	0.72	290.40	4,708.8	3,503.8	13.8	-18.4	23.0	0.30	-0.16	19.00	
4,759.0	1.05	306.40	4,758.8	3,553.8	14.2	-19.0	23.8	0.82	0.66	32.00	
4,809.0	0.73	321.50	4,808.8	3,603.8	14.7	-19.6	24.5	0.79	-0.64	30.20	
4,859.0	0.47	347.30	4,858.8	3,653.8	15.2	-19.9	25.0	0.74	-0.52	51.60	
4,909.0	0.62	301.90	4,908.8	3,703.8	15.5	-20.1	25.4	0.89	0.30	-90.80	
MID											
4,959.0	0.67	303.00	4,958.8	3,753.8	15.8	-20.6	26.0	0.10	0.10	2.20	
5,004.0	0.51	263.60	5,003.8	3,798.8	15.9	-21.0	26.4	0.95	-0.36	-87.56	
5,067.0	0.51	268.30	5,066.8	3,861.8	15.9	-21.6	26.8	0.07	0.00	7.46	
5,130.0	0.51	300.43	5,129.8	3,924.8	16.0	-22.1	27.3	0.45	0.00	51.00	
5,191.0	0.40	327.02	5,190.8	3,985.8	16.4	-22.5	27.8	0.39	-0.18	43.59	
5,254.0	0.40	359.72	5,253.8	4,048.8	16.8	-22.6	28.1	0.36	0.00	51.90	
5,316.0	0.70	357.61	5,315.8	4,110.8	17.4	-22.6	28.5	0.48	0.48	-3.40	
5,379.0	0.79	8.42	5,378.8	4,173.8	18.2	-22.5	28.9	0.26	0.14	17.16	
5,442.0	0.59	9.13	5,441.7	4,236.7	18.9	-22.4	29.3	0.32	-0.32	1.13	
5,505.0	0.70	0.91	5,504.7	4,299.7	19.6	-22.4	29.7	0.23	0.17	-13.05	
5,568.0	0.70	344.21	5,567.7	4,362.7	20.4	-22.5	30.2	0.32	0.00	-26.51	
5,631.0	0.79	341.53	5,630.7	4,425.7	21.2	-22.7	30.9	-0.15	0.14	-4.25	
5,693.0	0.90	347.90	5,692.7	4,487.7	22.0	-22.9	31.6	0.23	0.18	10.27	
5,757.0	0.51	342.14	5,756.7	4,551.7	22.8	-23.1	32.2	0.62	-0.61	-9.00	
5,820.0	0.51	332.03	5,819.7	4,614.7	23.3	-23.4	32.7	0.14	0.00	-16.05	
5,883.0	0.20	163.44	5,882.7	4,677.7	23.5	-23.5	32.9	1.12	-0.49	-267.60	
5,945.0	0.11	100.50	5,944.7	4,739.7	23.3	-23.4	32.7	0.29	-0.15	-101.52	
TOP											
5,977.0	0.40	229.10	5,976.7	4,771.7	23.3	-23.4	32.7	1.49	0.91	401.88	
6,008.0	2.59	241.54	6,007.7	4,802.7	22.9	-24.1	33.0	7.10	7.06	40.13	
6,040.0	5.60	228.84	6,039.6	4,834.6	21.5	-25.9	33.7	9.77	9.41	-39.69	
6,071.0	8.39	223.43	6,070.4	4,865.4	18.8	-28.6	34.2	9.24	9.00	-17.45	
6,103.0	10.50	224.84	6,102.0	4,897.0	15.1	-32.3	34.8	6.63	6.59	4.41	
6,134.0	12.00	225.63	6,132.4	4,927.4	10.8	-36.6	35.6	4.86	4.84	2.55	
6,166.0	13.01	223.91	6,163.6	4,958.6	5.9	-41.5	36.5	3.36	3.16	-5.38	
6,198.0	14.20	221.10	6,194.7	4,989.7	0.4	-46.5	37.2	4.25	3.72	-8.78	
6,228.0	15.29	218.64	6,223.7	5,018.7	-5.5	-51.4	37.5	4.19	3.63	-8.20	
6,260.0	17.29	216.93	6,254.4	5,049.4	-12.6	-56.9	37.6	6.43	6.25	-5.34	
6,291.0	20.11	217.72	6,283.8	5,078.8	-20.5	-62.9	37.6	9.13	9.10	2.55	
6,323.0	22.00	217.63	6,313.6	5,108.6	-29.6	-70.0	37.6	5.91	5.91	-0.28	
6,386.0	26.19	216.62	6,371.1	5,166.1	-50.1	-85.5	37.5	6.68	6.65	-1.60	
6,448.0	31.60	216.84	6,425.4	5,220.4	-74.1	-103.4	37.1	8.73	8.73	0.35	
6,511.0	38.50	217.23	6,477.0	5,272.0	-103.0	-125.2	36.9	10.96	10.95	0.52	
6,573.0	42.61	220.22	6,524.1	5,319.1	-134.4	-150.4	37.9	7.33	6.63	4.82	
6,636.0	40.70	231.43	6,571.2	5,366.2	-163.5	-180.3	43.9	12.20	-3.03	17.79	
6,699.0	39.10	241.80	6,619.6	5,414.6	-185.7	-213.9	57.1	10.85	-2.54	16.46	



PHX  
Survey Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well North Unit 7H
Company:	XTO	TVD Reference:	KB @ 23 @ 1205.0usft
Project:	Harrison County, WV	MD Reference:	KB @ 23 @ 1205.0usft
Site:	Bogges A PAD	North Reference:	True
Well:	North Unit 7H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	7H AS Drilled Surveys		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,762.0	39.01	247.74	6,668.5	5,463.5	-202.6	-249.8	75.4	5.94	-0.14	9.43
6,824.0	41.60	249.32	6,715.8	5,510.8	-217.3	-287.1	96.1	4.49	4.18	2.55
6,887.0	45.40	251.12	6,761.5	5,556.5	-232.0	-327.9	119.6	6.34	6.03	2.86
6,919.0	47.60	255.34	6,783.5	5,578.5	-238.6	-350.1	133.2	11.78	6.88	13.19
6,950.0	50.30	259.91	6,803.9	5,598.9	-243.6	-372.9	148.3	14.12	8.71	14.74
6,982.0	52.50	263.82	6,823.8	5,618.8	-247.1	-397.7	165.9	11.76	6.88	12.22
7,013.0	54.30	269.01	6,842.3	5,637.3	-248.7	-422.5	184.6	14.64	5.81	16.74
7,044.0	56.10	273.80	6,860.0	5,655.0	-248.1	-448.0	205.2	13.95	5.81	15.45
7,075.0	57.60	278.63	6,877.0	5,672.0	-245.2	-473.7	227.4	13.91	4.84	15.58
7,106.0	59.00	283.51	6,893.3	5,688.3	-240.2	-499.6	251.1	14.13	4.52	15.74
Top of Marcellus @ 5808' TVD										
7,129.0	59.92	287.13	6,905.0	5,700.0	-234.9	-518.7	269.5	14.11	3.98	15.71
7,138.0	60.30	288.52	6,909.5	5,704.5	-232.5	-526.1	276.8	14.11	4.28	15.51
7,169.0	61.60	292.43	6,924.5	5,719.5	-223.1	-551.5	302.7	11.80	4.19	12.61
7,201.0	63.00	296.30	6,939.4	5,734.4	-211.4	-577.3	330.3	11.57	4.38	12.09
7,264.0	64.41	302.23	6,967.3	5,762.3	-183.8	-626.5	386.2	8.73	2.24	9.41
7,327.0	67.00	305.84	6,993.3	5,788.3	-151.6	-674.1	443.5	6.65	4.11	5.73
7,389.0	70.69	311.33	7,015.6	5,810.6	-115.6	-719.3	501.2	10.18	5.95	8.85
7,451.0	74.10	314.54	7,034.4	5,829.4	-75.3	-782.5	560.0	7.39	5.50	5.18
7,513.0	79.99	316.04	7,048.3	5,843.3	-32.4	-805.0	619.9	9.79	9.50	2.42
Top of W. Marcellus @ 5811' TVD										
7,567.7	85.90	317.49	7,055.0	5,850.0	7.1	-842.1	673.4	11.13	10.81	2.65
7,576.0	86.80	317.71	7,055.5	5,850.5	13.3	-847.7	681.5	11.13	10.81	2.62
Top of W. Marcellus @ 5812' TVD										
7,639.0	90.89	320.74	7,056.8	5,851.8	61.0	-888.8	743.2	8.08	6.49	4.81
7,702.0	90.49	320.52	7,056.0	5,851.0	109.7	-928.8	804.5	0.72	-0.63	-0.35
7,765.0	90.60	322.32	7,055.4	5,850.4	158.9	-968.1	865.6	2.86	0.17	2.86
7,828.0	90.69	322.41	7,054.7	5,849.7	208.8	-1,006.6	926.5	0.20	0.14	0.14
7,891.0	90.49	324.83	7,054.1	5,849.1	259.5	-1,043.9	987.0	3.85	-0.32	3.84
7,954.0	89.51	326.54	7,054.1	5,849.1	311.5	-1,079.4	1,046.8	3.13	-1.56	2.71
8,017.0	89.51	326.41	7,054.6	5,849.6	364.1	-1,114.2	1,106.3	0.21	0.00	-0.21
8,080.0	89.11	326.41	7,055.4	5,850.4	416.5	-1,149.1	1,165.9	0.63	-0.63	0.00
8,143.0	88.89	325.70	7,056.5	5,851.5	468.8	-1,184.3	1,225.5	1.18	-0.35	-1.13
8,206.0	88.89	324.12	7,057.7	5,852.7	520.3	-1,220.5	1,285.6	2.51	0.00	-2.51
8,269.0	88.41	324.52	7,059.2	5,854.2	571.5	-1,257.2	1,345.9	0.99	-0.76	0.63
8,332.0	87.90	322.10	7,061.2	5,856.2	622.0	-1,294.8	1,406.4	3.92	-0.81	-3.84
8,395.0	87.70	321.70	7,063.6	5,858.6	671.5	-1,333.7	1,467.4	0.71	-0.32	-0.63
8,458.0	88.41	322.01	7,065.8	5,860.8	721.0	-1,372.6	1,528.3	1.23	1.13	0.49
8,521.0	88.30	322.32	7,067.6	5,862.6	770.8	-1,411.2	1,589.2	0.52	-0.17	0.49
8,584.0	89.40	322.41	7,068.8	5,863.8	820.7	-1,449.6	1,650.1	1.75	1.75	0.14
8,647.0	89.90	322.32	7,069.2	5,864.2	870.5	-1,488.1	1,710.9	0.81	0.79	-0.14
8,710.0	89.40	321.70	7,069.6	5,864.6	920.2	-1,526.9	1,771.9	1.26	-0.79	-0.98





**PHX**  
Survey Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well North Unit 7H
Company:	XTO	TVD Reference:	KB@23 @ 1205.0usft
Project:	Harrison County, WV	MD Reference:	KB@23 @ 1205.0usft
Site:	Bogges A PAD	North Reference:	True
Well:	North Unit 7H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	7H AS Drilled Surveys		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,773.0	90.69	320.91	7,069.6	5,864.6	969.4	-1,566.3	1,833.0	2.40	2.05	-1.25
8,836.0	92.41	319.42	7,067.9	5,862.9	1,017.7	-1,606.6	1,894.5	3.61	2.73	-2.37
8,900.0	93.00	319.11	7,064.8	5,859.8	1,066.2	-1,648.3	1,957.0	1.04	0.92	-0.48
8,962.0	91.40	319.73	7,062.5	5,857.5	1,113.2	-1,688.6	2,017.6	2.77	-2.58	1.00
9,025.0	90.89	319.42	7,061.2	5,856.2	1,161.2	-1,729.5	2,079.2	0.95	-0.81	-0.49
9,088.0	91.51	320.43	7,059.9	5,854.9	1,209.4	-1,770.0	2,140.7	1.88	0.98	1.60
9,152.0	90.69	320.83	7,058.7	5,853.7	1,258.8	-1,810.6	2,203.0	1.43	-1.28	0.63
9,215.0	90.89	321.62	7,057.8	5,852.8	1,307.9	-1,850.1	2,264.1	1.29	0.32	1.25
9,278.0	90.60	321.62	7,057.0	5,852.0	1,357.3	-1,889.2	2,325.2	0.46	-0.46	0.00
9,341.0	90.60	322.63	7,056.3	5,851.3	1,407.0	-1,927.8	2,386.1	1.60	0.00	1.60
9,404.0	90.01	322.10	7,056.0	5,851.0	1,456.9	-1,966.3	2,447.0	1.26	-0.94	-0.84
9,467.0	90.21	323.73	7,055.8	5,850.8	1,507.2	-2,004.3	2,507.7	2.61	0.32	2.59
9,530.0	90.10	324.21	7,055.7	5,850.7	1,558.1	-2,041.4	2,568.1	0.78	-0.17	0.76
9,593.0	89.90	324.03	7,055.7	5,850.7	1,609.2	-2,078.3	2,628.4	0.43	-0.32	-0.29
9,655.0	90.01	325.44	7,055.7	5,850.7	1,659.8	-2,114.1	2,687.6	2.28	0.18	2.27
9,718.0	90.21	324.83	7,055.6	5,850.6	1,711.5	-2,150.1	2,747.6	1.02	0.32	-0.97
9,781.0	89.51	324.74	7,055.8	5,850.8	1,763.0	-2,186.4	2,807.7	1.12	-1.11	-0.14
9,844.0	88.80	324.83	7,056.7	5,851.7	1,814.4	-2,222.7	2,867.8	1.14	-1.13	0.14
9,907.0	88.49	324.91	7,058.2	5,853.2	1,865.9	-2,259.0	2,927.9	0.51	-0.49	0.13
9,970.0	88.89	325.00	7,059.6	5,854.6	1,917.5	-2,295.2	2,987.9	0.65	0.63	0.14
10,032.0	89.59	324.61	7,060.4	5,855.4	1,968.2	-2,330.9	3,047.1	1.29	1.13	-0.63
10,095.0	89.90	323.20	7,060.7	5,855.7	2,019.1	-2,368.0	3,107.5	2.29	0.49	-2.24
10,158.0	88.80	322.94	7,061.5	5,856.5	2,069.4	-2,405.8	3,168.1	2.10	-2.06	-0.41
10,221.0	89.79	322.54	7,062.4	5,857.4	2,119.6	-2,444.0	3,228.9	1.99	1.89	-0.63
10,285.0	91.70	321.62	7,061.6	5,856.6	2,170.0	-2,483.3	3,290.8	3.31	2.98	-1.44
10,347.0	93.40	319.90	7,058.8	5,853.8	2,218.0	-2,522.5	3,351.1	3.90	2.74	-2.77
10,410.0	93.70	319.90	7,054.9	5,849.9	2,266.1	-2,563.0	3,412.4	0.48	0.48	0.00
10,473.0	93.59	319.82	7,050.9	5,845.9	2,314.2	-2,603.5	3,473.8	0.22	-0.17	-0.13
10,536.0	93.79	320.12	7,046.9	5,841.9	2,362.3	-2,644.0	3,535.2	0.57	0.32	0.48
10,599.0	93.70	320.83	7,042.8	5,837.8	2,410.8	-2,684.0	3,596.4	1.13	-0.14	1.13
10,661.0	93.70	320.30	7,038.8	5,833.8	2,458.6	-2,723.3	3,656.7	0.85	0.00	-0.85
10,723.0	92.60	320.21	7,035.4	5,830.4	2,506.2	-2,762.8	3,717.0	1.78	-1.77	-0.15
10,787.0	91.59	321.70	7,033.0	5,828.0	2,555.9	-2,803.1	3,779.2	2.81	-1.58	2.33
10,849.0	91.11	321.31	7,031.6	5,826.6	2,604.4	-2,841.7	3,839.3	1.00	-0.77	-0.63
10,912.0	90.89	321.22	7,030.5	5,825.5	2,653.5	-2,881.1	3,900.5	0.38	-0.35	-0.14
10,975.0	89.11	322.94	7,030.5	5,825.5	2,703.2	-2,919.8	3,961.4	3.93	-2.83	2.73
11,038.0	88.69	322.10	7,031.7	5,826.7	2,753.2	-2,958.2	4,022.2	1.49	-0.67	-1.33
11,099.0	89.31	322.32	7,032.7	5,827.7	2,801.4	-2,995.5	4,081.2	1.08	1.02	0.36
11,162.0	89.70	324.03	7,033.3	5,828.3	2,851.8	-3,033.3	4,141.8	2.78	0.62	2.71
11,224.0	89.40	322.94	7,033.8	5,828.8	2,901.6	-3,070.2	4,201.4	1.82	-0.48	-1.76
11,288.0	90.41	322.94	7,033.9	5,828.9	2,952.7	-3,108.8	4,263.0	1.58	1.58	0.00
11,351.0	91.20	322.80	7,033.0	5,828.0	3,002.9	-3,146.8	4,323.7	1.27	1.25	-0.22



**PHX**  
Survey Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well North Unit 7H
<b>Company:</b>	XTO	<b>TVD Reference:</b>	KB@23 @ 1205 Quasi
<b>Project:</b>	Harrison County, WV	<b>MD Reference:</b>	KB@23 @ 1205 Quasi
<b>Site:</b>	Boggs A PAD	<b>North Reference:</b>	True
<b>Well:</b>	North Unit 7H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Main Wellbore		
<b>Design:</b>	7HAS Drilled Surveys		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,414.0	90.69	321.70	7,031.9	5,826.9	3,052.7	-3,185.3	4,384.6	1.92	-0.81	-1.75
11,476.0	90.41	323.11	7,031.3	5,826.3	3,101.9	-3,223.2	4,444.5	2.32	-0.45	2.27
11,539.0	90.69	324.74	7,030.7	5,825.7	3,152.8	-3,260.3	4,504.9	2.63	0.44	2.59
11,602.0	89.79	324.34	7,030.5	5,825.5	3,204.1	-3,296.8	4,565.1	1.56	-1.43	-0.63
11,665.0	89.59	324.43	7,030.8	5,825.8	3,255.3	-3,333.5	4,625.3	0.35	-0.32	0.14
11,727.0	90.89	326.94	7,030.6	5,825.6	3,306.5	-3,368.4	4,684.2	4.56	2.10	4.05
11,790.0	90.80	326.80	7,029.6	5,824.6	3,359.3	-3,402.9	4,743.6	0.26	-0.14	-0.22
11,853.0	90.10	325.53	7,029.1	5,824.1	3,411.6	-3,438.0	4,803.2	2.30	-1.11	-2.02
11,916.0	90.41	326.41	7,028.9	5,823.9	3,463.8	-3,473.2	4,862.9	1.48	0.49	1.40
11,979.0	91.51	326.72	7,027.8	5,822.8	3,516.4	-3,507.9	4,922.4	1.81	1.75	0.49
12,042.0	90.49	326.72	7,026.7	5,821.7	3,569.0	-3,542.5	4,981.9	1.62	-1.62	0.00
12,105.0	89.70	324.52	7,026.6	5,821.6	3,621.0	-3,578.1	5,041.7	3.71	-1.25	-3.49
12,168.0	90.21	323.11	7,026.6	5,821.6	3,671.9	-3,615.2	5,102.1	2.38	0.81	-2.24
12,231.0	90.10	322.32	7,026.5	5,821.5	3,722.0	-3,653.4	5,162.9	1.27	-0.17	-1.25
12,294.0	89.70	322.01	7,026.6	5,821.6	3,771.7	-3,692.1	5,223.8	0.80	-0.63	-0.49
12,356.0	88.89	321.44	7,027.4	5,822.4	3,820.4	-3,730.5	5,283.9	1.60	-1.31	-0.92
12,418.0	88.69	320.91	7,028.7	5,823.7	3,868.7	-3,769.3	5,344.1	0.91	-0.32	-0.85
12,480.0	90.89	321.13	7,028.9	5,823.9	3,916.9	-3,808.3	5,404.3	3.57	3.55	0.35
12,544.0	90.69	319.64	7,028.0	5,823.0	3,966.2	-3,849.1	5,466.7	2.35	-0.31	-2.33
12,607.0	90.21	319.11	7,027.5	5,822.5	4,014.0	-3,890.1	5,528.3	1.13	-0.76	-0.84
12,670.0	92.80	319.82	7,025.9	5,820.9	4,061.9	-3,931.1	5,589.9	4.26	4.11	1.13
12,732.0	92.69	319.73	7,022.9	5,817.9	4,109.1	-3,971.1	5,650.4	0.23	-0.18	-0.15
12,795.0	90.89	320.03	7,020.9	5,815.9	4,157.3	-4,011.6	5,711.9	2.90	-2.86	0.48
12,858.0	90.80	320.52	7,020.0	5,815.0	4,205.7	-4,051.9	5,773.3	0.79	-0.14	0.78
12,920.0	89.79	320.21	7,019.7	5,814.7	4,253.5	-4,091.4	5,833.7	1.70	-1.63	-0.50
12,983.0	89.40	320.61	7,020.1	5,815.1	4,302.0	-4,131.6	5,895.1	0.89	-0.62	0.63
13,046.0	90.10	321.13	7,020.4	5,815.4	4,350.9	-4,171.3	5,956.3	1.38	1.11	0.83
13,092.0	90.30	321.62	7,020.2	5,815.2	4,386.8	-4,200.1	6,001.0	1.15	0.43	1.07
13,166.0	90.30	321.62	7,019.8	5,814.8	4,444.9	-4,246.0	6,072.7	0.00	0.00	0.00

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
7,129.0	6,905.0	Top of Marcellus@6905' TVD		0.00	
7,567.7	7,055.0	Top of Onondaga@7055' TVD		0.00	





**PHX**  
Survey Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well North Unit 7H
Company:	XTO	TVD Reference:	KB@23 @ 1205.0usft
Project:	Harrison County, WV	MD Reference:	KB@23 @ 1205.0usft
Site:	Bogges A PAD	North Reference:	True
Well:	North Unit 7H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	7H AS Drilled Surveys		

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,959.0	4,958.8	15.8	-20.6	Gyro Tie In=4959' MD
5,977.0	5,976.7	23.3	-23.4	KOP=5977' MD
7,639.0	7,056.8	61.0	-888.8	LP=7639' MD/ 7057' TVD
8,710.0	7,069.6	920.2	-1,526.9	Deepest Point of Well=8710' MD/ 7070' TVD
13,092.0	7,020.2	4,386.8	-4,200.1	Final Survey=13092' MD/ 7020' TVD
13,166.0	7,019.8	4,444.9	-4,246.0	Projection to TD=13166' MD/ 7020' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

**PHOENIX**  
TECHNOLOGY SERVICES



Project: Harrison County, WV  
 Site: Boggess A PAD  
 Well: North Unit 7H  
 Wellbore: Main Wellbore  
 Design: 7H AS Drilled Surveys

