



NM OIL CONSERVATION
ARTESIA DISTRICT

30-015-43274

JUL 13 2017

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XTO Energy

Eddy County, New Mexico (NAD 27)

Nash Unit

60H

Wellbore #1

Design: Surveys

Standard Survey Report

18 January, 2017



MS Energy Services

Survey Report



Company: XTO Energy
Project: Eddy County, New Mexico (NAD 27)
Site: Nash Unit
Well: 60H
Wellbore: Wellbore #1
Design: Surveys

Local Co-ordinate Reference: Well 60H
TVD Reference: Rig @ 3012.00usft (Noram 25)
MD Reference: Rig @ 3012.00usft (Noram 25)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Conroe Server

Project	Eddy County, New Mexico (NAD 27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Well 60H

Well Position	+N/-S	0.00 usft	Northing:	472,580.30 usft	Latitude:	32° 17' 55.051 N
	+E/-W	0.00 usft	Easting:	621,717.50 usft	Longitude:	103° 56' 21.872 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	2,987.00 usft	

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2016	1/2/2017	7.23	60.08	48,076

Design Surveys

Audit Notes:

Version: 1.0 **Phase:** ACTUAL **Tie On Depth:** 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	357.89

Survey Program Date 1/18/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
94.53	5,687.00	Phoenix Gyro (Wellbore #1)	GYRO-NS	OWSG Gyrocompass Gyro
5,720.00	11,200.00	MS MWD (Wellbore #1)	MWD	OWSG MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94.53	0.86	292.73	94.53	0.27	-0.65	0.30	0.91	0.91	0.00
189.15	1.46	176.15	189.14	-0.65	-1.23	-0.61	2.11	0.63	-123.21
283.76	1.56	175.53	283.71	-3.14	-1.05	-3.10	0.11	0.11	-0.66
378.38	1.65	175.57	378.30	-5.78	-0.84	-5.75	0.10	0.10	0.04
473.00	1.67	173.77	472.88	-8.51	-0.59	-8.48	0.06	0.02	-1.90
567.62	1.68	173.44	567.46	-11.26	-0.28	-11.24	0.01	0.01	-0.35
662.24	1.85	173.05	662.03	-14.15	0.06	-14.15	0.18	0.18	-0.41
756.85	2.07	175.29	756.58	-17.37	0.39	-17.38	0.25	0.23	2.37
851.47	2.33	177.72	851.14	-21.00	0.61	-21.01	0.29	0.27	2.57
946.09	2.55	176.54	945.67	-25.02	0.81	-25.03	0.24	0.23	-1.25
1,040.71	2.93	180.33	1,040.18	-29.54	0.92	-29.55	0.44	0.40	4.01
1,135.33	3.15	179.44	1,134.67	-34.56	0.93	-34.57	0.24	0.23	-0.94
1,229.95	3.02	182.65	1,229.15	-39.65	0.84	-39.65	0.23	-0.14	3.39
1,324.56	3.07	182.01	1,323.63	-44.67	0.64	-44.66	0.06	0.05	-0.68



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1,419.18	3.07	182.20	1,418.11	-49.73	0.45	-49.72	0.01	0.00	0.20
1,513.80	3.20	178.98	1,512.59	-54.91	0.40	-54.88	0.23	0.14	-3.40
1,608.42	3.53	173.75	1,607.05	-60.44	0.77	-60.43	0.48	0.35	-5.53
1,703.04	3.12	165.54	1,701.51	-65.83	1.73	-65.85	0.66	-0.43	-8.68
1,797.65	2.73	157.35	1,795.99	-70.40	3.24	-70.47	0.60	-0.41	-8.66
1,892.27	2.58	154.81	1,890.51	-74.41	5.01	-74.54	0.20	-0.16	-2.68
1,986.89	2.19	150.14	1,985.05	-77.90	6.82	-78.10	0.46	-0.41	-4.94
2,081.51	1.88	148.62	2,079.61	-80.80	8.53	-81.06	0.33	-0.33	-1.61
2,176.13	1.74	141.86	2,174.18	-83.25	10.22	-83.57	0.27	-0.15	-7.14
2,270.75	1.97	130.85	2,268.75	-85.45	12.34	-85.84	0.45	0.24	-11.64
2,365.36	2.93	128.27	2,363.28	-88.01	15.47	-88.52	1.02	1.01	-2.73
2,459.98	3.32	132.26	2,457.76	-91.35	19.40	-92.00	0.47	0.41	4.22
2,554.60	3.11	125.32	2,552.23	-94.67	23.52	-95.48	0.47	-0.22	-7.33
2,649.22	3.27	128.24	2,646.70	-97.83	27.73	-98.78	0.24	0.17	3.09
2,743.84	3.38	128.46	2,741.16	-101.23	32.04	-102.34	0.12	0.12	0.23
2,838.45	3.46	130.12	2,835.60	-104.81	36.40	-106.08	0.13	0.08	1.75
2,933.07	3.26	167.45	2,930.07	-109.27	39.17	-110.64	2.28	-0.21	39.45
3,027.69	2.79	128.67	3,024.57	-113.34	41.55	-114.79	2.17	-0.50	-40.98
3,122.31	2.33	128.85	3,119.09	-115.99	44.85	-117.56	0.49	-0.49	0.19
3,216.93	1.96	124.83	3,213.65	-118.12	47.68	-119.79	0.42	-0.39	-4.25
3,311.55	1.96	125.94	3,308.21	-119.99	50.31	-121.76	0.04	-0.00	1.17
3,406.16	2.01	126.67	3,402.77	-121.93	52.95	-123.80	0.06	0.05	0.77
3,500.78	1.84	120.77	3,497.33	-123.70	55.59	-125.66	0.28	-0.18	-6.24
3,595.40	1.82	117.56	3,591.90	-125.17	58.23	-127.23	0.11	-0.02	-3.39
3,690.02	1.52	113.02	3,686.48	-126.36	60.72	-128.51	0.35	-0.32	-4.80
3,784.64	1.48	117.76	3,781.07	-127.42	62.95	-129.65	0.14	-0.04	5.01
3,879.25	1.36	116.12	3,875.65	-128.48	65.04	-130.79	0.13	-0.13	-1.73
3,973.87	1.22	114.87	3,970.25	-129.40	66.96	-131.78	0.15	-0.15	-1.32
4,068.49	1.07	119.91	4,064.85	-130.26	68.64	-132.70	0.19	-0.16	5.33
4,163.11	0.95	121.62	4,159.46	-131.11	70.08	-133.61	0.13	-0.13	1.81
4,257.73	0.89	121.21	4,254.06	-131.91	71.37	-134.44	0.06	-0.06	-0.43
4,352.35	0.93	116.64	4,348.67	-132.63	72.69	-135.22	0.09	0.04	-4.83
4,446.96	0.91	115.90	4,443.27	-133.30	74.05	-135.94	0.02	-0.02	-0.78
4,541.58	0.81	108.87	4,537.88	-133.85	75.36	-136.53	0.15	-0.11	-7.43
4,636.20	0.70	105.15	4,632.49	-134.22	76.55	-136.94	0.13	-0.12	-3.93
4,730.82	0.58	107.16	4,727.10	-134.51	77.56	-137.27	0.13	-0.13	2.12
4,825.44	0.60	116.00	4,821.72	-134.87	78.47	-137.66	0.10	0.02	9.34
4,920.05	0.73	158.10	4,916.32	-135.64	79.14	-138.46	0.52	0.14	44.50
5,014.67	0.64	144.31	5,010.94	-136.63	79.67	-139.47	0.20	-0.10	-14.57
5,109.29	0.55	156.04	5,105.55	-137.48	80.16	-140.33	0.16	-0.10	12.40
5,203.91	0.64	182.29	5,200.17	-138.42	80.33	-141.28	0.30	0.10	27.74
5,298.53	0.50	178.85	5,294.78	-139.36	80.31	-142.22	0.15	-0.15	-3.64
5,393.15	0.42	199.71	5,389.40	-140.10	80.21	-142.96	0.19	-0.08	22.05



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5,487.76	0.46	195.63	5,484.01	-140.79	79.99	-143.64	0.05	0.04	-4.31
5,582.38	0.56	198.72	5,578.62	-141.59	79.74	-144.43	0.11	0.11	3.27
5,677.00	0.54	210.52	5,673.24	-142.42	79.36	-145.24	0.12	-0.02	12.47
5,687.00	0.57	211.97	5,683.24	-142.50	79.31	-145.32	0.33	0.30	14.50
Final Gyro - 5687.00' MD - Tie-in to Gyro - 5687.00' MD									
5,720.00	1.00	245.00	5,716.23	-142.76	78.96	-145.57	1.84	1.30	100.09
5,752.00	1.30	314.60	5,748.23	-142.62	78.45	-145.42	4.17	0.94	217.50
5,783.00	3.90	340.50	5,779.20	-141.38	77.85	-144.15	9.00	8.39	83.55
5,815.00	5.60	344.60	5,811.08	-138.85	77.07	-141.59	5.41	5.31	12.81
5,847.00	8.30	347.20	5,842.85	-135.09	76.14	-137.80	8.49	8.44	8.13
5,878.00	10.30	348.70	5,873.44	-130.19	75.11	-132.87	6.50	6.45	4.84
5,910.00	12.00	350.10	5,904.83	-124.11	73.97	-126.75	5.38	5.31	4.38
5,941.00	14.00	350.80	5,935.04	-117.23	72.82	-119.83	6.47	6.45	2.26
5,973.00	16.00	351.40	5,965.94	-109.05	71.54	-111.61	6.27	6.25	1.88
6,004.00	17.90	351.60	5,995.60	-100.11	70.21	-102.63	6.13	6.13	0.65
6,036.00	20.00	350.50	6,025.86	-89.85	68.58	-92.31	6.66	6.56	-3.44
6,067.00	21.60	349.70	6,054.84	-79.01	66.69	-81.41	5.24	5.16	-2.58
6,099.00	23.10	349.80	6,084.43	-67.03	64.52	-69.36	4.69	4.69	0.31
6,131.00	25.20	350.20	6,113.63	-54.14	62.25	-56.39	6.58	6.56	1.25
6,162.00	26.80	352.20	6,141.49	-40.71	60.18	-42.90	5.88	5.16	6.45
6,194.00	28.10	353.40	6,169.89	-26.08	58.33	-28.21	4.41	4.06	3.75
6,225.00	30.20	354.60	6,196.96	-11.06	56.76	-13.14	7.03	6.77	3.87
6,257.00	32.00	355.10	6,224.36	5.40	55.28	3.36	5.68	5.63	1.56
6,289.00	33.20	355.40	6,251.32	22.58	53.85	20.58	3.78	3.75	0.94
6,320.00	35.20	353.90	6,276.96	39.93	52.22	37.98	7.00	6.45	-4.84
6,352.00	37.70	351.60	6,302.70	58.78	49.81	56.91	8.90	7.81	-7.19
6,383.00	39.40	351.50	6,326.94	77.89	46.97	76.11	5.49	5.48	-0.32
6,414.00	41.80	351.80	6,350.48	97.85	44.05	96.16	7.77	7.74	0.97
6,446.00	43.60	351.60	6,373.99	119.32	40.91	117.74	5.64	5.63	-0.63
6,478.00	45.20	351.50	6,396.86	141.47	37.62	139.99	5.00	5.00	-0.31
6,509.00	46.30	351.60	6,418.49	163.43	34.36	162.06	3.56	3.55	0.32
6,541.00	48.00	350.80	6,440.25	186.62	30.77	185.36	5.62	5.31	-2.50
6,573.00	49.30	350.70	6,461.39	210.32	26.91	209.19	4.07	4.06	-0.31
6,604.00	50.00	351.10	6,481.46	233.65	23.17	232.64	2.46	2.26	1.29
6,636.00	50.30	350.90	6,501.97	257.92	19.33	257.03	1.05	0.94	-0.63
6,667.00	50.40	350.80	6,521.75	281.48	15.53	280.72	0.41	0.32	-0.32
6,698.00	50.50	350.80	6,541.49	305.08	11.71	304.44	0.32	0.32	0.00
6,730.00	50.90	350.80	6,561.76	329.52	7.75	329.01	1.25	1.25	0.00
6,762.00	52.70	351.10	6,581.54	354.35	3.80	353.97	5.67	5.63	0.94
6,793.00	56.10	352.10	6,599.59	379.29	0.12	379.03	11.28	10.97	3.23
6,825.00	59.00	352.60	6,616.76	406.05	-3.47	405.90	9.16	9.06	1.56
6,856.00	61.50	353.20	6,632.14	432.75	-6.80	432.71	8.24	8.06	1.94
6,888.00	64.00	353.30	6,646.79	461.00	-10.14	461.06	7.82	7.81	0.31



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6,919.00	66.30	354.00	6,659.81	488.96	-13.25	489.11	7.70	7.42	2.26
6,951.00	68.00	354.50	6,672.24	518.30	-16.20	518.54	5.50	5.31	1.56
6,982.00	70.20	355.20	6,683.30	547.14	-18.80	547.46	7.40	7.10	2.26
7,014.00	73.20	355.30	6,693.35	577.41	-21.32	577.81	9.38	9.38	0.31
7,045.00	75.40	355.50	6,701.73	607.16	-23.71	607.62	7.12	7.10	0.65
7,077.00	78.70	356.50	6,708.90	638.26	-25.88	638.78	10.75	10.31	3.13
7,108.00	81.30	356.90	6,714.29	668.74	-27.64	669.30	8.48	8.39	1.29
7,140.00	83.40	356.70	6,718.55	700.40	-29.41	701.01	6.59	6.56	-0.63
7,171.00	85.50	356.60	6,721.54	731.20	-31.21	731.86	6.78	6.77	-0.32
7,194.00	86.90	357.20	6,723.07	754.12	-32.45	754.80	6.62	6.09	2.61
7,225.00	88.50	357.50	6,724.31	785.06	-33.89	785.77	5.25	5.16	0.97
7,257.00	89.10	357.40	6,724.98	817.02	-35.31	817.77	1.90	1.88	-0.31
7,352.00	90.10	357.20	6,725.65	911.91	-39.78	912.76	1.07	1.05	-0.21
7,446.00	91.20	356.80	6,724.58	1,005.78	-44.70	1,006.74	1.25	1.17	-0.43
7,541.00	90.10	357.30	6,723.50	1,100.64	-49.59	1,101.72	1.27	-1.16	0.53
7,635.00	90.70	356.30	6,722.85	1,194.49	-54.84	1,195.70	1.24	0.64	-1.06
7,729.00	90.00	359.40	6,722.27	1,288.41	-58.37	1,289.69	3.38	-0.74	3.30
7,823.00	91.50	359.50	6,721.04	1,382.40	-59.27	1,383.64	1.60	1.60	0.11
7,917.00	89.80	359.60	6,719.97	1,476.38	-60.01	1,477.59	1.81	-1.81	0.11
8,012.00	91.00	359.50	6,719.31	1,571.38	-60.75	1,572.55	1.27	1.26	-0.11
8,106.00	89.80	358.20	6,718.65	1,665.35	-62.64	1,666.53	1.88	-1.28	-1.38
8,201.00	91.20	358.00	6,717.83	1,760.29	-65.79	1,761.52	1.49	1.47	-0.21
8,296.00	89.80	358.50	6,717.00	1,855.24	-68.69	1,856.51	1.56	-1.47	0.53
8,391.00	90.80	357.60	6,716.50	1,950.18	-71.92	1,951.51	1.42	1.05	-0.95
8,485.00	88.10	357.60	6,717.40	2,044.09	-75.86	2,045.50	2.87	-2.87	0.00
8,580.00	89.60	357.60	6,719.31	2,138.98	-79.83	2,140.47	1.58	1.58	0.00
8,674.00	88.90	358.90	6,720.54	2,232.93	-82.70	2,234.46	1.57	-0.74	1.38
8,769.00	92.00	359.90	6,719.79	2,327.91	-83.70	2,329.41	3.43	3.26	1.05
8,863.00	89.60	357.20	6,718.48	2,421.85	-86.08	2,423.38	3.84	-2.55	-2.87
8,957.00	91.10	356.50	6,717.91	2,515.71	-91.24	2,517.36	1.76	1.60	-0.74
9,052.00	89.60	356.00	6,717.33	2,610.50	-97.46	2,612.32	1.66	-1.58	-0.53
9,146.00	92.30	357.30	6,715.77	2,704.31	-102.95	2,706.27	3.19	2.87	1.38
9,240.00	89.00	355.90	6,714.70	2,798.13	-108.52	2,800.23	3.81	-3.51	-1.49
9,334.00	88.90	356.50	6,716.42	2,891.90	-114.75	2,894.17	0.65	-0.11	0.64
9,429.00	92.00	357.50	6,715.68	2,986.76	-119.72	2,989.14	3.43	3.26	1.05
9,524.00	88.90	355.90	6,714.93	3,081.58	-125.19	3,084.10	3.67	-3.26	-1.68
9,618.00	91.00	358.10	6,715.01	3,175.44	-130.11	3,178.08	3.24	2.23	2.34
9,712.00	89.40	357.20	6,714.69	3,269.36	-133.96	3,272.08	1.95	-1.70	-0.96
9,807.00	89.90	357.50	6,715.27	3,364.26	-138.36	3,367.07	0.61	0.53	0.32
9,901.00	91.50	359.60	6,714.12	3,458.21	-140.73	3,461.05	2.81	1.70	2.23
9,996.00	90.20	359.90	6,712.71	3,553.20	-141.15	3,555.98	1.40	-1.37	0.32
10,091.00	89.70	0.30	6,712.79	3,648.20	-140.98	3,650.91	0.67	-0.53	0.42
10,185.00	89.00	359.90	6,713.86	3,742.19	-140.82	3,744.84	0.86	-0.74	-0.43
10,280.00	87.40	359.10	6,716.84	3,837.13	-141.65	3,839.75	1.88	-1.68	-0.84



Company: XTO Energy
Project: Eddy County, New Mexico (NAD 27)
Site: Nash Unit
Well: 60H
Wellbore: Wellbore #1
Design: Surveys

Local Co-ordinate Reference: Well 60H
TVD Reference: Rig @ 3012.00usft (Noram 25)
MD Reference: Rig @ 3012.00usft (Noram 25)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Conroe Server

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,374.00	87.50	359.00	6,721.02	3,931.03	-143.20	3,933.64	0.15	0.11	-0.11
10,468.00	87.70	358.90	6,724.96	4,024.93	-144.92	4,027.54	0.24	0.21	-0.11
10,563.00	88.90	358.80	6,727.78	4,119.87	-146.83	4,122.48	1.27	1.26	-0.11
10,657.00	90.00	358.90	6,728.68	4,213.84	-148.72	4,216.46	1.18	1.17	0.11
10,752.00	90.70	358.80	6,728.10	4,308.82	-150.62	4,311.45	0.74	0.74	-0.11
10,846.00	91.40	359.40	6,726.38	4,402.79	-152.10	4,405.41	0.98	0.74	0.64
10,941.00	89.90	358.40	6,725.30	4,497.77	-153.92	4,500.38	1.90	-1.58	-1.05
11,036.00	89.80	358.00	6,725.55	4,592.72	-156.91	4,595.38	0.43	-0.11	-0.42
11,079.08	90.17	358.00	6,725.56	4,635.77	-158.41	4,638.46	0.85	0.85	0.00
330' Hardline Cross - 11079.08' MD									
11,130.00	90.60	358.00	6,725.22	4,686.66	-160.19	4,689.38	0.85	0.85	0.00
11,200.00	90.60	358.00	6,724.49	4,756.61	-162.63	4,759.38	0.00	0.00	0.00
Projection to TD - 11200.00' MD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,687.00	5,683.24	-142.50	79.31	Final Gyro - 5687.00' MD
5,687.00	5,683.24	-142.50	79.31	Tie-in to Gyro - 5687.00' MD
11,079.08	6,725.56	4,635.77	-158.41	330' Hardline Cross - 11079.08' MD
11,200.00	6,724.49	4,756.61	-162.63	Projection to TD - 11200.00' MD



Company: XTO Energy
Site: Nash Unit
Well: 60H
Project: Eddy County, New Mexico (NAD 27)
Rig: Noram 25

MS Energy Services.
WWW.MSENERGYSERVICES.COM

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation
5687.00	0.57	211.97	5683.24	-142.50	79.31	-145.32	0.00	Last Survey - 5687.00' MD
5829.31	0.57	211.97	5825.54	-143.70	78.56	-146.50	1.42	Begin 7.00°/100' Build & Turn
6549.78	50.00	351.25	6458.73	144.88	31.61	143.62	294.03	Hold 50.00° Inc, 351.25° Azm
6749.78	50.00	351.25	6587.29	296.31	8.31	295.80	447.24	Begin 10.00°/100' Build & Turn
7154.34	90.00	357.89	6723.00	667.14	-24.08	667.57	819.67	Begin 90.00° Lateral
11255.99	90.00	357.89	6723.00	4766.00	-175.30	4769.22	4921.32	PBHL



Azinuths to Grid North
True North: -0.21°
Magnetic North: 7.02°

Magnetic Field
Strength: 48075.6nT
Dip Angle: 60.08°
Date: 1/2/2017
Model: BGGM2016

US State Plane 1927 (Exact solution)
New Mexico East 3001

Created By: DLD
Date: 16:22, January 18 2017
Plan: Design #3

