Company:

Project: Site: Well:

Local Co-ordinate Reference:

TVD Reference: MD Reference: North Reference: KB= 26' @ 2978.0usft (H&P 637) KB= 26' @ 2978.0usft (H&P 637)

Wellbore: Design:

Survey Calculation Method: Database:

Minimum Curvature MID_Regulatory

Well #22H

Project Andrews County, TX (NAD 27 TC)

Map System: Geo Datum:

US State Plane 1927 (Exact solution) NAD 1927 (NADCON CONUS)

System Datum:

Mean Sea Level

Texas Central 4203 Map Zone:

Well Position

Site

Well

Universtiy 7-43

Site Position: From:

Northing:

982,143.61 usft

Latitude:

32° 21' 10.084 N

1,405,965.42 usft 102° 15' 23.840 W Map Easting: Longitude: Position Uncertainty: 0.0 usft 13-3/16" -0.99 ° Slot Radius: **Grid Convergence:**

#22H

+N/-S +E/-W

0.0 usft 0.0 usft

Northing: Easting:

982,786.66 usft 1,407,706.59 usft

Latitude: Longitude: 32° 21' 16.742 N

102° 15' 3.679 W **Position Uncertainty** 0.0 usft Wellhead Elevation: 0.0 usft Ground Level: 2,952.0 usft

Wellbore	OH - Job #321214-MPH-	OH - Job #321214-MPH-1440					
Magnetics	Model Name	e Sample Date Declination		Dip Angle	Field Strength		
			(°)	(°)	(nT)		
	BGGM2012	11/12/2014	6 64	60.39	48.437		

ОН Design

Audit Notes:

1.0 Version:

Phase:

ACTUAL

Tie On Depth:

0.0

Vertical Section: Depth From (TVD) +E/-W Direction +N/-S (usft) (usft) (usft) (°) 165.89 0.0 0.0 0.0

Survey Program Date 3/8/2015 То From (usft) (usft) Survey (Wellbore) **Tool Name** Description 237.0 19,441.0 SDI MWD #1 (OH - Job #321214-MPH-14 SDI MWD SDI MWD - Standard ver 1.0.1

Survey							
MD (usft)	Inc (°)	Azi (grid_north_azim	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth	Closure Distance (usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
237.0	1.24	306.02	237.0	1.5	-2.1	306.02	2.6
395.0	0.52	311.11	395.0	3.0	-4.0	306.75	5.0
580.0	0.51	242.98	580.0	3.2	-5.4	300.53	6.2
765.0	0.54	226.76	764.9	2.2	-6.7	288.03	7.1
950.0	0.56	172.37	949.9	0.7	-7.2	275.50	7.3
1,140.0	0.62	165.71	1,139.9	-1.2	-6.9	259.94	7.0
1,329.0	1.08	163.48	1,328.9	-3.9	-6.1	237.34	7.3
1,518.0	1.92	161.95	1,517.8	-8.6	-4.6	208.17	9.8
1,708.0	2.48	166.45	1,707.7	-15.7	-2.7	189.69	15.9
1,801.0	2.86	165.05	1,800.6	-19.9	-1.6	184.62	19.9
1,900.0	3.15	164.03	1,899.5	-24.9	-0.2	180.50	24.9

Well #22H Company: Local Co-ordinate Reference: Project: KB= 26' @ 2978.0usft (H&P 637) TVD Reference: Site: KB= 26' @ 2978.0usft (H&P 637) MD Reference: Well: North Reference: Wellbore: **Survey Calculation Method:** Minimum Curvature Design: Database: MID_Regulatory

J11.			Database.		WID_Itegulati	y	
 }y							
MD (usft)	Inc (°)	Azi (grid_north_azim	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth	Closure Distanc
2,089.0	1.21	118.37	2,088.3	-30.8	3.0	174.50	3
2,278.0	1.35	119.78	2,277.3	-32.9	6.7	168.55	3
2,467.0	1.11	121.06	2,466.2	-34.9	10.2	163.78	3
2,657.0	1.34	119.28	2,656.2	-36.9	13.7	159.69	3
2,846.0	1.34	131.16	2,845.1	-39.5	17.3	156.38	4
3,035.0	1.49	131.39	3,034.1	-42.6	20.8	153.98	4
3,225.0	1.75	129.05	3,224.0	-46.0	24.9	151.60	
3,414.0	1.65	141.81	3,412.9	-50.0	28.8	150.05	Ę
3,603.0	0.77	137.10	3,601.9	-53.0	31.3	149.42	(
3,793.0	1.15	136.07	3,791.9	-55.3	33.5	148.79	(
3,982.0	1.27	118.77	3,980.8	-57.7	36.7	147.56	(
4,172.0	1.22	118.52	4,170.8	-59.7	40.3	145.97	•
4,361.0	1.29	111.80	4,359.7	-61.5	44.1	144.36	
4,550.0	1.41	107.53	4,548.7	-62.9	48.2	142.53	
4,739.0	1.42	116.90	4,737.6	-64.7	52.6	140.92	
4,929.0	1.53	120.41	4,927.6	-67.1	56.8	139.71	
5,118.0	1.53	120.71	5,116.5	-69.6	61.2	138.69	
5,307.0	1.78	122.89	5,305.4	-72.5	65.8	137.76	!
5,497.0	0.74	24.02	5,495.4	-73.0	68.8	136.69	1
5,686.0	0.88	4.09	5,684.4	-70.4	69.4	135.42	
5,875.0	0.99	12.73	5,873.3	-67.4	69.9	133.96	
6,065.0	1.60	339.07	6,063.3	-63.3	69.3	132.42	!
6,254.0	1.49	341.76	6,252.2	-58.5	67.6	130.89	
6,443.0	1.51	348.94	6,441.1	-53.7	66.3	129.01	
6,633.0	1.71	330.10	6,631.1	-48.8	64.4	127.15	
6,822.0	2.07	336.44	6,820.0	-43.2	61.7	125.04	
7,011.0	1.97	280.18	7,008.9	-39.5	57.1	124.70	
7,200.0	0.17	272.96	7,197.8	-38.9	53.6	125.99	1
7,389.0	0.09	296.01	7,386.8	-38.9	53.2	126.15	
7,579.0	0.34	227.40	7,576.8	-39.2	52.7	126.66	
7,768.0	0.54	219.13	7,765.8	-40.3	51.7	127.92	
7,957.0	0.60	228.03	7,954.8	-41.6	50.4	129.55	
8,076.0	0.66	187.40	8,073.8	-42.7	49.8	130.60	
9 156 0	0.69	170.52	0 152 0	42.6	40.9	121 10	
8,156.0 8,188.0	0.68 0.61	170.52 172.47	8,153.8 8,185.8	-43.6 -44.0	49.8 49.9	131.19 131.39	
8,219.0	2.22	181.24	8,216.8	-44.0 -44.7	49.9	131.88	,
8,251.0	5.07	180.16	8,248.7	-44.7 -46.8	49.9	133.16	
8,283.0	6.89	178.49	8,280.5	- 4 0.8 -50.1	49.9	135.10	-
8,314.0	8.47	175.93	8,311.3	-54.2	50.1	137.25	,
8,346.0	10.76	176.62	8,342.8	-59.6	50.5	139.72	
8,377.0	12.88	177.24	8,373.2	-65.9	50.8	142.37	8
8,409.0	15.12	177.43	8,404.2	-73.7	51.2	145.20	8
8,440.0	17.95	178.23	8,433.9	-82.5	51.5	148.01	9
8,472.0	21.03	177.25	8,464.1	-93.1	51.9	150.85	10

Company:
Project:
Site:
Well:
Wellbore:
Design:

Local Co-ordinate Reference:

TVD Reference: MD Reference: North Reference: Well #22H KB= 26' @ 2978.0usft (H&P 637) KB= 26' @ 2978.0usft (H&P 637)

rth Reference:

Survey Calculation Method: Minimum Curvature

Database: MID_Regulatory

	•		T. (D	11/0	= 0.4.1		
MD (usft)	Inc (°)	Azi (grid_north_azim	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth (°)	Closure Dista (usft)
8,504.0	23.80	174.75	8,493.7	-105.3	52.8	153.37	
8,535.0	26.10	175.35	8,521.8	-118.3	53.9	155.50	
8,567.0	28.39	176.65	8,550.2	-132.9	55.0	157.54	
8,598.0	30.22	176.30	8,577.2	-148.1	55.9	159.32	
8,630.0	31.34	177.75	8,604.7	-164.4	56.7	160.97	
8,661.0	32.42	178.40	8,631.1	-180.8	57.3	162.42	
8,693.0	32.65	178.45	8,658.0	-198.0	57.8	163.74	
8,725.0	34.02	177.86	8,684.8	-215.6	58.3	164.86	
8,756.0	35.62	177.69	8,710.2	-233.3	59.0	165.80	
8,788.0	37.45	177.15	8,735.9	-252.3	59.9	166.65	
8,819.0	39.60	177.80	8,760.2	-271.6	60.7	167.40	
8,851.0	41.43	177.46	8,784.5	-292.4	61.6	168.11	
8,882.0	44.59	177.20	8,807.2	-313.5	62.6	168.71	
8,914.0	47.81	175.89	8,829.3	-336.5	64.0	169.24	
8,946.0	51.19	173.76	8,850.1	-360.8	66.2	169.61	
8,977.0	54.84	171.63	8,868.8	-385.3	69.3	169.80	
9,009.0	59.02	169.56	8,886.2	-411.8	73.7	169.85	
9,040.0	63.29	168.65	8,901.2	-438.4	78.9	169.80	
9,072.0	68.46	167.31	8,914.2	-467.0	84.9	169.69	
9,103.0	73.33	166.18	8,924.4	-495.5	91.7	169.52	
9,133.0	77.85	164.01	8,931.8	-523.5	99.1	169.28	
9,165.0	81.81	163.87	8,937.5	-553.8	107.8	168.98	
9,196.0	83.34	163.71	8,941.5	-583.3	116.4	168.71	
9,228.0	84.58	163.42	8,944.9	-613.8	125.4	168.45	
9,323.0	85.76	163.42	8,952.9	-704.6	152.4	167.79	
9,417.0	86.38	162.61	8,959.3	-794.2	179.8	167.24	
9,512.0	87.31	162.16	8,964.5	-884.7	208.5	166.74	
9,607.0	88.28	161.28	8,968.2	-974.8	238.3	166.26	1,
9,702.0	89.53	160.63	8,970.0	-1,064.6	269.3	165.80	1,
9,796.0	89.80	162.66	8,970.6	-1,153.8	298.9	165.48	1
9,891.0	87.98	164.29	8,972.4	-1,244.8	325.9	165.33	1,
9,986.0	87.68	167.23	8,976.0	-1,336.8	349.3	165.36	1,
10,080.0	88.73	166.32	8,978.9	-1,428.3	370.8	165.45	1,
10,175.0	88.15	167.97	8,981.5	-1,520.9	391.9	165.55	1,
10,270.0	89.56	168.37	8,983.4	-1,613.8	411.4	165.70	1,
10,365.0	91.14	168.30	8,982.8	-1,706.9	430.6	165.84	1,
10,460.0	92.39	168.08	8,979.9	-1,799.8	450.0	165.96	1,
10,554.0	91.18	169.01	8,977.0	-1,891.9	468.7	166.09	1,
10,649.0	91.78	168.18	8,974.5	-1,985.0	487.4	166.20	2
10,744.0	92.05	166.87	8,971.4	-2,077.7	508.0	166.26	2,
10,838.0	89.53	166.19	8,970.1	-2,169.1	529.8	166.27	2
10,933.0	90.60	166.04	8,970.0	-2,261.3	552.6	166.27	2,
11,028.0	92.02	165.60	8,967.8	-2,353.4	575.9	166.25	2,
11,123.0	90.10	166.10	8,966.0	-2,445.5	599.1	166.23	2,

Well #22H Company: Local Co-ordinate Reference: Project: KB= 26' @ 2978.0usft (H&P 637) TVD Reference: Site: KB= 26' @ 2978.0usft (H&P 637) MD Reference: Well: North Reference: Wellbore: **Survey Calculation Method:** Minimum Curvature Design: Database: MID_Regulatory

					_ 13111	. ,	
у							
MD (usft)	Inc (°)	Azi (grid_north_azim	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth	Closure Distanc
11,217.0	89.50	167.54	8,966.4	-2,537.0	620.6	166.26	2,61
11,312.0	91.04	167.81	8,965.9	-2,629.8	640.8	166.30	2,70
11,406.0	89.16	167.18	8,965.7	-2,721.6	661.2	166.34	2,80
11,499.0	87.58	167.30	8,968.4	-2,812.2	681.7	166.37	2,89
11,591.0	87.49	167.12	8,972.4	-2,901.9	702.1	166.40	2,98
11,684.0	88.53	166.48	8,975.6	-2,992.4	723.3	166.41	3,07
11,776.0	88.79	165.10	8,977.7	-3,081.5	745.9	166.39	3,1
11,869.0	90.94	164.75	8,978.0	-3,171.3	770.1	166.35	3,2
11,961.0	92.12	164.25	8,975.5	-3,259.9	794.6	166.30	3,3
12,054.0	88.05	162.91	8,975.4	-3,349.1	820.9	166.23	3,4
12,148.0	87.98	166.02	8,978.6	-3,439.6	846.1	166.18	3,5
12,243.0	89.80	167.16	8,980.5	-3,532.0	868.1	166.19	3,6
12,338.0	89.50	164.48	8,981.0	-3,624.1	891.4	166.18	3,7
12,432.0	90.03	167.77	8,981.4	-3,715.4	913.9	166.18	3,8
12,527.0	92.15	168.95	8,979.6	-3,808.4	933.1	166.23	3,9
12,622.0	90.55	168.79	8,977.4	-3,901.6	951.4	166.30	4,0
12,717.0	91.38	167.96	8,975.8	-3,994.6	970.5	166.34	4,1
12,811.0	89.76	168.21	8,974.8	-4,086.6	989.9	166.38	4,2
12,906.0	92.69	168.30	8,972.8	-4,179.5	1,009.3	166.42	4,2
13,001.0	90.07	168.63	8,970.5	-4,272.6	1,028.3	166.47	4,3
13,096.0	88.99	166.87	8,971.3	-4,365.4	1,048.4	166.50	4,4
13,190.0	89.50	166.05	8,972.5	-4,456.8	1,070.4	166.49	4,5
13,285.0	89.09	164.72	8,973.7	-4,548.7	1,094.4	166.47	4,6
13,380.0	89.63	163.87	8,974.8	-4,640.2	1,120.1	166.43	4,7
13,474.0	90.17	162.59	8,974.9	-4,730.2	1,147.2	166.37	4,8
13,569.0	89.83	164.52	8,974.9	-4,821.3	1,174.1	166.31	4,9
13,663.0	89.06	166.40	8,975.8	-4,912.2	1,197.7	166.30	5,0
13,758.0	90.17	165.54	8,976.5	-5,004.4	1,220.8	166.29	5,1
13,853.0	88.22	166.08	8,977.8	-5,096.5	1,244.0	166.28	5,2
13,947.0	88.55	164.60	8,980.5	-5,187.4	1,267.8	166.27	5,3
14,042.0	88.08	166.57	8,983.3	-5,279.4	1,291.5	166.25	5,4
14,136.0	89.83	167.30	8,985.0	-5,370.9	1,312.7	166.27	5,5
14,231.0	91.07	165.79	8,984.2	-5,463.3	1,334.8	166.27	5,6
14,326.0	91.24	164.66	8,982.3	-5,555.1	1,359.0	166.25	5,7
14,421.0	92.09	166.93	8,979.6	-5,647.2	1,382.3	166.25	5,8
14,515.0	92.08	165.74	8,976.1	-5,738.5	1,404.5	166.25	5,9
14,610.0	90.30	167.39	8,974.2	-5,830.8	1,426.6	166.25	6,0
14,705.0	92.45	168.42	8,971.9	-5,923.7	1,446.5	166.28	6,0
14,800.0	90.67	166.69	8,969.3	-6,016.4	1,466.9	166.30	6,1
14,895.0	91.35	166.16	8,967.6	-6,108.7	1,489.2	166.30	6,2
14,990.0	91.04	164.77	8,965.6	-6,200.7	1,513.1	166.29	6,3
15,085.0	91.75	163.60	8,963.3	-6,292.1	1,539.0	166.26	6,4
15,179.0	89.16	160.15	8,962.6	-6,381.4	1,568.2	166.19	6,5
15,274.0	89.97	163.15	8,963.3	-6,471.5	1,598.1	166.13	6,6
15,369.0	90.44	164.55	8,963.0	-6,562.8	1,624.5	166.10	6,7

Company:
Project:
Site:
Well:
Wellbore:
Design:

Local Co-ordinate Reference: TVD Reference: MD Reference:

North Reference:

Survey Calculation Method: Database:

Well #22H

KB= 26' @ 2978.0usft (H&P 637) KB= 26' @ 2978.0usft (H&P 637)

Grid

Minimum Curvature MID_Regulatory

MD	Inc (°)	Azi	TVD	N/S	E/W	Closure Azimuth	Closure Distanc
(usft) 15,464.0	(°) 89.33	(grid_north_azim 165.62	(usft) 8,963.2	(usft) -6,654.6	(usft) 1,649.0	(°) 166.08	(usft) 6,855
15,559.0	89.50	167.09	8,964.1	-6,746.9	1,671.4	166.09	6,95
15,653.0	90.57	166.43	8,964.1	-6,838.4	1,692.9	166.10	7,04
15,748.0	91.74	165.98	8,962.1	-6,930.6	1,715.6	166.10	7,04
15,843.0	93.13	164.54	8,958.1	-7,022.4	1,739.7	166.09	7,10
15,938.0	91.31	163.62	8,954.4	-7,113.7	1,765.7	166.06	7,32
16,032.0	89.80	165.09	8,953.5	-7,204.2	1,791.1	166.04	7,42
16,127.0	90.81	164.35	8,953.0	-7,295.8	1,816.1	166.02	7,5
16,222.0	92.09	163.10	8,950.6	-7,387.0	1,842.7	165.99	7,61
16,317.0	92.09	162.61	8,947.7	-7,477.7	1,842.7	165.95	7,70
16,411.0	91.48	164.70	8,945.2	-7,567.9	1,897.2	165.93	7,80
16,506.0	90.67	166.06	8,943.4	-7,659.8	1,921.1	165.92	7,89
16,601.0	91.61	168.78	8,941.6	-7,752.5	1,941.8	165.94	7,99
16,695.0	89.13	169.61	8,940.9	-7,844.8	1,959.5	165.98	8,08
16,790.0	93.29	170.96	8,938.9	-7,938.4	1,975.5	166.03	8,18
16,884.0	92.75	173.47	8,934.0	-8,031.4	1,988.2	166.10	8,2
16,979.0	91.01	173.57	8,930.9	-8,125.7	1,998.9	166.18	8,3
17,075.0	89.46	172.43	8,930.5	-8,221.0	2,010.6	166.26	8,4
17,169.0	89.90	167.99	8,931.0	-8,313.6	2,026.6	166.30	8,5
17,264.0	90.27	167.65	8,930.9	-8,406.5	2,046.6	166.32	8,6
17,359.0	90.34	166.88	8,930.4	-8,499.2	2,067.6	166.33	8,7
17,453.0	90.67	166.07	8,929.5	-8,590.5	2,089.6	166.33	8,8
17,548.0	91.31	166.39	8,927.9	-8,682.8	2,112.2	166.33	8,9
17,643.0	89.83	164.76	8,926.9	-8,774.8	2,135.8	166.32	9,0
17,737.0	90.44	164.48	8,926.7	-8,865.4	2,160.8	166.30	9,1
17,832.0	91.55	165.00	8,925.1	-8,957.1	2,185.8	166.29	9,2
17,927.0	90.50	164.30	8,923.4	-9,048.7	2,210.9	166.27	9,3
18,021.0	89.97	164.30	8,923.0	-9,139.1	2,236.3	166.25	9,4
18,116.0	91.89	164.06	8,921.4	-9,230.5	2,262.2	166.23	9,5
18,211.0	92.12	164.11	8,918.1	-9,321.8	2,288.3	166.21	9,5
18,306.0	89.09	164.95	8,917.1	-9,413.4	2,313.6	166.19	9,6
18,400.0	87.01	165.67	8,920.3	-9,504.2	2,337.4	166.18	9,7
18,495.0	87.01	164.35	8,925.3	-9,595.9	2,362.0	166.17	9,8
18,590.0	87.69	163.62	8,929.7	-9,687.1	2,388.1	166.15	9,9
18,684.0	87.58	162.92	8,933.5	-9,777.0	2,415.2	166.12	10,0
18,779.0	88.39	162.20	8,936.9	-9,867.6	2,443.6	166.09	10,10
18,874.0	90.64	161.12	8,937.7	-9,957.8	2,473.5	166.05	10,26
18,969.0	92.39	160.83	8,935.2	-10,047.6	2,504.5	166.00	10,3
19,063.0 19,158.0	91.01	160.90 160.95	8,932.4 8,932.3	-10,136.3 -10,226.1	2,535.3 2,566.3	165.96 165.91	10,44 10,54
19,158.0	89.06	160.95	8,932.3	-10,226.1	2,566.3	165.91	
19,253.0	88.49	161.67	8,934.4	-10,316.1	2,596.8	165.87	10,6
19,348.0	89.33	160.03	8,936.2	-10,405.8	2,627.9	165.83	10,7

Company:	Local Co-ordinate Reference: Well #22H
Project:	TVD Reference: KB= 26' @ 2978.0usft (H&P 637)
Site:	MD Reference: KB= 26' @ 2978.0usft (H&P 637)
Well:	North Reference: Grid
Wellbore:	Survey Calculation Method: Minimum Curvature
Design:	Database: MID_Regulatory

Survey							
MD (usft)	Inc (°)	Azi (grid_north_azim	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth	Closure Distance (usft)
19,441.0	89	.50 159.67	8,937.0	-10,493.0	2,660.1	165.77	10,825.0
Final Projection to I	Bit						

Survey An	nnotations					
	Measured Depth (usft)	Vertical Depth (usft)	Local Coord +N/-S (usft)	dinates +E/-W (usft)	Comment	
	19,384.0 19,441.0	8,936.5 8,937.0	-10,439.6 -10,493.0	2,640.3 2,660.1	Final MWD Survey Final Projection to Bit	

Checked By:	Approved By:	Date: