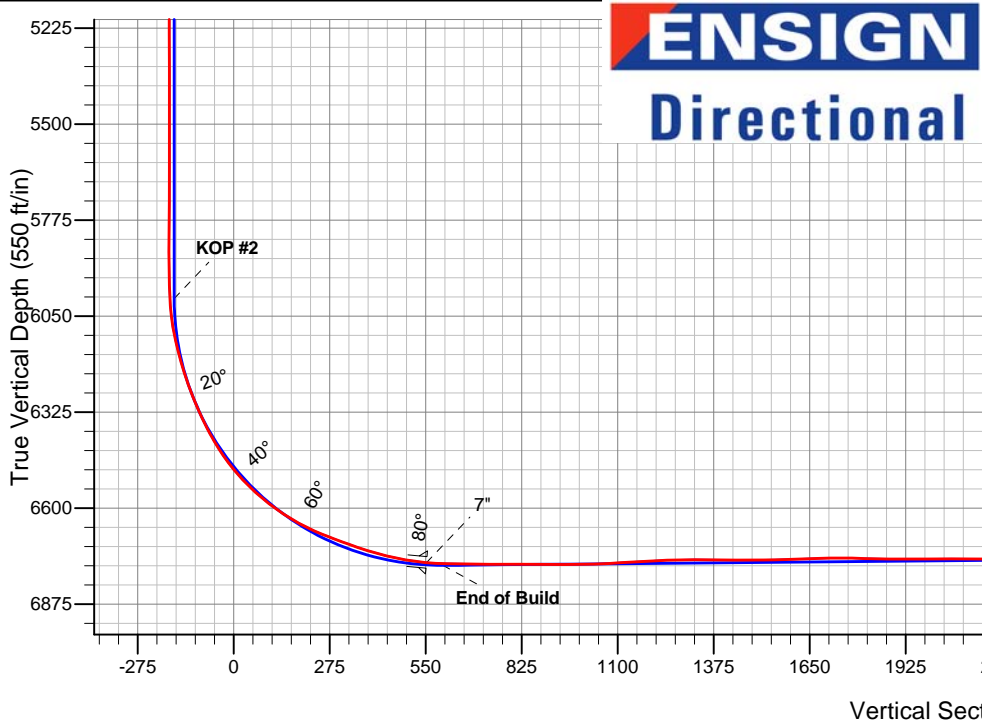
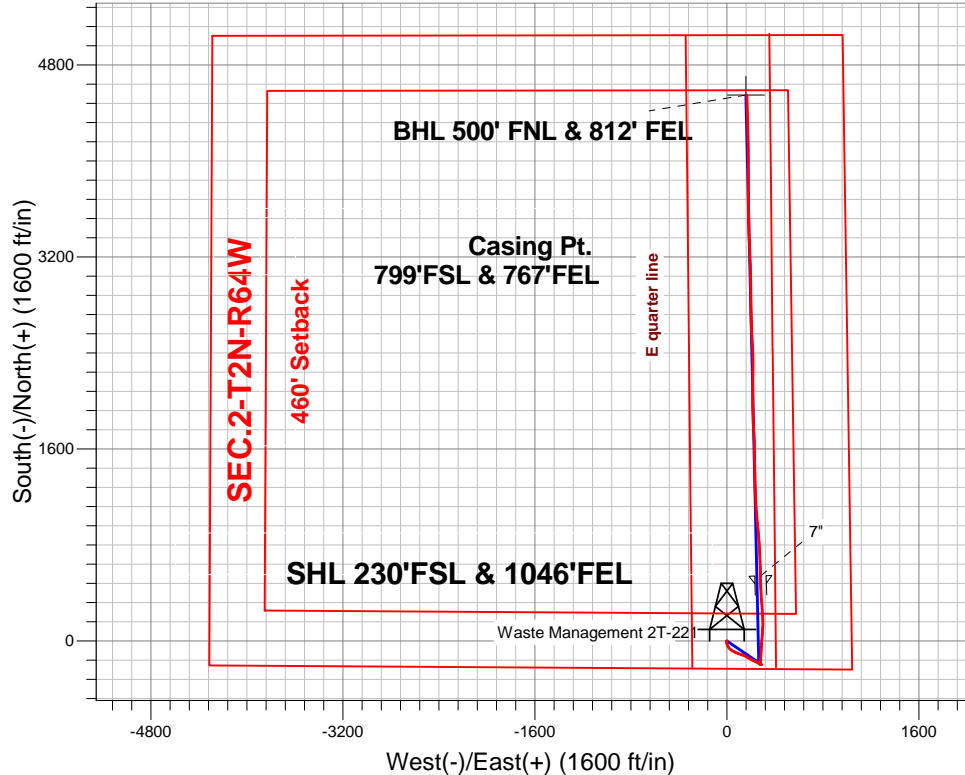


PETROLEUM DEVELOPMENT CORP Weld County CO

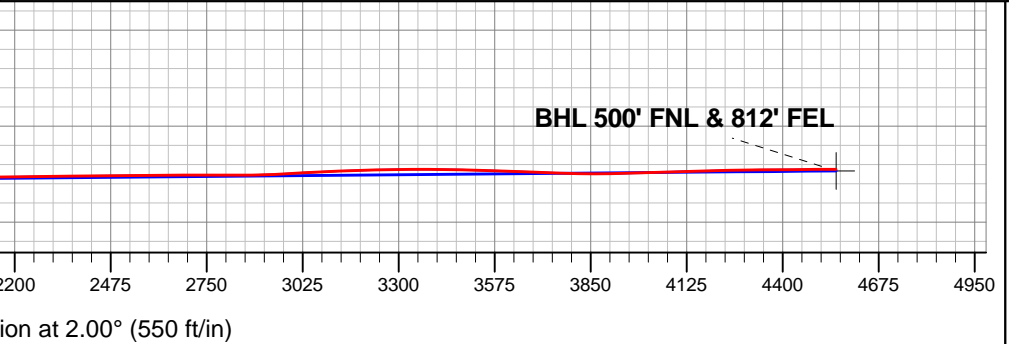
Well Name: **Waste Management 2T-221**
Surface Location: Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4893.0
+N/-S +E/-W Northing Easting Latitude Longitude Slot
0.0 0.0 1302950.93 3275890.33 40.160780 -104.512870
Ensign 119 RKB - 23' WELL @ 4916.0ft (Ensign 119 RKB - 23')

FINAL SURVEY

Projected Bottom Hole Location
11189'MD 6724'TVD 4550'N & 167'E of SHL
90.0 degree Incl @ 358.6 degree AZM



Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W Waste Management 2T-221 Wellbore #1 11:52, September 04 2013	ANNOTATIONS No annotation data is available.
LEGEND ○ Waste Management 2T-221, Wellbore #1, Plan #1 (08-20-13)R V0 □ Wellbore #1 ○ Survey #1	





PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.2-T2N-R64W

Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W

Waste Management 2T-221

Wellbore #1

Survey: Survey #1

Standard Survey Report

04 September, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Waste Management 2T-221
Project:	SEC.2-T2N-R64W	TVD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Site:	Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W	MD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Well:	Waste Management 2T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	SEC.2-T2N-R64W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W				
Site Position:		Northing:	1,302,951.63ft	Latitude:	40.160780
From:	Lat/Long	Easting:	3,275,951.82ft	Longitude:	-104.512650
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.64 °

Well	Waste Management 2T-221					
Well Position	+N-S	0.0 ft	Northing:	1,302,950.93 ft	Latitude:	40.160780
	+E-W	0.0 ft	Easting:	3,275,890.33 ft	Longitude:	-104.512870
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,893.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/20/2013	8.41	66.82	52,802

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N-S (ft)	+E-W (ft)	Direction (°)	
	0.0	0.0	0.0	2.00	

Survey Program	Date	9/4/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
169.0	11,189.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
169.0	0.70	225.90	169.0	-0.7	-0.7	-0.7	0.41	0.41	0.00
261.0	0.40	288.30	261.0	-1.0	-1.4	-1.1	0.68	-0.33	67.83
352.0	0.70	227.60	352.0	-1.3	-2.2	-1.4	0.67	0.33	-66.70
442.0	1.10	205.30	442.0	-2.4	-2.9	-2.5	0.58	0.44	-24.78
533.0	1.10	188.60	533.0	-4.1	-3.4	-4.2	0.35	0.00	-18.35
624.0	1.50	145.90	623.9	-5.9	-2.9	-6.0	1.12	0.44	-46.92
713.0	1.50	148.90	712.9	-7.9	-1.6	-8.0	0.09	0.00	3.37
804.0	1.50	151.20	803.9	-10.0	-0.5	-10.0	0.07	0.00	2.53
894.0	1.50	159.90	893.8	-12.1	0.5	-12.1	0.25	0.00	9.67
986.0	1.70	201.40	985.8	-14.5	0.4	-14.5	1.25	0.22	45.11

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Waste Management 2T-221
Project:	SEC.2-T2N-R64W	TVD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Site:	Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W	MD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Well:	Waste Management 2T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,076.0	2.20	192.30	1,075.8	-17.4	-0.4	-17.4	0.65	0.56	-10.11
1,170.0	4.30	165.60	1,169.6	-22.6	0.1	-22.6	2.70	2.23	-28.40
1,262.0	5.50	159.10	1,261.3	-30.1	2.5	-30.0	1.44	1.30	-7.07
1,357.0	6.90	158.90	1,355.7	-39.6	6.2	-39.4	1.47	1.47	-0.21
1,452.0	7.60	148.40	1,450.0	-50.3	11.5	-49.9	1.57	0.74	-11.05
1,548.0	7.50	137.60	1,545.1	-60.4	19.1	-59.7	1.48	-0.10	-11.25
1,643.0	6.90	132.50	1,639.4	-68.8	27.5	-67.8	0.92	-0.63	-5.37
1,738.0	7.80	124.30	1,733.6	-76.3	37.0	-74.9	1.45	0.95	-8.63
1,833.0	7.30	117.60	1,827.8	-82.7	47.7	-81.0	1.06	-0.53	-7.05
1,928.0	6.70	119.90	1,922.1	-88.3	57.8	-86.2	0.70	-0.63	2.42
2,024.0	7.70	116.20	2,017.3	-93.9	68.4	-91.4	1.15	1.04	-3.85
2,119.0	7.80	109.50	2,111.5	-98.9	80.2	-96.0	0.96	0.11	-7.05
2,214.0	7.00	109.20	2,205.7	-102.9	91.8	-99.6	0.84	-0.84	-0.32
2,309.0	6.60	110.00	2,300.0	-106.7	102.4	-103.0	0.43	-0.42	0.84
2,404.0	6.90	111.10	2,394.3	-110.6	112.8	-106.6	0.34	0.32	1.16
2,500.0	6.70	112.30	2,489.7	-114.8	123.4	-110.4	0.26	-0.21	1.25
2,595.0	7.10	108.60	2,584.0	-118.8	134.1	-114.0	0.63	0.42	-3.89
2,690.0	5.60	108.60	2,678.4	-122.1	144.0	-117.0	1.58	-1.58	0.00
2,785.0	4.70	112.50	2,773.0	-125.1	152.0	-119.7	1.02	-0.95	4.11
2,880.0	4.70	122.20	2,867.7	-128.7	158.9	-123.0	0.84	0.00	10.21
2,975.0	5.10	127.30	2,962.3	-133.3	165.6	-127.4	0.62	0.42	5.37
3,071.0	5.10	121.10	3,058.0	-138.1	172.6	-132.0	0.57	0.00	-6.46
3,166.0	5.50	113.90	3,152.5	-142.1	180.4	-135.7	0.82	0.42	-7.58
3,261.0	4.80	113.50	3,247.2	-145.5	188.2	-138.9	0.74	-0.74	-0.42
3,356.0	4.10	117.90	3,341.9	-148.7	194.9	-141.8	0.82	-0.74	4.63
3,451.0	5.00	125.10	3,436.6	-152.7	201.2	-145.6	1.12	0.95	7.58
3,546.0	6.00	123.70	3,531.1	-157.8	208.8	-150.4	1.06	1.05	-1.47
3,641.0	6.10	116.50	3,625.6	-162.8	217.4	-155.1	0.81	0.11	-7.58
3,737.0	5.90	114.10	3,721.1	-167.1	226.5	-159.1	0.33	-0.21	-2.50
3,832.0	5.40	114.80	3,815.6	-171.0	235.0	-162.7	0.53	-0.53	0.74
3,927.0	5.40	120.40	3,910.2	-175.1	242.9	-166.5	0.55	0.00	5.89
4,022.0	5.50	112.00	4,004.8	-179.1	251.0	-170.2	0.85	0.11	-8.84
4,117.0	4.90	116.20	4,099.4	-182.6	258.8	-173.4	0.75	-0.63	4.42
4,213.0	3.70	123.20	4,195.1	-186.1	265.1	-176.7	1.36	-1.25	7.29
4,308.0	2.70	103.90	4,290.0	-188.3	269.8	-178.8	1.53	-1.05	-20.32
4,403.0	3.30	125.90	4,384.8	-190.5	274.2	-180.7	1.35	0.63	23.16
4,498.0	3.10	98.30	4,479.7	-192.4	279.0	-182.6	1.62	-0.21	-29.05
4,593.0	2.70	110.00	4,574.6	-193.6	283.6	-183.5	0.75	-0.42	12.32
4,689.0	2.30	129.00	4,670.5	-195.6	287.3	-185.4	0.95	-0.42	19.79
4,784.0	1.20	120.10	4,765.4	-197.3	289.6	-187.0	1.19	-1.16	-9.37
4,879.0	0.60	8.80	4,860.4	-197.3	290.5	-187.0	1.60	-0.63	-117.16
4,974.0	1.30	302.50	4,955.4	-196.2	289.7	-185.9	1.26	0.74	-69.79
5,070.0	1.10	280.90	5,051.4	-195.4	287.9	-185.2	0.51	-0.21	-22.50
5,165.0	1.30	280.40	5,146.4	-195.1	285.9	-184.9	0.21	0.21	-0.53
5,260.0	1.20	276.30	5,241.4	-194.8	283.9	-184.7	0.14	-0.11	-4.32
5,355.0	1.10	287.40	5,336.3	-194.4	282.0	-184.4	0.26	-0.11	11.68
5,450.0	0.60	278.10	5,431.3	-194.0	280.7	-184.1	0.54	-0.53	-9.79
5,546.0	0.70	265.90	5,527.3	-194.0	279.6	-184.1	0.18	0.10	-12.71
5,641.0	0.40	229.20	5,622.3	-194.3	278.7	-184.4	0.47	-0.32	-38.63
5,736.0	0.40	245.00	5,717.3	-194.6	278.2	-184.8	0.12	0.00	16.63
5,831.0	0.20	150.10	5,812.3	-194.9	278.0	-185.1	0.49	-0.21	-99.89
5,926.0	0.50	298.80	5,907.3	-194.8	277.7	-185.0	0.71	0.32	156.53
6,021.0	2.70	12.50	6,002.3	-192.5	277.8	-182.6	2.74	2.32	77.58

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Waste Management 2T-221
Project:	SEC.2-T2N-R64W	TVD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Site:	Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W	MD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Well:	Waste Management 2T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,068.0	6.90	6.80	6,049.1	-188.6	278.4	-178.7	8.98	8.94	-12.13
6,117.0	10.90	4.90	6,097.5	-181.0	279.1	-171.2	8.18	8.16	-3.88
6,164.0	13.90	4.40	6,143.4	-171.0	279.9	-161.1	6.39	6.38	-1.06
6,212.0	16.20	3.70	6,189.7	-158.5	280.8	-148.6	4.81	4.79	-1.46
6,259.0	19.20	4.40	6,234.5	-144.3	281.8	-134.3	6.40	6.38	1.49
6,307.0	21.80	3.30	6,279.5	-127.5	283.0	-117.5	5.48	5.42	-2.29
6,354.0	23.80	3.20	6,322.8	-109.3	284.0	-99.3	4.26	4.26	-0.21
6,402.0	26.70	2.60	6,366.2	-88.9	285.0	-78.9	6.07	6.04	-1.25
6,449.0	30.40	2.80	6,407.5	-66.5	286.1	-56.4	7.87	7.87	0.43
6,498.0	34.00	3.90	6,448.9	-40.4	287.6	-30.3	7.44	7.35	2.24
6,545.0	39.30	4.40	6,486.6	-12.4	289.7	-2.3	11.29	11.28	1.06
6,593.0	44.20	4.90	6,522.4	19.4	292.3	29.6	10.23	10.21	1.04
6,640.0	48.00	4.20	6,555.0	53.2	294.9	63.5	8.16	8.09	-1.49
6,688.0	51.60	3.90	6,586.0	89.7	297.5	100.1	7.52	7.50	-0.63
6,735.0	56.30	0.90	6,613.7	127.7	299.1	138.1	11.25	10.00	-6.38
6,783.0	60.70	358.90	6,638.7	168.6	299.0	179.0	9.83	9.17	-4.17
6,830.0	65.10	357.00	6,660.1	210.4	297.5	220.7	10.03	9.36	-4.04
6,879.0	68.50	355.40	6,679.4	255.3	294.5	265.5	7.56	6.94	-3.27
6,926.0	70.00	355.40	6,696.1	299.1	291.0	309.1	3.19	3.19	0.00
6,974.0	71.40	355.60	6,712.0	344.3	287.4	354.1	2.94	2.92	0.42
7,021.0	73.60	356.80	6,726.1	389.0	284.4	398.7	5.28	4.68	2.55
7,069.0	76.90	358.60	6,738.3	435.4	282.6	445.0	7.77	6.88	3.75
7,138.0	81.60	358.80	6,751.2	503.1	281.0	512.7	6.82	6.81	0.29
7,178.0	84.99	358.56	6,755.8	542.9	280.1	552.3	8.51	8.48	-0.61
7"									
7,204.0	87.20	358.40	6,757.6	568.8	279.4	578.2	8.51	8.48	-0.60
7,267.0	89.10	358.00	6,759.6	631.7	277.5	641.0	3.08	3.02	-0.63
7,359.0	90.00	357.20	6,760.4	723.6	273.6	732.8	1.31	0.98	-0.87
7,450.0	89.90	356.50	6,760.4	814.5	268.6	823.4	0.78	-0.11	-0.77
7,545.0	89.20	354.20	6,761.2	909.2	260.9	917.7	2.53	-0.74	-2.42
7,640.0	91.50	354.90	6,760.6	1,003.7	251.9	1,011.9	2.53	2.42	0.74
7,735.0	93.60	355.60	6,756.4	1,098.3	244.0	1,106.2	2.33	2.21	0.74
7,831.0	92.80	357.50	6,751.0	1,194.0	238.3	1,201.6	2.14	-0.83	1.98
7,926.0	90.90	358.60	6,748.0	1,288.9	235.0	1,296.3	2.31	-2.00	1.16
8,021.0	89.00	358.80	6,748.0	1,383.8	232.9	1,391.1	2.01	-2.00	0.21
8,116.0	90.00	359.60	6,748.9	1,478.8	231.6	1,486.0	1.35	1.05	0.84
8,212.0	92.30	359.50	6,746.9	1,574.8	230.8	1,581.9	2.40	2.40	-0.10
8,307.0	91.50	357.50	6,743.8	1,669.7	228.3	1,676.7	2.27	-0.84	-2.11
8,402.0	89.20	356.60	6,743.2	1,764.6	223.4	1,771.3	2.60	-2.42	-0.95
8,497.0	88.40	357.50	6,745.2	1,859.4	218.5	1,865.9	1.27	-0.84	0.95
8,592.0	90.90	358.60	6,745.8	1,954.4	215.3	1,960.7	2.88	2.63	1.16
8,688.0	89.50	0.50	6,745.5	2,050.3	214.5	2,056.6	2.46	-1.46	1.98
8,783.0	90.10	1.70	6,745.8	2,145.3	216.4	2,151.6	1.41	0.63	1.26
8,878.0	91.30	0.70	6,744.6	2,240.3	218.4	2,246.6	1.64	1.26	-1.05
8,973.0	90.60	358.90	6,743.0	2,335.3	218.0	2,341.5	2.03	-0.74	-1.89
9,068.0	90.40	357.20	6,742.2	2,430.2	214.8	2,436.2	1.80	-0.21	-1.79
9,163.0	90.70	356.80	6,741.3	2,525.1	209.8	2,530.9	0.53	0.32	-0.42
9,259.0	90.30	357.50	6,740.5	2,621.0	205.1	2,626.5	0.84	-0.42	0.73
9,354.0	90.10	358.00	6,740.1	2,715.9	201.3	2,721.3	0.57	-0.21	0.53
9,449.0	89.50	359.60	6,740.5	2,810.9	199.3	2,816.1	1.80	-0.63	1.68
9,544.0	92.00	0.30	6,739.2	2,905.8	199.3	2,911.0	2.73	2.63	0.74
9,640.0	93.40	358.80	6,734.7	3,001.7	198.5	3,006.8	2.14	1.46	-1.56

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Waste Management 2T-221
Project:	SEC.2-T2N-R64W	TVD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Site:	Waste Management 2T-HZ1 Pad Sec.2-T2N-R64W	MD Reference:	WELL @ 4916.0ft (Ensign 119 RKB - 23')
Well:	Waste Management 2T-221	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
9,735.0	92.70	358.00	6,729.6	3,096.6	195.9	3,101.5	1.12	-0.74	-0.84	
9,830.0	91.40	358.40	6,726.2	3,191.4	192.9	3,196.2	1.43	-1.37	0.42	
9,925.0	91.10	357.50	6,724.2	3,286.4	189.5	3,291.0	1.00	-0.32	-0.95	
10,021.0	89.40	357.30	6,723.8	3,382.3	185.1	3,386.7	1.78	-1.77	-0.21	
10,116.0	89.00	358.60	6,725.1	3,477.2	181.7	3,481.4	1.43	-0.42	1.37	
10,211.0	88.10	358.90	6,727.5	3,572.1	179.6	3,576.2	1.00	-0.95	0.32	
10,306.0	87.50	359.80	6,731.1	3,667.1	178.6	3,671.1	1.14	-0.63	0.95	
10,401.0	88.10	0.30	6,734.8	3,762.0	178.7	3,765.9	0.82	0.63	0.53	
10,496.0	90.00	0.20	6,736.4	3,857.0	179.1	3,860.9	2.00	2.00	-0.11	
10,592.0	91.80	0.20	6,734.8	3,952.9	179.4	3,956.8	1.88	1.88	0.00	
10,687.0	91.30	358.80	6,732.3	4,047.9	178.6	4,051.7	1.56	-0.53	-1.47	
10,782.0	92.10	358.60	6,729.5	4,142.8	176.4	4,146.5	0.87	0.84	-0.21	
10,878.0	91.20	358.60	6,726.7	4,238.8	174.1	4,242.3	0.94	-0.94	0.00	
10,973.0	90.70	358.80	6,725.1	4,333.7	171.9	4,337.1	0.57	-0.53	0.21	
11,068.0	90.40	358.60	6,724.2	4,428.7	169.8	4,431.9	0.38	-0.32	-0.21	
11,129.0	90.00	358.60	6,724.0	4,489.7	168.3	4,492.8	0.66	-0.66	0.00	
11,189.0	90.00	358.60	6,724.0	4,549.7	166.8	4,552.7	0.00	0.00	0.00	
BHL 500' FNL & 820' FEL										

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")	
7,178.0	6,755.8	7"	7	7-1/2	

Checked By: _____	Approved By: _____	Date: _____
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