

1 General

1.1 Customer Information

Company	PICEANCE VLY
Representative	
Address	

1.2 Well/Wellbore Information

Well	PA 431-21	Wellbore No.	OH
Wellbore Legal Name	PA 431-21	Common Wellbore Name	PA 431-21
Project	PA 21-06S-095W	Site	PA 22-21 Pad
Vertical Section Azimuth	52.61 (°)	North reference	True
Origin N/S		Origin E/W	
Spud date	10/1/2013	UWI	PA 431-21
Active datum	KB @6,056.0ft (above Mean Sea Level)		

2 Survey Name

2.1 Survey Name: Survey #1

Survey Name	Survey #1	Company	MOSTAR
Date Started	10/1/2013	Ended	
Tool Name	MWD	Engineer	

2.1.1 Tie On Point

MD (ft)	Inc. (°)	Azi. (°)	TVD (ft)	N/S (ft)	E/W (ft)
0.0	0.00	0.00	0.00	0.00	0.00

2.1.2 Survey Stations

Date	Type	MD (ft)	Inc. (°)	Azi. (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. sec. (ft)	DLS (°/100usft)	Build Rate (°/100usft)	Turn (°/100usft)	Tface (°)
10/1/2013	Tie On	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/1/2013	NORMAL	147.0	0.26	286.84	147.00	0.10	-0.32	-0.19	0.18	0.18	0.00	286.84
	NORMAL	178.0	0.31	53.93	178.00	0.17	-0.32	-0.15	1.65	0.16	409.97	151.05
	NORMAL	207.0	0.92	78.71	207.00	0.26	-0.03	0.14	2.25	2.10	85.45	36.28
	NORMAL	238.0	1.32	109.83	237.99	0.19	0.55	0.55	2.30	1.29	100.39	72.88
	NORMAL	268.0	1.58	95.94	267.98	0.03	1.29	1.04	1.45	0.87	-46.30	299.41
	NORMAL	299.0	2.73	88.56	298.96	0.00	2.45	1.95	3.81	3.71	-23.81	342.73
	NORMAL	329.0	2.99	81.26	328.92	0.14	3.94	3.21	1.49	0.87	-24.33	301.84
	NORMAL	359.0	3.82	86.80	358.87	0.31	5.71	4.73	2.97	2.77	18.47	24.41
	NORMAL	390.0	4.35	82.23	389.79	0.53	7.91	6.60	2.01	1.71	-14.74	326.15
	NORMAL	421.0	4.63	84.95	420.70	0.79	10.29	8.66	0.89	0.58	8.77	50.84
	NORMAL	451.0	5.45	85.13	450.58	1.02	12.89	10.86	3.07	3.07	0.60	1.06
	NORMAL	481.0	6.86	81.44	480.41	1.41	16.08	13.63	4.88	4.70	-12.30	342.49
	NORMAL	511.0	8.40	74.93	510.15	2.24	19.97	17.23	5.88	5.13	-21.70	327.44
	NORMAL	541.0	9.67	69.31	539.77	3.70	24.44	21.67	5.15	4.23	-18.73	322.41
	NORMAL	572.0	10.88	68.78	570.29	5.66	29.56	26.92	3.27	3.26	-1.71	354.44
	NORMAL	603.0	12.62	67.73	600.65	7.99	35.37	32.95	6.30	6.26	-3.39	353.25
	NORMAL	633.0	13.98	67.64	629.84	10.61	41.75	39.62	4.53	4.53	-0.30	359.08
	NORMAL	664.0	15.87	68.25	659.79	13.60	49.15	47.31	6.12	6.10	1.97	5.05
	NORMAL	694.0	17.98	69.40	688.49	16.75	57.30	55.70	7.12	7.03	3.83	9.57
	NORMAL	725.0	20.40	67.64	717.77	20.49	66.78	65.50	8.03	7.81	-5.68	345.72

2.1.2 Survey Stations (Continued)

Date	Type	MD (ft)	Inc. (°)	Azi. (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. sec. (ft)	DLS (°/100usft)	Build Rate (°/100usft)	Turn (°/100usft)	Tface (°)
10/1/2013	NORMAL	755.0	22.90	65.00	745.65	24.95	76.90	76.25	8.94	8.33	-8.80	337.48
	NORMAL	786.0	24.92	61.75	773.99	30.59	88.12	88.59	7.78	6.52	-10.48	325.40
	NORMAL	816.0	25.80	58.00	801.10	37.04	99.23	101.33	6.10	2.93	-12.50	297.01
	NORMAL	847.0	26.37	54.38	828.94	44.63	110.55	114.93	5.45	1.84	-11.68	288.07
	NORMAL	877.0	26.29	52.00	855.83	52.60	121.20	128.23	3.53	-0.27	-7.93	264.60
	NORMAL	907.0	26.73	51.29	882.68	60.91	131.70	141.62	1.81	1.47	-2.37	323.92
	NORMAL	967.0	27.43	50.24	936.10	78.18	152.85	168.92	1.41	1.17	-1.75	325.20
	NORMAL	1,062.0	26.29	52.34	1,020.85	105.04	186.33	211.83	1.56	-1.20	2.21	141.16
10/4/2013	NORMAL	1,140.0	27.96	52.96	1,090.27	126.61	214.60	247.39	2.17	2.14	0.79	9.88
	NORMAL	1,255.0	29.27	53.05	1,191.22	159.75	258.59	302.46	1.14	1.14	0.08	1.92
	NORMAL	1,350.0	27.39	51.29	1,274.84	187.37	294.21	347.53	2.17	-1.98	-1.85	203.18
	NORMAL	1,445.0	27.60	51.20	1,359.11	214.83	328.41	391.38	0.23	0.22	-0.09	348.77
	NORMAL	1,540.0	28.00	50.59	1,443.15	242.78	362.79	435.67	0.52	0.42	-0.64	324.31
	NORMAL	1,636.0	28.61	50.15	1,527.67	271.81	397.85	481.15	0.67	0.64	-0.46	340.92
	NORMAL	1,731.0	26.07	51.38	1,612.05	299.42	431.62	524.75	2.74	-2.67	1.29	168.01
	NORMAL	1,826.0	25.76	51.64	1,697.50	325.26	464.12	566.26	0.35	-0.33	0.27	159.99
	NORMAL	1,922.0	24.53	51.91	1,784.40	350.50	496.16	607.05	1.29	-1.28	0.28	174.79
	NORMAL	2,017.0	25.80	52.87	1,870.38	375.15	528.17	647.44	1.40	1.34	1.01	18.25
	NORMAL	2,112.0	26.64	53.40	1,955.61	400.33	561.75	689.42	0.92	0.88	0.56	15.81
	NORMAL	2,207.0	27.43	53.05	2,040.22	426.18	596.34	732.59	0.85	0.83	-0.37	348.46
	NORMAL	2,302.0	28.70	52.61	2,124.05	453.18	631.95	777.29	1.35	1.34	-0.46	350.55
	NORMAL	2,398.0	27.34	53.84	2,208.80	480.19	668.06	822.38	1.54	-1.42	1.28	157.52
	NORMAL	2,493.0	28.88	53.22	2,292.59	506.80	704.05	867.13	1.65	1.62	-0.65	348.99
	NORMAL	2,588.0	27.03	52.43	2,376.50	533.70	739.54	911.66	1.99	-1.95	-0.83	190.97
	NORMAL	2,683.0	28.40	52.70	2,460.60	560.55	774.62	955.84	1.45	1.44	0.28	5.36
	NORMAL	2,779.0	27.60	52.34	2,545.36	587.98	810.39	1,000.91	0.85	-0.83	-0.38	191.77
	NORMAL	2,875.0	28.92	52.79	2,629.92	615.60	846.48	1,046.37	1.39	1.38	0.47	9.37
	NORMAL	2,970.0	27.56	53.22	2,713.61	642.65	882.38	1,091.31	1.45	-1.43	0.45	171.88
	NORMAL	3,064.0	28.28	51.03	2,796.68	669.67	917.10	1,135.31	1.32	0.74	-2.33	303.36
	NORMAL	3,159.0	28.61	49.97	2,880.22	698.44	952.00	1,180.51	0.65	0.37	-1.12	304.27
	NORMAL	3,255.0	28.57	50.24	2,964.51	727.91	987.25	1,226.40	0.14	-0.04	0.28	107.32
	NORMAL	3,350.0	27.78	50.94	3,048.26	756.39	1,021.90	1,271.23	0.90	-0.83	0.74	157.60
	NORMAL	3,445.0	27.12	50.85	3,132.56	784.01	1,055.89	1,315.00	0.70	-0.69	-0.09	183.56
	NORMAL	3,540.0	28.48	50.94	3,216.59	811.96	1,090.27	1,359.29	1.43	1.43	0.09	1.81
10/5/2013	NORMAL	3,636.0	30.02	50.76	3,300.35	841.57	1,126.64	1,408.17	1.61	1.60	-0.19	356.65
	NORMAL	3,731.0	28.18	52.16	3,383.36	870.37	1,162.77	1,452.36	2.07	-1.94	1.47	160.30
	NORMAL	3,826.0	28.26	53.05	3,467.07	897.65	1,198.45	1,497.28	0.45	0.08	0.94	78.63
	NORMAL	3,922.0	27.25	53.31	3,552.02	924.44	1,234.24	1,541.99	1.06	-1.05	0.27	173.28
	NORMAL	4,017.0	26.42	53.49	3,636.79	950.01	1,268.67	1,584.87	0.88	-0.87	0.19	174.49
	NORMAL	4,112.0	26.11	53.75	3,721.98	974.95	1,302.52	1,626.90	0.35	-0.33	0.27	159.75
	NORMAL	4,208.0	25.89	54.10	3,808.27	999.73	1,336.53	1,668.97	0.28	-0.23	0.36	145.26
	NORMAL	4,303.0	26.68	51.20	3,893.45	1,025.26	1,369.95	1,711.03	1.59	0.83	-3.05	300.29
	NORMAL	4,398.0	26.24	50.76	3,978.49	1,051.90	1,402.84	1,753.34	0.51	-0.46	-0.46	203.82
	NORMAL	4,494.0	27.47	51.82	4,064.14	1,079.02	1,436.68	1,796.69	1.37	1.28	1.10	21.74
	NORMAL	4,589.0	28.22	52.08	4,148.14	1,106.36	1,471.63	1,841.06	0.80	0.79	0.27	9.31
	NORMAL	4,684.0	27.91	52.34	4,231.97	1,133.75	1,506.95	1,885.76	0.35	-0.33	0.27	158.58
	NORMAL	4,779.0	27.47	52.61	4,316.09	1,160.64	1,541.96	1,929.90	0.48	-0.46	0.28	164.20
	NORMAL	4,873.0	27.60	52.08	4,399.44	1,187.19	1,576.36	1,973.36	0.30	0.14	-0.56	297.71
	NORMAL	4,968.0	27.78	51.38	4,483.56	1,214.53	1,611.02	2,017.50	0.39	0.19	-0.74	298.65
	NORMAL	5,063.0	27.47	52.28	4,567.73	1,241.76	1,645.64	2,061.54	0.54	-0.33	0.93	127.61
10/6/2013	NORMAL	5,158.0	27.16	50.85	4,652.14	1,268.86	1,679.79	2,105.12	0.76	-0.33	-1.48	243.77
	NORMAL	5,254.0	27.43	50.85	4,737.45	1,296.66	1,713.92	2,149.13	0.28	0.28	0.00	0.00
	NORMAL	5,349.0	27.69	50.50	4,821.67	1,324.51	1,747.93	2,193.06	0.32	0.27	-0.37	327.93
	NORMAL	5,444.0	26.50	51.91	4,906.25	1,351.63	1,781.64	2,236.31	1.42	-1.25	1.48	152.27
	NORMAL	5,539.0	23.91	51.73	4,992.19	1,376.63	1,813.44	2,276.76	2.73	-2.73	-0.19	181.61
	NORMAL	5,635.0	23.43	51.55	5,080.12	1,400.55	1,843.66	2,315.29	0.51	-0.50	-0.19	188.48

2.1.2 Survey Stations (Continued)

Date	Type	MD (ft)	Inc. (°)	Azi. (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. sec. (ft)	DLS (°/100usft)	Build Rate (°/100usft)	Turn (°/100usft)	Tface (°)
10/6/2013	NORMAL	5,730.0	22.50	51.55	5,167.59	1,423.60	1,872.89	2,352.35	0.98	-0.98	0.00	180.00
	NORMAL	5,825.0	22.59	50.94	5,255.33	1,446.40	1,901.09	2,388.77	0.26	0.09	-0.64	290.77
	NORMAL	5,920.0	23.30	50.85	5,342.81	1,469.76	1,929.83	2,425.78	0.75	0.75	-0.09	357.13
	NORMAL	6,016.0	21.80	53.75	5,431.47	1,492.29	1,958.93	2,462.59	1.94	-1.56	3.02	144.78
10/7/2013	NORMAL	6,111.0	18.86	54.63	5,520.54	1,511.61	1,985.69	2,495.58	3.11	-3.09	0.93	174.48
	NORMAL	6,207.0	17.67	54.19	5,611.71	1,529.12	2,010.16	2,525.65	1.25	-1.24	-0.46	186.40
	NORMAL	6,302.0	16.26	53.66	5,702.57	1,545.44	2,032.56	2,553.36	1.49	-1.48	-0.56	186.01
	NORMAL	6,397.0	14.77	53.40	5,794.11	1,560.54	2,053.00	2,578.77	1.57	-1.57	-0.27	182.55
	NORMAL	6,493.0	14.77	52.79	5,886.93	1,575.23	2,072.57	2,603.24	0.16	0.00	-0.64	269.71
10/8/2013	NORMAL	6,588.0	13.67	53.40	5,979.02	1,589.25	2,091.23	2,628.58	1.17	-1.16	0.64	172.54
	NORMAL	6,684.0	14.59	53.05	6,072.12	1,603.28	2,110.00	2,650.01	0.96	0.96	-0.36	354.52
	NORMAL	6,779.0	14.81	53.40	6,164.01	1,617.72	2,129.31	2,674.11	0.25	0.23	0.37	22.15
	NORMAL	6,874.0	14.86	54.54	6,255.84	1,632.02	2,148.98	2,698.43	0.31	0.05	1.20	80.83
	NORMAL	6,969.0	13.01	54.19	6,348.04	1,645.35	2,167.57	2,721.30	1.95	-1.95	-0.37	182.44
	NORMAL	7,064.0	10.55	53.66	6,441.03	1,656.76	2,183.25	2,740.88	2.59	-2.59	-0.56	182.26
	NORMAL	7,159.0	9.01	51.47	6,534.65	1,666.55	2,196.08	2,756.82	1.67	-1.62	-2.31	192.50
	NORMAL	7,254.0	7.30	49.62	6,628.69	1,675.09	2,206.50	2,770.28	1.82	-1.80	-1.95	187.81
10/9/2013	NORMAL	7,350.0	4.53	47.25	6,724.17	1,681.62	2,213.93	2,780.15	2.90	-2.89	-2.47	183.86
	NORMAL	7,445.0	3.69	43.03	6,818.92	1,686.40	2,218.77	2,786.90	0.94	-0.88	-4.44	197.71
	NORMAL	7,541.0	3.34	41.97	6,914.74	1,690.74	2,222.75	2,792.70	0.37	-0.36	-1.10	189.99
	NORMAL	7,636.0	2.94	44.88	7,009.60	1,694.52	2,226.32	2,797.83	0.45	-0.42	3.06	159.72
	NORMAL	7,731.0	2.55	48.92	7,104.49	1,697.63	2,229.63	2,802.35	0.46	-0.41	4.25	155.62
	NORMAL	7,827.0	2.07	54.02	7,200.41	1,700.06	2,232.64	2,806.22	0.54	-0.50	5.31	159.35
	NORMAL	7,922.0	1.50	50.94	7,295.37	1,701.85	2,234.99	2,809.17	0.61	-0.60	-3.24	188.02
	NORMAL	8,018.0	1.45	39.95	7,391.33	1,703.57	2,236.75	2,811.62	0.30	-0.05	-11.45	254.51
	NORMAL	8,113.0	1.54	47.77	7,486.30	1,705.35	2,238.47	2,814.06	0.23	0.09	8.23	70.14
	NORMAL	8,209.0	1.23	56.04	7,582.27	1,706.79	2,240.28	2,816.37	0.38	-0.32	8.61	151.27
	NORMAL	8,304.0	1.01	64.83	7,677.26	1,707.72	2,241.88	2,818.21	0.29	-0.23	9.25	146.35
	NORMAL	8,399.0	0.66	103.50	7,772.25	1,707.95	2,243.17	2,819.37	0.68	-0.37	40.71	140.18
10/10/2013	NORMAL	8,495.0	0.35	146.39	7,868.24	1,707.57	2,243.87	2,819.70	0.49	-0.32	44.68	149.45
	NORMAL	8,590.0	0.83	136.10	7,963.24	1,708.84	2,244.51	2,819.76	0.52	0.51	-10.83	342.37
	NORMAL	8,685.0	1.54	215.47	8,058.22	1,705.30	2,244.24	2,818.62	1.69	0.75	83.55	109.83
	NORMAL	8,781.0	1.54	219.25	8,154.19	1,703.25	2,242.68	2,816.13	0.11	0.00	3.94	91.89
	NORMAL	8,971.0	1.50	243.60	8,344.12	1,700.17	2,238.84	2,811.21	0.34	-0.02	12.82	105.66
	NORMAL	9,067.0	1.85	242.10	8,440.08	1,698.88	2,236.34	2,808.45	0.37	0.36	-1.56	352.11
	NORMAL	9,445.0	1.85	242.10	8,817.89	1,693.17	2,225.56	2,796.41	0.00	0.00	0.00	0.00