

## 1 General

### 1.1 Customer Information

Company	PICEANCE VLY
Representative	
Address	

### 1.2 Well/Wellbore Information

Well	PA 531-21	Wellbore No.	OH
Wellbore Legal Name	PA 531-21	Common Wellbore Name	PA 531-21
Project	PA 21-06S-095W	Site	PA 22-21 Pad
Vertical Section Azimuth	57.42 (°)	North reference	True
Origin N/S		Origin E/W	
Spud date	10/12/2013	UWI	PA 531-21
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	10/12/2013	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 (°)
10/12/2013	Tie On	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/12/2013	NORMAL	131.0	0.26	43.15	131.00	0.22	0.20	0.29	0.20	0.20	0.00	43.15
	NORMAL	161.0	0.79	81.39	161.00	0.30	0.45	0.54	2.02	1.77	127.47	53.60
	NORMAL	191.0	0.79	85.96	191.00	0.34	0.87	0.91	0.21	0.00	15.23	92.28
	NORMAL	222.0	1.58	76.29	221.99	0.46	1.49	1.51	2.62	2.55	-31.19	340.93
	NORMAL	253.0	1.67	82.00	252.98	0.62	2.36	2.32	0.60	0.29	18.42	63.81
	NORMAL	283.0	1.58	75.76	282.96	0.79	3.19	3.11	0.66	-0.30	-20.80	239.95
	NORMAL	314.0	2.02	67.85	313.95	1.10	4.11	4.05	1.63	1.42	-25.52	326.56
	NORMAL	344.0	2.64	68.73	343.92	1.55	5.24	5.25	2.07	2.07	2.93	3.74
	NORMAL	375.0	2.82	67.85	374.89	2.09	6.62	6.70	0.60	0.58	-2.84	346.45
	NORMAL	405.0	3.43	63.54	404.84	2.77	8.10	8.32	2.18	2.03	-14.37	336.77
	NORMAL	436.0	4.13	71.37	435.78	3.54	9.99	10.33	2.80	2.26	25.26	40.36
	NORMAL	466.0	5.37	65.48	465.67	4.47	12.29	12.76	4.44	4.13	-19.63	335.58
	NORMAL	497.0	6.16	73.04	496.52	5.56	15.20	15.80	3.53	2.55	24.39	47.67
10/13/2013	NORMAL	528.0	6.33	75.32	527.33	6.47	18.45	19.03	0.97	0.55	7.35	58.71
	NORMAL	557.0	6.95	76.55	556.14	7.29	21.70	22.21	2.19	2.14	4.24	13.53
	NORMAL	587.0	7.57	71.19	585.90	8.35	25.33	25.84	3.06	2.07	-17.87	309.79
	NORMAL	616.0	8.27	74.97	616.60	9.58	29.42	29.95	2.81	2.26	12.19	38.53
	NORMAL	649.0	9.33	73.74	647.24	10.87	33.99	34.49	3.47	3.42	-3.97	349.33
	NORMAL	681.0	9.59	73.74	678.80	12.34	39.04	39.54	0.81	0.81	0.00	0.00
	NORMAL	709.0	9.77	68.12	706.40	13.88	43.48	44.11	3.43	0.64	-20.07	278.01

## 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 (°)
10/13/2013	NORMAL	750.0	11.48	69.11	746.70	16.63	50.52	51.52	4.19	4.17	2.41	6.58
	NORMAL	780.0	12.57	67.54	776.04	18.94	56.33	57.66	3.79	3.63	-5.23	342.53
	NORMAL	871.0	14.68	64.73	864.48	27.65	75.91	78.85	2.43	2.32	-3.09	341.21
	NORMAL	963.0	16.55	64.73	953.08	38.22	98.30	103.41	2.03	2.03	0.00	0.00
	NORMAL	1,058.0	16.27	59.72	1,044.21	50.70	122.03	130.13	1.52	-0.29	-5.27	256.41
	NORMAL	1,153.0	18.59	61.11	1,134.84	64.73	146.78	158.54	2.48	2.44	1.46	10.84
	NORMAL	1,249.0	20.29	61.64	1,225.37	80.03	174.83	190.42	1.78	1.77	0.55	6.17
	NORMAL	1,344.0	22.47	62.74	1,313.83	96.17	205.47	224.92	2.33	2.29	1.16	10.94
	NORMAL	1,439.0	24.34	61.30	1,401.01	113.89	238.78	262.54	2.06	1.97	-1.52	342.33
	NORMAL	1,534.0	25.69	59.53	1,487.10	133.74	273.70	302.65	1.62	1.42	-1.86	330.19
	NORMAL	1,629.0	27.54	59.31	1,572.03	155.39	310.34	345.18	1.95	1.95	-0.23	356.85
	NORMAL	1,685.0	27.80	59.25	1,621.62	168.67	332.70	371.17	0.47	0.46	-0.11	353.86
10/14/2013	NORMAL	1,731.0	28.61	58.05	1,662.16	179.99	351.26	392.91	2.15	1.76	-2.61	324.47
	NORMAL	1,826.0	29.23	57.61	1,745.31	204.45	390.15	438.84	0.69	0.65	-0.46	340.87
	NORMAL	1,922.0	28.22	53.65	1,829.50	230.46	428.22	484.94	2.24	-1.05	-4.13	240.32
	NORMAL	2,017.0	28.26	51.81	1,913.20	257.68	463.99	529.73	0.92	0.04	-1.94	271.82
	NORMAL	2,112.0	27.03	53.04	1,997.35	284.57	498.92	573.64	1.43	-1.29	1.29	155.65
	NORMAL	2,207.0	27.03	53.04	2,081.98	310.52	533.42	616.69	0.00	0.00	0.00	0.00
	NORMAL	2,302.0	26.77	53.57	2,166.70	336.21	567.88	659.56	0.37	-0.27	0.56	137.55
	NORMAL	2,398.0	25.76	56.55	2,252.79	360.55	602.68	701.99	1.73	-1.05	3.10	128.78
	NORMAL	2,493.0	25.89	57.79	2,338.30	382.98	637.46	743.37	0.58	0.14	1.31	77.03
	NORMAL	2,588.0	27.21	60.25	2,423.28	404.82	673.86	785.81	1.81	1.39	2.59	40.90
	NORMAL	2,683.0	28.84	61.30	2,507.14	426.60	712.82	830.37	1.79	1.72	1.11	17.30
	NORMAL	2,779.0	28.57	60.86	2,591.34	448.89	753.18	876.38	0.36	-0.28	-0.46	217.86
	NORMAL	2,874.0	27.69	62.18	2,675.12	470.26	792.54	921.05	1.13	-0.93	1.39	145.31
	NORMAL	2,970.0	28.75	61.65	2,759.71	491.63	832.59	966.31	1.13	1.10	-0.55	346.46
10/15/2013	NORMAL	3,064.0	27.65	58.75	2,842.56	513.68	871.14	1,010.66	1.87	-1.17	-3.09	229.97
	NORMAL	3,159.0	27.56	60.51	2,926.74	535.94	909.11	1,054.64	0.86	-0.09	1.85	97.08
	NORMAL	3,255.0	27.96	58.40	3,011.70	558.66	947.61	1,099.32	1.11	0.42	-2.20	291.21
	NORMAL	3,350.0	27.56	55.85	3,095.77	582.67	984.77	1,143.56	1.32	-0.42	-2.68	250.26
	NORMAL	3,445.0	27.56	56.12	3,179.99	607.26	1,021.20	1,187.50	0.13	0.00	0.28	90.12
	NORMAL	3,541.0	27.16	56.64	3,265.25	631.69	1,057.94	1,231.61	0.49	-0.42	0.54	149.37
	NORMAL	3,636.0	26.33	56.91	3,350.08	655.12	1,093.70	1,274.36	0.88	-0.87	0.28	171.79
	NORMAL	3,731.0	27.21	55.76	3,434.90	678.84	1,129.31	1,317.14	1.07	0.93	-1.21	329.00
	NORMAL	3,826.0	27.91	55.68	3,519.12	703.60	1,165.63	1,361.08	0.74	0.74	-0.08	356.94
	NORMAL	3,922.0	27.16	55.15	3,604.25	728.78	1,202.17	1,405.43	0.82	-0.78	-0.55	197.86
	NORMAL	4,017.0	28.09	56.64	3,688.42	753.47	1,238.64	1,449.46	1.22	0.98	1.57	37.27
	NORMAL	4,113.0	27.87	58.12	3,773.20	778.41	1,276.15	1,494.49	0.34	-0.23	-0.54	227.73
	NORMAL	4,208.0	27.82	56.03	3,857.20	803.18	1,312.97	1,538.85	0.07	-0.05	-0.09	220.02
	NORMAL	4,303.0	26.99	56.20	3,941.54	827.56	1,349.27	1,582.57	0.88	-0.87	0.18	174.69
	NORMAL	4,399.0	27.65	56.65	4,026.83	851.92	1,385.98	1,626.62	0.72	0.69	0.47	17.58
	NORMAL	4,494.0	28.84	57.26	4,110.51	876.43	1,423.67	1,671.58	1.29	1.25	0.64	13.90
	NORMAL	4,589.0	28.75	56.99	4,193.77	901.27	1,462.10	1,717.33	0.17	-0.09	-0.28	235.20
	NORMAL	4,685.0	28.57	56.12	4,278.01	926.64	1,500.51	1,763.37	0.47	-0.19	-0.91	246.28
	NORMAL	4,779.0	28.40	58.49	4,360.63	950.86	1,538.23	1,808.19	1.22	-0.18	2.52	99.59
	NORMAL	4,873.0	28.92	59.10	4,443.11	974.21	1,576.80	1,853.26	0.63	0.55	0.65	29.63
	NORMAL	4,969.0	27.12	58.58	4,527.86	997.54	1,615.39	1,898.35	1.89	-1.88	-0.54	187.50
	NORMAL	5,063.0	27.30	59.28	4,611.46	1,019.72	1,652.21	1,941.31	0.39	0.19	0.74	60.96
10/16/2013	NORMAL	5,159.0	27.96	58.58	4,696.51	1,042.70	1,690.34	1,985.82	0.77	0.69	-0.73	333.50
	NORMAL	5,254.0	25.80	57.52	4,781.24	1,065.42	1,726.79	2,028.76	2.33	-2.27	-1.12	192.04
	NORMAL	5,349.0	25.76	58.05	4,866.78	1,087.44	1,761.74	2,070.08	0.25	-0.04	0.56	100.08
	NORMAL	5,444.0	26.50	57.17	4,952.07	1,109.86	1,797.07	2,111.92	0.88	0.78	-0.93	331.96
	NORMAL	5,540.0	26.20	57.17	5,038.10	1,132.96	1,832.87	2,154.52	0.31	-0.31	0.00	180.00
	NORMAL	5,635.0	25.14	56.82	5,123.72	1,155.37	1,867.39	2,195.68	1.13	-1.12	-0.37	187.98
	NORMAL	5,730.0	24.40	55.32	5,209.98	1,177.58	1,900.41	2,235.46	1.02	-0.78	-1.58	219.66
	NORMAL	5,825.0	24.31	55.06	5,296.53	1,199.95	1,932.58	2,274.61	0.15	-0.09	-0.27	229.87

## 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)	Bulld Rate (°/100usft)	Turn (°/100usft)	Tface (°)
10/16/2013	NORMAL	5,920.0	22.15	56.73	5,383.82	1,220.97	1,963.59	2,312.06	2.38	-2.27	1.76	163.81
	NORMAL	6,016.0	21.36	57.96	5,472.99	1,240.18	1,993.54	2,347.64	0.95	-0.82	1.28	150.58
	NORMAL	6,112.0	20.88	58.66	5,562.54	1,258.35	2,022.97	2,382.23	0.56	-0.50	0.73	152.61
	NORMAL	6,207.0	18.02	58.75	5,652.11	1,274.78	2,050.00	2,413.85	3.01	-3.01	0.09	179.44
10/17/2013	NORMAL	6,302.0	17.50	59.98	5,742.58	1,289.55	2,074.93	2,442.81	0.67	-0.55	1.29	144.77
	NORMAL	6,398.0	16.44	56.12	5,834.40	1,304.35	2,098.70	2,470.81	1.61	-1.10	-4.02	224.91
10/18/2013	NORMAL	6,493.0	16.04	56.55	5,925.61	1,319.07	2,120.82	2,497.38	0.44	-0.42	0.45	163.47
	NORMAL	6,590.0	13.76	55.32	6,019.34	1,333.03	2,141.49	2,522.31	2.37	-2.35	-1.27	187.30
	NORMAL	6,686.0	13.28	55.24	6,112.68	1,345.81	2,159.93	2,544.73	0.50	-0.50	-0.08	182.19
	NORMAL	6,781.0	12.00	56.82	6,205.38	1,357.44	2,177.16	2,565.51	1.40	-1.35	1.66	165.65
	NORMAL	6,876.0	9.58	59.72	6,298.69	1,366.84	2,192.25	2,583.29	2.61	-2.55	2.96	169.11
	NORMAL	6,972.0	7.43	53.92	6,393.63	1,374.53	2,204.16	2,597.47	2.40	-2.24	-5.95	198.64
	NORMAL	7,066.0	7.25	54.53	6,486.86	1,381.55	2,213.91	2,609.46	0.21	-0.19	0.65	156.89
	NORMAL	7,162.0	5.23	58.93	6,582.29	1,387.33	2,222.59	2,619.89	2.16	-2.10	4.58	168.86
	NORMAL	7,257.0	4.97	59.28	6,676.92	1,391.67	2,229.83	2,628.33	0.28	-0.27	0.37	173.35
	NORMAL	7,352.0	4.35	63.50	6,771.60	1,395.38	2,236.60	2,636.02	0.75	-0.65	4.44	153.15
	NORMAL	7,447.0	4.04	70.09	6,866.35	1,398.12	2,242.97	2,642.87	0.60	-0.33	6.94	126.00
10/19/2013	NORMAL	7,543.0	3.69	58.40	6,962.13	1,400.89	2,248.78	2,649.26	0.90	-0.36	-12.18	240.29
	NORMAL	7,638.0	3.30	56.64	7,056.95	1,404.00	2,253.66	2,655.05	0.43	-0.41	-1.85	194.50
	NORMAL	7,733.0	2.20	57.79	7,151.84	1,406.47	2,257.49	2,659.61	1.16	-1.16	1.21	177.70
	NORMAL	7,829.0	0.53	314.95	7,247.82	1,407.77	2,258.74	2,661.35	2.47	-1.74	-107.13	192.57
	NORMAL	7,924.0	0.83	270.83	7,342.81	1,408.09	2,257.74	2,660.68	0.61	0.32	-46.44	276.50
	NORMAL	8,020.0	1.10	263.36	7,438.80	1,407.99	2,256.13	2,659.28	0.31	0.28	-7.78	331.25
	NORMAL	8,115.0	1.58	245.08	7,533.77	1,407.34	2,254.03	2,657.18	0.67	0.51	-19.24	308.93
	NORMAL	8,210.0	1.76	225.04	7,628.74	1,405.75	2,251.81	2,654.43	0.64	0.19	-21.09	276.95
	NORMAL	8,306.0	2.46	230.84	7,724.67	1,403.41	2,249.17	2,650.95	0.76	0.73	6.04	19.88
	NORMAL	8,401.0	2.20	229.26	7,819.59	1,400.93	2,246.21	2,647.12	0.28	-0.27	-1.66	193.09
	NORMAL	8,496.0	1.36	242.35	7,914.55	1,399.22	2,243.83	2,644.19	0.98	-0.88	13.78	160.61
	NORMAL	8,592.0	1.54	242.18	8,010.51	1,398.09	2,241.68	2,641.77	0.19	0.19	-0.18	358.55
10/20/2013	NORMAL	8,688.0	1.54	235.59	8,106.48	1,396.76	2,239.47	2,639.19	0.18	0.00	-6.86	266.71
	NORMAL	8,784.0	2.11	239.10	8,202.43	1,395.12	2,236.89	2,636.14	0.60	0.59	3.66	12.85
	NORMAL	8,880.0	2.46	243.15	8,298.36	1,393.28	2,233.54	2,632.32	0.40	0.36	4.22	26.80
	NORMAL	8,976.0	2.64	238.22	8,394.26	1,391.19	2,229.82	2,628.06	0.30	0.19	-5.14	306.89
	NORMAL	9,072.0	2.42	234.80	8,490.17	1,388.86	2,226.29	2,623.83	0.28	-0.23	-3.56	212.76
	NORMAL	9,168.0	2.90	232.78	8,586.06	1,386.22	2,222.70	2,619.38	0.51	0.50	-2.10	347.94
	NORMAL	9,264.0	3.56	227.94	8,681.91	1,382.75	2,218.55	2,614.02	0.74	0.69	-5.04	335.12
	NORMAL	9,360.0	3.91	229.17	8,777.71	1,378.62	2,213.86	2,607.84	0.37	0.36	1.28	13.51
	NORMAL	9,456.0	3.91	229.17	8,873.48	1,374.34	2,208.91	2,601.36	0.00	0.00	0.00	0.00