

1 General

1.1 Customer Information

Company	PICEANCE VLY
Representative	
Address	

1.2 Well Information

Well	PA 324-20	Wellbore No.	0H
Well Name	PA 324-20	Common Name	PA 324-20
Project	PA 20-06S-095W	Site	DOE 1-W-20 Pad
Vertical Section Azimuth	257.62 (°)	North Reference	True
Origin N/S		Origin E/W	
Spud Date	11/25/2011	UWI	PA 324-20
Active Datum	KB @6,255.5ft (above Mean Sea Level)		

2 Survey Name

2.1 Survey Name: Survey #1

Survey Name	Survey #1	Company	sicentific drilling
Started	11/25/2011	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)	DLeg (°/100ft)	Build (°/100ft)	Turn (°/100ft)	TFace (°)
11/25/2011	Tie On	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/25/2011	NORMAL	83.0	0.18	311.48	83.00	0.09	-0.10	0.08	0.22	0.22	0.00	311.48
	NORMAL	115.0	1.14	272.02	115.00	0.13	-0.45	0.41	3.15	3.00	-123.31	314.02
	NORMAL	146.0	1.67	247.32	145.99	-0.03	-1.18	1.16	2.56	1.71	-79.68	298.40
	NORMAL	176.0	1.85	255.32	175.97	-0.32	-2.05	2.07	1.01	0.60	26.67	57.82
	NORMAL	207.0	2.46	258.57	206.95	-0.58	-3.19	3.24	2.01	1.97	10.48	12.96
	NORMAL	237.0	3.78	269.65	236.91	-0.72	-4.81	4.85	4.82	4.40	36.93	30.15
	NORMAL	268.0	5.89	274.22	267.80	-0.61	-7.41	7.37	6.91	6.81	14.74	12.63
	NORMAL	298.0	6.89	270.97	297.61	-0.46	-10.75	10.60	3.54	3.33	-10.83	338.49
	NORMAL	328.0	6.69	270.53	327.40	-0.41	-14.30	14.05	0.69	-0.67	-1.47	194.36
	NORMAL	359.0	6.42	267.54	358.20	-0.47	-17.83	17.52	1.40	-0.87	-9.65	230.18
	NORMAL	389.0	5.81	262.97	388.02	-0.73	-21.02	20.68	2.60	-2.03	-15.23	216.33
	NORMAL	419.0	5.63	261.47	417.88	-1.13	-23.98	23.66	0.78	-0.60	-5.00	218.97
	NORMAL	449.0	5.54	259.54	447.73	-1.62	-26.86	26.58	0.69	-0.30	-6.43	243.44
	NORMAL	480.0	5.01	260.60	478.60	-2.11	-29.66	29.43	1.74	-1.71	3.42	170.11
	NORMAL	510.0	5.10	263.23	508.49	-2.48	-32.28	32.06	0.83	0.30	8.77	70.09
	NORMAL	540.0	5.54	263.41	538.36	-2.80	-35.04	34.83	1.47	1.47	0.60	2.26
	NORMAL	570.0	5.72	259.45	568.21	-3.24	-37.95	37.76	1.43	0.60	-13.20	292.88
	NORMAL	612.0	6.00	257.76	609.99	-4.09	-42.15	42.05	0.78	0.67	-4.02	327.51
	NORMAL	642.0	6.30	254.68	639.82	-4.86	-45.27	45.26	1.49	1.00	-10.27	310.74
	NORMAL	673.0	6.57	254.59	670.62	-5.78	-48.62	48.73	0.87	0.87	-0.29	357.82

2.1.2 Survey Stations (Continued)

Date	Type	MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Build (°/100ft)	Turn (°/100ft)	TFace (°)
11/25/2011	NORMAL	703.0	6.93	255.34	700.42	-6.69	-52.03	52.26	1.24	1.20	2.50	14.13
11/26/2011	NORMAL	733.0	7.68	257.12	730.17	-7.60	-55.74	56.07	2.61	2.50	5.93	17.68
	NORMAL	763.0	7.94	254.43	759.89	-8.60	-59.69	60.14	1.50	0.87	-8.97	304.09
	NORMAL	793.0	8.22	260.47	789.60	-9.51	-63.80	64.35	2.98	0.93	20.13	74.75
	NORMAL	823.0	8.85	255.52	819.26	-10.44	-68.15	68.80	3.22	2.10	-16.50	308.15
	NORMAL	853.0	9.56	253.81	848.88	-11.72	-72.77	73.59	2.54	2.37	-5.70	338.08
	NORMAL	884.0	10.49	258.45	879.41	-13.00	-78.01	78.98	3.97	3.00	14.97	43.28
	NORMAL	914.0	11.02	256.10	908.88	-14.23	-83.47	84.68	2.29	1.77	-7.83	319.24
	NORMAL	944.0	11.93	258.48	938.28	-15.54	-89.29	90.55	3.42	3.03	7.93	28.66
	NORMAL	974.0	12.89	259.14	967.58	-16.79	-95.62	96.99	3.23	3.20	2.20	8.73
	NORMAL	1,006.0	13.85	261.07	998.71	-18.06	-102.90	104.38	3.31	3.00	6.03	25.87
	NORMAL	1,038.0	14.72	257.79	1,029.72	-19.51	-110.66	112.27	3.71	2.72	-10.25	315.47
	NORMAL	1,070.0	15.68	257.97	1,060.60	-21.28	-118.87	120.66	3.00	3.00	0.56	2.90
	NORMAL	1,101.0	17.02	258.88	1,090.35	-23.02	-127.41	129.39	4.40	4.32	2.94	11.26
	NORMAL	1,133.0	18.56	259.93	1,120.82	-24.82	-137.03	139.16	4.92	4.81	3.28	12.27
	NORMAL	1,164.0	19.91	258.94	1,150.08	-26.69	-147.06	149.37	4.48	4.35	-3.19	345.95
	NORMAL	1,196.0	21.45	259.48	1,180.02	-28.81	-158.16	160.66	4.85	4.81	1.69	7.31
	NORMAL	1,259.0	23.03	257.79	1,238.33	-33.52	-181.54	184.50	2.71	2.51	-2.68	337.18
	NORMAL	1,289.0	23.01	257.97	1,265.94	-35.98	-193.01	196.23	0.24	-0.07	0.60	105.94
	NORMAL	1,348.0	24.00	256.77	1,319.94	-41.34	-216.17	219.76	1.18	1.09	-1.15	336.77
11/27/2011	NORMAL	1,442.0	24.66	256.19	1,405.59	-50.40	-253.82	258.73	0.75	0.70	-0.62	339.83
	NORMAL	1,537.0	23.31	255.79	1,492.39	-59.74	-291.29	297.33	1.43	-1.42	-0.42	186.69
	NORMAL	1,633.0	22.39	256.82	1,580.85	-68.57	-327.51	334.59	1.04	-0.96	1.07	156.98
	NORMAL	1,728.0	22.04	258.64	1,668.80	-76.21	-362.60	370.51	0.81	-0.37	1.92	117.80
	NORMAL	1,824.0	21.74	261.73	1,757.88	-82.32	-397.86	406.25	1.24	-0.31	3.22	106.03
	NORMAL	1,919.0	22.43	260.72	1,845.91	-87.77	-433.15	441.90	0.83	0.73	-1.06	330.71
	NORMAL	2,015.0	22.95	259.39	1,934.48	-94.17	-469.63	478.89	0.76	0.54	-1.39	314.77
	NORMAL	2,110.0	22.41	257.22	2,022.14	-101.58	-505.49	515.52	1.05	-0.57	-2.28	236.16
	NORMAL	2,205.0	21.91	255.83	2,110.12	-109.93	-540.34	551.34	0.76	-0.53	-1.46	225.72
	NORMAL	2,301.0	20.49	255.42	2,199.62	-118.54	-573.97	586.03	1.49	-1.48	-0.43	185.77
	NORMAL	2,396.0	20.71	253.60	2,288.55	-127.47	-606.17	619.41	0.71	0.23	-1.92	288.11
	NORMAL	2,492.0	20.48	254.91	2,378.41	-136.64	-638.67	653.12	0.54	-0.24	1.36	117.14
11/28/2011	NORMAL	2,587.0	20.24	256.47	2,467.48	-144.81	-670.69	686.15	0.62	-0.25	1.64	114.58
	NORMAL	2,683.0	20.74	258.12	2,557.41	-152.19	-703.47	719.75	0.80	0.52	1.72	49.89
	NORMAL	2,779.0	21.55	258.37	2,646.94	-159.25	-737.38	754.37	0.85	0.84	0.26	6.47
	NORMAL	2,874.0	22.06	257.55	2,735.15	-166.61	-771.89	789.66	0.63	0.54	-0.86	328.77
	NORMAL	2,970.0	22.16	257.49	2,824.09	-174.42	-807.17	825.79	0.11	0.10	-0.06	347.25
	NORMAL	3,065.0	22.32	256.85	2,912.02	-182.40	-842.23	861.75	0.31	0.17	-0.67	303.15
	NORMAL	3,160.0	22.75	256.12	2,999.77	-190.91	-877.62	898.15	0.54	0.45	-0.77	326.61
	NORMAL	3,256.0	23.34	255.01	3,088.10	-200.29	-914.01	935.70	0.76	0.61	-1.16	323.12
	NORMAL	3,352.0	21.70	257.25	3,176.78	-209.12	-949.70	972.45	1.93	-1.71	2.33	153.42
	NORMAL	3,477.0	21.45	260.22	3,293.03	-218.10	-994.76	1,018.39	0.90	-0.20	2.38	104.27
	NORMAL	3,543.0	21.19	259.97	3,354.51	-222.23	-1,018.40	1,042.37	0.42	-0.39	-0.38	199.15
	NORMAL	3,638.0	21.01	258.13	3,443.14	-228.73	-1,051.97	1,076.55	0.72	-0.19	-1.94	253.94
	NORMAL	3,734.0	21.41	261.95	3,532.64	-234.72	-1,086.17	1,111.23	1.50	0.42	3.98	75.64
	NORMAL	3,829.0	21.49	260.22	3,621.07	-240.10	-1,120.48	1,145.91	0.67	0.08	-1.82	276.40
	NORMAL	3,925.0	21.37	260.31	3,710.43	-246.03	-1,155.05	1,180.94	0.13	-0.12	0.09	164.72
	NORMAL	4,020.0	21.52	261.24	3,798.85	-251.60	-1,189.34	1,215.62	0.39	0.16	0.98	66.63
	NORMAL	4,115.0	21.49	259.13	3,887.24	-257.54	-1,223.65	1,250.41	0.81	-0.03	-2.22	266.80
	NORMAL	4,211.0	21.24	257.53	3,976.64	-264.61	-1,257.89	1,285.38	0.66	-0.26	-1.67	246.04
	NORMAL	4,307.0	20.83	258.28	4,066.25	-271.83	-1,291.59	1,319.83	0.51	-0.43	0.78	147.06
	NORMAL	4,402.0	22.14	256.52	4,154.64	-279.43	-1,325.54	1,354.62	1.54	1.38	-1.85	332.98
	NORMAL	4,498.0	21.90	255.35	4,243.64	-288.18	-1,360.45	1,390.60	0.52	-0.25	-1.22	240.77
	NORMAL	4,594.0	22.22	257.77	4,332.61	-296.55	-1,395.51	1,426.64	1.00	0.33	2.52	71.73
	NORMAL	4,689.0	21.22	259.65	4,420.87	-303.45	-1,429.98	1,461.79	1.28	-1.05	1.98	146.04
	NORMAL	4,785.0	19.97	259.05	4,510.73	-309.68	-1,463.17	1,495.54	1.32	-1.30	-0.63	189.30
	NORMAL	4,880.0	18.08	258.69	4,600.54	-315.66	-1,493.55	1,526.50	1.99	-1.99	-0.38	183.38

2.1.2 Survey Stations (Continued)

Date	Type	MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Build (°/100ft)	Turn (°/100ft)	TFace (°)
11/29/2011	NORMAL	4,975.0	17.53	258.03	4,690.99	-321.51	-1,522.00	1,555.54	0.62	-0.58	-0.69	199.84
	NORMAL	5,071.0	16.20	259.55	4,782.86	-326.94	-1,549.32	1,583.39	1.46	-1.39	1.58	162.38
	NORMAL	5,167.0	15.36	259.12	4,875.24	-331.77	-1,574.97	1,609.48	0.88	-0.88	-0.45	187.72
	NORMAL	5,262.0	15.10	257.15	4,966.90	-336.90	-1,599.39	1,634.43	0.61	-0.27	-2.07	242.38
	NORMAL	5,355.0	13.82	259.04	5,056.96	-341.70	-1,622.11	1,657.65	1.47	-1.38	2.03	160.67
	NORMAL	5,451.0	11.74	258.38	5,150.57	-345.85	-1,642.94	1,678.88	2.17	-2.17	-0.69	183.69
	NORMAL	5,546.0	10.69	261.35	5,243.76	-349.12	-1,661.11	1,697.34	1.26	-1.11	3.13	152.63
	NORMAL	5,641.0	10.70	260.23	5,337.11	-351.94	-1,678.52	1,714.94	0.22	0.01	-1.18	272.20
	NORMAL	5,736.0	9.39	258.15	5,430.65	-355.03	-1,694.79	1,731.50	1.43	-1.38	-2.19	194.46
	NORMAL	5,832.0	8.23	254.27	5,525.52	-358.50	-1,709.07	1,746.19	1.36	-1.21	-4.04	205.22
	NORMAL	5,927.0	7.67	250.57	5,619.60	-362.46	-1,721.59	1,759.27	0.80	-0.59	-3.89	220.60
	NORMAL	6,020.0	7.74	248.14	5,711.76	-366.85	-1,733.26	1,771.61	0.36	0.08	-2.61	280.92
	NORMAL	6,115.0	7.20	251.20	5,805.96	-371.15	-1,744.83	1,783.83	0.71	-0.57	3.22	145.13
11/30/2011	NORMAL	6,210.0	6.13	253.00	5,900.32	-374.55	-1,755.32	1,794.81	1.15	-1.13	1.89	169.85
12/1/2011	NORMAL	6,305.0	3.41	262.25	5,994.98	-376.42	-1,762.97	1,802.68	2.97	-2.86	9.74	168.79
	NORMAL	6,401.0	0.90	265.54	6,090.90	-376.86	-1,766.55	1,806.27	2.62	-2.61	3.43	178.82
	NORMAL	6,496.0	1.18	75.92	6,185.90	-376.68	-1,766.35	1,806.03	2.18	0.29	179.35	174.54
	NORMAL	6,591.0	1.19	80.90	6,280.88	-376.29	-1,764.42	1,804.07	0.11	0.01	5.24	86.95
	NORMAL	6,687.0	1.15	105.85	6,376.86	-376.39	-1,762.51	1,802.23	0.53	-0.04	25.99	106.89
	NORMAL	6,782.0	0.87	114.59	6,471.84	-376.95	-1,760.94	1,800.81	0.34	-0.29	9.20	155.50
	NORMAL	6,876.0	0.70	128.35	6,565.83	-377.61	-1,759.84	1,799.88	0.27	-0.18	14.64	138.79
	NORMAL	6,972.0	0.42	211.85	6,661.83	-378.27	-1,759.57	1,799.75	0.81	-0.29	86.98	147.40
	NORMAL	7,068.0	0.40	309.17	6,757.83	-378.36	-1,760.01	1,800.21	0.64	-0.02	101.37	139.89
	NORMAL	7,163.0	0.65	296.12	6,852.83	-377.91	-1,760.75	1,800.83	0.29	0.26	-13.74	327.82
	NORMAL	7,258.0	0.60	287.99	6,947.82	-377.52	-1,761.71	1,801.68	0.11	-0.05	-8.56	236.56
	NORMAL	7,353.0	1.04	272.00	7,042.81	-377.34	-1,763.05	1,802.95	0.52	0.46	-16.83	324.37
12/2/2011	NORMAL	8,609.0	3.02	210.12	8,298.46	-394.55	-1,776.70	1,820.23	0.00	0.00	0.00	0.00
12/2/2011	NORMAL	7,449.0	0.61	338.83	7,138.80	-376.83	-1,764.10	1,803.87	1.02	-0.45	69.61	144.97
	NORMAL	7,544.0	0.30	45.02	7,233.80	-376.18	-1,764.11	1,803.74	0.59	-0.33	69.67	150.69
	NORMAL	7,640.0	0.12	188.68	7,329.80	-376.10	-1,763.94	1,803.56	0.42	-0.19	149.65	169.84
	NORMAL	7,735.0	0.66	203.55	7,424.80	-376.70	-1,764.18	1,803.92	0.57	0.57	15.65	18.11
	NORMAL	7,831.0	0.62	249.81	7,520.79	-377.39	-1,764.89	1,804.76	0.53	-0.04	48.19	117.31
	NORMAL	7,926.0	0.60	1.71	7,615.79	-377.07	-1,765.35	1,805.15	1.06	-0.02	117.79	146.58
	NORMAL	8,022.0	0.80	209.72	7,711.78	-377.15	-1,765.67	1,805.47	1.42	0.21	-158.32	196.05
	NORMAL	8,117.0	1.06	212.10	7,806.77	-378.47	-1,766.47	1,806.53	0.28	0.27	2.51	9.64
	NORMAL	8,212.0	1.58	215.26	7,901.75	-380.28	-1,767.69	1,808.12	0.55	0.55	3.33	9.55
	NORMAL	8,307.0	1.91	221.29	7,996.70	-382.54	-1,769.49	1,810.36	0.40	0.35	6.35	32.13
	NORMAL	8,403.0	2.64	210.47	8,092.63	-385.65	-1,771.67	1,813.15	0.88	0.76	-11.27	324.05
	NORMAL	8,498.0	3.00	209.29	8,187.51	-389.70	-1,773.99	1,816.29	0.38	0.38	-1.24	350.25
	NORMAL	8,545.0	3.02	210.12	8,234.45	-391.85	-1,775.22	1,817.95	0.10	0.04	1.77	65.76