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APPENDICES

Appendix A Well A Information

Table A1 Definitive survey of well A

Casing	MD (m)	Inc (°)	Az (°)	TVD (m)	NS[a] (m)	EW[b] (m)	DLS[c] (°/30m)
Tie-In	0.00	0.00	100.00	0.00	0.00	0.00	N/A
Marker MudLine	6.00	0.00	25.07	6.00	0.00	0.00	0.02
20" Conductor	18.67	0.01	25.07	18.67	0.00	0.00	0.02
13 3/8" Casing	101.46	0.06	25.07	101.46	0.05	0.02	0.02
	118.89	0.07	25.07	118.89	0.07	0.03	0.02
	138.63	0.28	57.24	138.63	0.10	0.08	0.34
	156.60	2.39	100.40	156.59	0.06	0.48	3.66
	175.28	5.85	103.16	175.22	-0.23	1.79	5.56
	194.22	8.86	102.65	194.01	-0.77	4.16	4.77
	212.05	11.81	102.48	211.54	-1.46	7.28	4.96
	232.69	15.80	102.58	231.58	-2.53	12.08	5.80
	250.65	20.27	103.16	248.66	-3.77	17.50	7.47
	269.96	24.76	103.95	266.49	-5.51	24.69	6.99
Top of 7" Liner	274.35	25.44	103.91	270.47	-5.96	26.50	4.66
	289.20	27.75	103.80	283.74	-7.55	32.95	4.66
	308.37	30.36	102.49	300.50	-9.66	42.02	4.20
	327.50	33.08	102.87	316.77	-11.87	51.83	4.28
	346.73	36.47	102.86	332.56	-14.31	62.52	5.29
	365.86	40.03	102.84	347.58	-16.95	74.06	5.58
	385.09	42.71	102.47	362.01	-19.73	86.46	4.20
	404.06	45.35	101.92	375.65	-22.51	99.35	4.22
	423.46	47.66	100.57	389.00	-25.25	113.15	3.88

[a] North south direction, [b] East west direction, [c] Dog leg severity

Table A1 (Cont.) Definitive survey of well A

Casing	MD (m)	Inc (°)	Az (°)	TVD (m)	NS[a] (m)	EW[b] (m)	DLS[c] (°/30m)
7" Liner	442.49	50.16	100.02	401.51	-27.82	127.26	3.99
	461.88	52.30	99.62	413.65	-30.39	142.16	3.35
	480.34	55.11	99.14	424.58	-32.82	156.84	4.61
	500.73	58.60	97.86	435.73	-35.34	173.72	5.37
	519.49	61.22	97.23	445.13	-37.47	189.81	4.28
	538.15	63.64	96.87	453.77	-39.50	206.22	3.92
	557.15	64.73	94.59	462.04	-41.20	223.24	3.67
	576.45	65.46	91.89	470.17	-42.19	240.71	3.97
	595.51	67.55	89.90	477.77	-42.46	258.19	4.37
	614.54	69.80	88.54	484.69	-42.22	275.91	4.07
	633.71	71.10	86.76	491.10	-41.48	293.96	3.32
	653.08	72.46	84.81	497.16	-40.12	312.31	3.56
	670.21	74.24	82.89	502.07	-38.36	328.63	4.48
	691.45	75.83	80.27	507.55	-35.36	348.92	4.22
	710.67	75.67	77.34	512.29	-31.74	367.19	4.44
	729.68	74.49	74.57	517.18	-27.28	385.01	4.62
	748.99	73.53	71.96	522.50	-21.94	402.79	4.17
	768.35	72.85	69.19	528.10	-15.78	420.26	4.24
9 5/8" Casing	779.25	72.73	68.35	531.33	-12.01	429.97	2.24
	796.39	72.55	67.02	536.44	-5.80	445.10	2.24
	816.15	74.41	66.72	542.06	1.64	462.52	2.86
	835.54	76.01	66.52	547.01	9.08	479.73	2.49
	854.68	76.41	66.48	551.57	16.50	496.78	0.63
	873.13	76.34	66.75	555.92	23.61	513.23	0.44
	885.61	76.05	66.48	558.90	28.42	524.36	0.94
	904.83	74.73	65.58	563.74	35.98	541.35	2.47

[a] North south direction, [b] East west direction, [c] Dog leg severity

Table A1 (Cont.) Definitive survey of well A

Casing	MD (m)	Inc (°)	Az (°)	TVD (m)	NS[a] (m)	EW[b] (m)	DLS[c] (°/30m)
9 5/8" Casing	924.09	75.09	64.19	568.76	43.87	558.19	2.16
	943.22	71.63	61.58	574.24	52.22	574.50	6.69
	962.49	68.53	58.49	580.80	61.26	590.19	6.61
	981.63	65.90	56.42	588.21	70.75	605.07	5.09
	1,000.87	64.35	53.98	596.31	80.71	619.40	4.21
	1,020.38	62.91	52.80	604.97	91.13	633.43	2.75
	1,039.30	62.30	51.27	613.68	101.47	646.68	2.36
	1,058.65	62.84	49.52	622.59	112.41	659.91	2.55
	1,077.94	62.72	47.67	631.42	123.76	672.77	2.57
	1,097.17	61.53	45.38	640.41	135.45	685.11	3.66
	1,123.50	61.91	41.55	652.89	152.28	701.05	3.87
	1,142.34	61.71	40.54	661.79	164.80	711.96	1.45
Top of 4 1/2" Liner	1,159.17	61.54	37.51	669.79	176.30	721.28	4.76
	1,161.63	61.52	37.07	670.96	178.02	722.59	4.76
	1,180.75	61.42	35.94	680.09	191.52	732.58	1.57
7" Liner	1,181.31	61.42	35.94	680.36	191.92	732.87	0.10
	1,199.90	61.37	35.98	689.26	205.13	742.46	0.10
	1,218.89	60.96	35.94	698.42	218.60	752.22	0.65
	1,238.32	59.53	36.33	708.06	232.22	762.17	2.27
	1,257.55	59.61	36.38	717.80	245.57	772.00	0.14
	1,276.59	59.47	36.89	727.45	258.74	781.79	0.73
	1,295.81	59.25	36.56	737.25	272.00	791.68	0.56
	1,315.11	58.89	37.01	747.17	285.26	801.60	0.82
	1,333.44	59.03	36.89	756.62	297.81	811.04	0.28
	1,353.24	58.84	37.07	766.84	311.36	821.24	0.37
	1,372.48	58.82	37.20	776.80	324.48	831.18	0.18

[a] North south direction, [b] East west direction, [c] Dog leg severity

Table A1 (Cont.) Definitive survey of well A

Casing	MD (m)	Inc (°)	Az (°)	TVD (m)	NS[a] (m)	EW[b] (m)	DLS[c] (°/30m)
7" Liner	1,391.40	58.96	37.71	786.57	337.34	841.03	0.73
	1,410.79	58.74	37.86	796.60	350.46	851.20	0.39
	1,429.84	58.72	38.27	806.49	363.28	861.23	0.55
	1,449.69	58.78	38.25	816.79	376.60	871.74	0.09
	1,468.12	58.67	38.79	826.36	388.92	881.55	0.77
	1,487.48	58.63	38.85	836.43	401.81	891.92	0.10
	1,506.71	58.40	39.07	846.47	414.56	902.23	0.46
	1,526.07	57.12	39.33	856.80	427.25	912.58	2.01
	1,545.55	55.64	39.44	867.59	439.78	922.87	2.28
	1,564.23	55.27	39.20	878.18	451.69	932.62	0.67
	1,583.40	55.41	39.52	889.08	463.88	942.62	0.47
	1,602.47	54.10	40.05	900.08	475.85	952.59	2.17
	1,621.59	54.05	40.49	911.30	487.66	962.59	0.56
	1,640.25	54.32	40.61	922.22	499.16	972.43	0.46
4 1/2" Liner	1,660.13	54.61	40.71	933.78	511.43	982.97	0.45
Projected to TD	1,661.13	54.62	40.72	934.36	512.05	983.50	0.45

[a] North south direction, [b] East west direction, [c] Dog leg severity

Table A2 The actual field data hookload (HK) and torque (T) of well A

MD (ft)	HK (lbf)
0.00	-
19.69	12,073.63
61.25	6,006.78
332.87	17,633.97
390.06	35,522.86
454.82	35,186.78
513.78	36,335.73
575.07	40,481.24
637.20	41,432.46
695.70	46,172.54
763.42	46,265.78
822.34	46,674.17
885.70	51,895.05
900.10	51,411.24
948.82	51,472.22
1,011.71	52,137.78
1,074.48	51,891.47
1,137.57	51,456.18
1,200.33	51,571.11
1,263.42	53,362.75
1,325.66	53,083.34
1,389.30	46,019.37
1,451.74	50,201.17
1,515.35	52,328.08
1,575.92	52,701.89
1,642.82	52,091.26

MD (ft)	T (ft-lbf)
0.00	-
19.69	5,087.05
61.25	1,645.73
332.87	1,323.17
390.06	839.07
454.82	832.69
542.57	1,372.39
602.44	938.68
665.19	1,207.58
725.07	1,508.14
787.81	1,869.11
849.33	2,113.02
911.25	2,483.70
969.90	2,862.70
1,032.64	3,197.78
1,097.85	3,559.86
1,160.60	3,687.73
1,224.98	3,601.24
1,283.22	4,190.78
1,343.91	4,306.82
1,408.30	4,913.55
1,472.28	4,956.02
1,535.84	4,868.53
1,601.46	4,666.09
1,667.49	4,765.27
1,733.51	4,344.38

Table A2 (Cont.) The actual field data hookload (HK) and torque (T) of well A

MD (ft)	HK (lbf)	MD (ft)	T (ft-lbf)
1,704.36	42,028.28	1,795.03	4,234.63
1,765.58	45,179.13	1,850.80	4,852.69
1,827.92	45,242.75	1,917.65	5,671.09
1,891.24	44,709.71	1,976.30	4,818.53
1,953.77	44,818.37	2,101.38	4,720.65
2,016.21	38,116.45	2,165.35	4,537.40
2,079.10	41,722.68	2,227.69	4,754.49
2,142.65	39,808.68	2,294.13	4,229.56
2,198.85	35,135.09	2,358.92	5,459.14
2,268.54	41,843.58	2,420.44	5,111.83
2,331.59	36,593.96	2,484.01	5,600.86
2,393.96	31,350.24	2,545.11	6,246.75
2,457.32	35,337.51	2,609.50	6,971.10
2,520.83	33,104.55	2,632.05	4,969.36
2,556.59	27,871.02	2,677.58	5,100.60
2,612.83	32,433.81	2,741.27	6,084.33
2,677.66	31,075.56	2,804.07	6,509.77
2,741.27	51,895.12	2,864.60	4,823.48
2,804.07	50,210.29	2,905.54	4,996.25
2,864.60	51,909.74	2,975.72	4,678.75
2,905.54	52,972.80	3,034.37	5,637.15
2,968.60	42,227.08	3,096.70	5,024.97
3,031.79	36,173.66	3,163.96	5,180.80
3,094.55	37,556.73	3,217.68	5,202.20
3,157.78	34,763.78	3,280.02	5,080.73
3,220.57	48,247.81	3,337.02	5,469.29

Table A2 (Cont.) The actual field data hookload (HK) and torque (T) of well A

MD (ft)	HK (lbf)
3,283.69	51,756.92
3,347.70	55,361.04
3,409.78	57,108.87
3,473.26	55,605.50
3,536.55	51,594.61
3,599.64	45,615.29
3,686.02	50,275.31
3,747.83	46,834.17
3,803.05	47,886.59
3,811.12	56,274.10
3,873.85	53,165.07
3,875.69	46,596.00
3,936.68	48,686.17
3,998.98	42,204.75
4,062.73	50,580.51
4,125.82	51,520.44
4,188.29	49,902.99
4,251.35	48,460.39
4,314.67	48,669.08
4,374.80	48,565.88
4,439.76	48,043.15
4,502.89	47,064.38
4,564.96	46,961.21
4,628.58	46,901.47
4,691.08	48,585.16
4,756.20	51,012.27

MD (ft)	T (ft-lbf)
3,397.31	5,510.83
3,464.65	5,291.82
3,527.31	5,030.00
3,593.75	5,452.84
3,658.55	6,062.72
3,702.18	4,288.81
3,730.64	4,685.03
3,807.82	5,297.05
3,873.85	6,255.28
3,875.69	6,961.32
3,936.68	5,522.78
3,998.98	5,434.94
4,062.73	5,795.40
4,125.82	5,841.55
4,188.29	5,948.86
4,251.35	5,945.67
4,314.67	6,006.03
4,374.80	6,088.18
4,439.76	6,718.50
4,502.89	6,321.30
4,564.96	6,994.33
4,628.58	8,324.32
4,691.08	8,430.74
4,756.20	8,661.24
4,816.67	7,280.03
4,880.18	7,753.66

Table A2 (Cont.) The actual field data hookload (HK) and torque (T) of well A

MD (ft)	HK (lbf)
4,816.67	53,107.82
4,880.18	57,208.96
4,943.27	57,311.55
5,006.79	58,386.62
5,070.70	57,413.05
5,131.99	60,773.96
5,194.88	64,408.08
5,257.45	64,602.14
5,320.18	57,913.34
5,381.40	61,308.91
5,446.62	63,721.79
5,449.90	63,790.39

MD (ft)	T (ft-lbf)
4,943.27	9,107.49
5,006.79	8,491.82
5,070.70	8,751.65
5,131.99	10,070.06
5,194.88	10,565.43
5,257.45	10,017.21
5,320.18	10,982.74
5,381.40	10,577.58
5,446.62	10,082.07
5,449.90	10,082.07

Table A3 The bottom hole assembly (BHA) of well A

BHA Description	Qty	OD (in)	ID (in)	Length (m)	Cumm (m)	Weight (lb)
8-1/2" Varelinsert 117 bit	1	8.50	-	0.25	0.25	92.59
Mud motor 1.5 deg bend	1	8.38	5.50	8.23	8.48	2,000.00
SLB String Stabilizer	1	8.00	3.00	1.52	10.00	1,000.00
SLB Poney NMDC	1	6.75	2.79	4.58	14.58	1,502.62
CLPS 675 Flex Stabilizer	1	8.38	2.83	10.33	24.91	1,000.00
SLB NMDC	1	6.75	2.88	9.49	34.40	3,113.52
5" HWDP	2	6.50	2.88	18.75	53.15	3,075.79
SLB String Stabilizer	1	7.75	3.00	1.82	54.97	1,000.00
5" HWDP	2	6.50	3.00	18.64	73.61	3,057.74
WFRD Hydraulic Jar	1	6.50	2.75	9.92	83.53	2,400.00
5" HWDP	1	6.50	3.00	9.35	92.88	1,533.79
Total					92.88	19,683.46
Average		7.32	3.16	Nominal weight (lb/ft)		64.77

Table A4 The results of well trajectory of well A

MD (ft)	TVD (ft)	Inc (deg)	AZ (deg)	North (ft)	East (ft)
5,449.88	-4,651.21	55.27	46.16	2,957.17	5,779.57
5,433.15	-4,636.96	55.27	46.51	2,942.97	5,764.70
5,416.42	-4,622.70	55.27	46.86	2,928.86	5,749.74
5,399.68	-4,608.45	55.27	47.20	2,914.84	5,734.69 -
5,382.95	-4,594.19	55.27	47.55	2,900.92	5,719.56
5,366.22	-4,579.94	55.27	47.90	2,887.08	5,704.34
5,349.49	-4,565.68	55.27	48.25	2,873.34	5,689.04
5,332.76	-4,551.43	55.27	48.60	2,859.70	5,673.65
5,316.02	-4,537.17	55.27	48.95	2,846.15	5,658.19
5,299.29	-4,522.91	55.27	49.30	2,832.69	5,642.64
5,282.56	-4,508.66	55.27	49.65	2,819.33	5,627.00
5,265.83	-4,494.40	55.27	50.00	2,806.06	5,611.29
5,249.09	-4,480.15	55.27	50.35	2,792.89	5,595.50
5,232.36	-4,465.89	55.27	50.70	2,779.82	5,579.62
5,215.63	-4,451.64	55.27	51.05	2,766.85	5,563.67
5,198.90	-4,437.38	55.27	51.40	2,753.97	5,547.64
5,182.17	-4,423.13	55.27	51.75	2,741.19	5,531.53
5,165.43	-4,408.87	55.27	52.10	2,728.51	5,515.34
5,148.70	-4,394.62	55.27	52.45	2,715.92	5,499.07
5,131.97	-4,380.36	55.27	52.80	2,703.44	5,482.73
5,131.97	-4,380.36	55.24	15.51	2,703.44	5,482.73
5,038.06	-4,300.42	55.64	17.47	2,592.17	5,449.79
4,944.15	-4,220.67	56.05	19.43	2,480.69	5,412.58
4,850.24	-4,141.11	56.45	21.40	2,369.14	5,371.06
4,756.33	-4,061.75	56.85	23.36	2,257.65	5,325.15
4,662.42	-3,982.59	57.26	25.32	2,146.37	5,274.81
4,568.51	-3,903.63	57.66	27.28	2,035.46	5,219.97

Table A4 (Cont.) The results of well trajectory of well A

MD (ft)	TVD (ft)	Inc (deg)	AZ (deg)	North (ft)	East (ft)
4,474.60	-3,824.86	58.06	29.25	1,925.05	5,160.61
4,380.69	-3,746.30	58.47	31.21	1,815.30	5,096.65
4,286.78	-3,667.94	58.87	33.17	1,706.38	5,028.08
4,192.88	-3,589.78	59.28	35.14	1,598.45	4,954.84
4,098.97	-3,511.83	59.68	37.10	1,491.65	4,876.92
4,005.06	-3,434.08	60.08	39.06	1,386.17	4,794.26
3,911.15	-3,356.53	60.49	41.02	1,282.18	4,706.86
3,817.24	-3,279.20	60.89	42.99	1,179.84	4,614.69
3,723.33	-3,202.07	61.29	44.95	1,079.32	4,517.73
3,629.42	-3,125.15	61.70	46.91	980.82	4,415.97
3,535.51	-3,048.44	62.10	48.87	884.51	4,309.40
3,441.60	-2,971.95	62.51	50.84	790.57	4,198.01
3,347.69	-2,895.66	62.91	52.80	699.19	4,081.80
3,347.69	-2,895.66	62.92	57.59	699.19	4,081.80
3,331.06	-2,882.20	63.41	57.93	685.00	4,059.30
3,314.44	-2,868.79	63.90	58.28	670.69	4,036.31
3,297.81	-2,855.43	64.39	58.63	656.27	4,012.80
3,281.18	-2,842.11	64.87	58.98	641.72	3,988.78
3,264.56	-2,828.83	65.36	59.32	627.05	3,964.22
3,247.93	-2,815.61	65.85	59.67	612.25	3,939.09
3,231.30	-2,802.43	66.33	60.02	597.32	3,913.39
3,214.68	-2,789.30	66.82	60.37	582.25	3,887.09
3,198.05	-2,776.22	67.31	60.71	567.05	3,860.17
3,181.42	-2,763.19	67.80	61.06	551.70	3,832.61
3,164.79	-2,750.20	68.28	61.41	536.21	3,804.38
3,148.17	-2,737.26	68.77	61.76	520.56	3,775.46
3,131.54	-2,724.38	69.26	62.10	504.75	3,745.81

Table A4 (Cont.) The results of well trajectory of well A

MD (ft)	TVD (ft)	Inc (deg)	AZ (deg)	North (ft)	East (ft)
3,114.91	-2,711.54	69.74	62.45	488.77	3,715.41
3,098.29	-2,698.75	70.23	62.80	472.63	3,684.22
3,081.66	-2,686.01	70.72	63.15	456.30	3,652.22
3,065.03	-2,673.31	71.21	63.49	439.79	3,619.36
3,048.41	-2,660.67	71.69	63.84	423.08	3,585.60
3,031.78	-2,648.08	72.18	64.19	406.17	3,550.90
3,031.78	-2,648.08	72.18	66.23	406.17	3,550.90
2,984.98	-2,612.71	72.18	67.21	362.67	3,449.81
2,938.19	-2,577.33	72.18	68.18	320.90	3,348.00
2,891.39	-2,541.96	72.18	69.16	280.88	3,245.49
2,844.59	-2,506.58	72.18	70.14	242.61	3,142.32
2,797.80	-2,471.21	72.18	71.12	206.11	3,038.50
2,751.00	-2,435.83	72.18	72.10	171.38	2,934.08
2,704.20	-2,400.46	72.18	73.07	138.45	2,829.08
2,657.41	-2,365.08	72.18	74.05	107.31	2,723.53
2,610.61	-2,329.71	72.18	75.03	77.97	2,617.47
2,563.81	-2,294.33	72.18	76.01	50.45	2,510.92
2,517.01	-2,258.96	72.18	76.99	24.76	2,403.92
2,470.22	-2,223.58	72.18	77.96	0.89	2,296.49
2,423.42	-2,188.21	72.18	78.94	-21.14	2,188.67
2,376.62	-2,152.83	72.18	79.92	-41.32	2,080.50
2,329.83	-2,117.45	72.18	80.90	-59.66	1,971.99
2,283.03	-2,082.08	72.18	81.88	-76.14	1,863.19
2,236.23	-2,046.70	72.18	82.85	-90.76	1,754.12
2,189.44	-2,011.33	72.18	83.83	-103.52	1,644.81
2,142.64	-1,975.95	72.18	84.81	-114.41	1,535.31
2,142.64	-1,975.95	72.19	84.84	-114.41	1,535.31

Table A4 (Cont.) The results of well trajectory of well A

MD (ft)	TVD (ft)	Inc (deg)	AZ (deg)	North (ft)	East (ft)
2,099.64	-1,943.27	70.77	85.74	-122.41	1,438.06
2,056.64	-1,910.20	69.34	86.64	-128.47	1,347.16
2,013.64	-1,876.77	67.91	87.54	-132.80	1,261.85
1,970.64	-1,842.97	66.48	88.44	-135.63	1,181.51
1,927.64	-1,808.81	65.06	89.34	-137.10	1,105.62
1,884.64	-1,774.29	63.63	90.24	-137.37	1,033.77
1,841.64	-1,739.43	62.20	91.14	-136.56	965.60
1,798.64	-1,704.22	60.77	92.03	-134.77	900.81
1,755.64	-1,668.67	59.35	92.93	-132.10	839.16
1,712.65	-1,632.80	57.92	93.83	-128.63	780.41
1,669.65	-1,596.59	56.49	94.73	-124.44	724.38
1,626.65	-1,560.07	55.06	95.63	-119.59	670.91
1,583.65	-1,523.24	53.64	96.53	-114.16	619.85
1,540.65	-1,486.10	52.21	97.43	-108.19	571.07
1,497.65	-1,448.66	50.78	98.33	-101.75	524.46
1,454.65	-1,410.93	49.35	99.22	-94.88	479.91
1,411.65	-1,372.91	47.93	100.12	-87.63	437.35
1,368.65	-1,334.62	46.50	101.02	-80.04	396.68
1,325.65	-1,296.05	45.07	101.92	-72.16	357.84
1,325.65	-1,296.05	45.11	101.88	-72.16	357.84
1,279.82	-1,254.59	42.73	101.80	-63.97	318.75
1,233.98	-1,212.68	40.36	101.72	-56.39	282.39
1,188.15	-1,170.34	37.99	101.65	-49.41	248.61
1,142.32	-1,127.60	35.61	101.57	-42.97	217.29
1,096.48	-1,084.49	33.24	101.49	-37.07	188.34
1,050.65	-1,041.02	30.86	101.41	-31.66	161.66
1,004.82	-997.22	28.49	101.33	-26.74	137.19

Table A4 (Cont.) The results of well trajectory of well A

MD (ft)	TVD (ft)	Inc (deg)	AZ (deg)	North (ft)	East (ft)
958.98	-953.11	26.12	101.26	-22.28	114.87
913.15	-908.72	23.74	101.18	-18.26	94.63
867.32	-864.07	21.37	101.10	-14.68	76.43
821.49	-819.18	18.99	101.02	-11.51	60.24
775.65	-774.10	16.62	100.95	-8.75	46.03
729.82	-728.82	14.24	100.87	-6.39	33.76
683.99	-683.40	11.87	100.79	-4.41	23.41
638.15	-637.84	9.50	100.71	-2.80	14.96
592.32	-592.18	7.12	100.63	-1.57	8.41
546.49	-546.43	4.75	100.56	-0.69	3.74
500.65	-500.64	2.37	100.48	-0.17	0.93
454.82	-454.82	0.00	100.40	0.00	0.00
454.82	-454.82	0.00	0.00	0.00	0.00
430.88	-430.88	0.00	0.00	0.00	0.00
406.94	-406.94	0.00	0.00	0.00	0.00
383.01	-383.01	0.00	0.00	0.00	0.00
359.07	-359.07	0.00	0.00	0.00	0.00
335.13	-335.13	0.00	0.00	0.00	0.00
311.19	-311.19	0.00	0.00	0.00	0.00
287.25	-287.25	0.00	0.00	0.00	0.00
263.32	-263.32	0.00	0.00	0.00	0.00
239.38	-239.38	0.00	0.00	0.00	0.00
215.44	-215.44	0.00	0.00	0.00	0.00
191.50	-191.50	0.00	0.00	0.00	0.00
167.57	-167.57	0.00	0.00	0.00	0.00
143.63	-143.63	0.00	0.00	0.00	0.00
119.69	-119.69	0.00	0.00	0.00	0.00

Table A4 (Cont.) The results of well trajectory of well A

MD (ft)	TVD (ft)	Inc (deg)	AZ (deg)	North (ft)	East (ft)
95.75	-95.75	0.00	0.00	0.00	0.00
71.81	-71.81	0.00	0.00	0.00	0.00
47.88	-47.88	0.00	0.00	0.00	0.00
23.94	-23.94	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

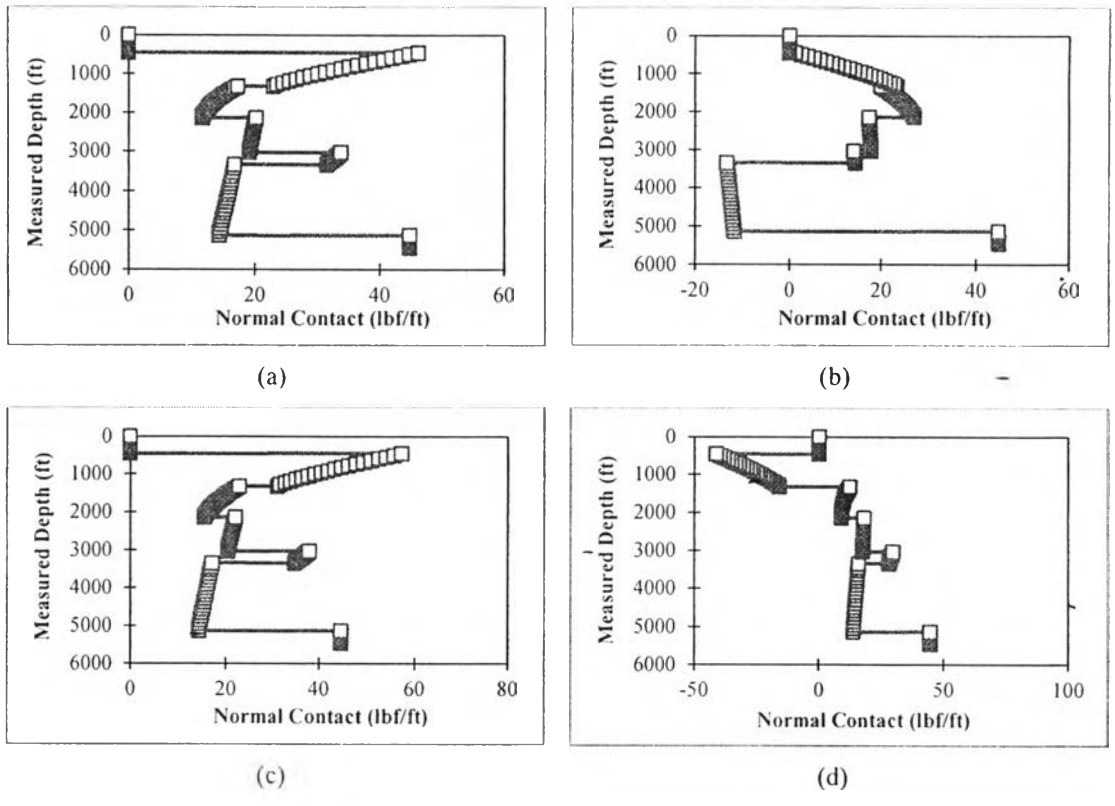

Figure A1 The normal contact force of different operations; (a) RoffB, (b) RonB, (c) POH, and (d) RIH at the FF of 0.1 of well A.

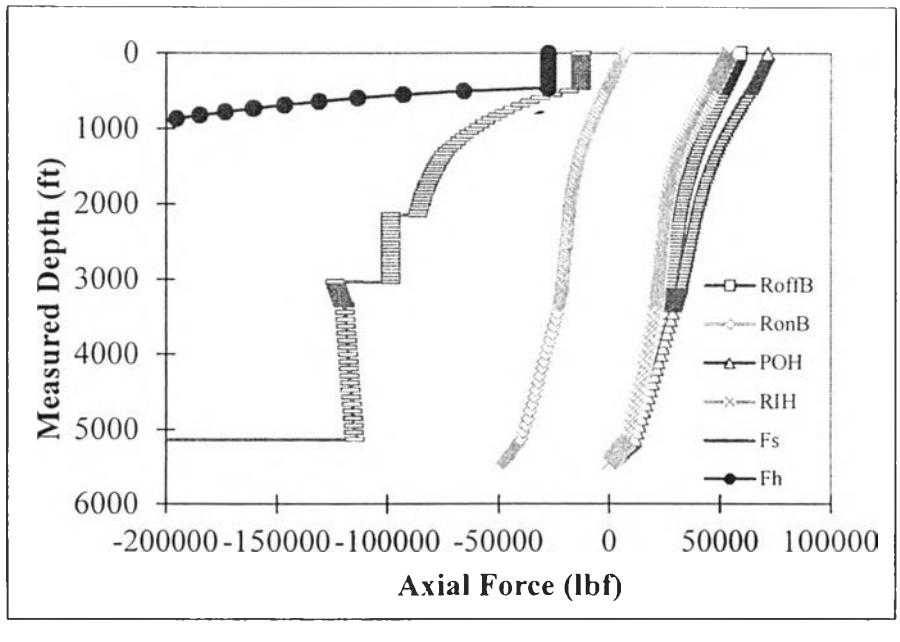

Figure A2 The axial force of different operation at the FF of 0.1 of well A.

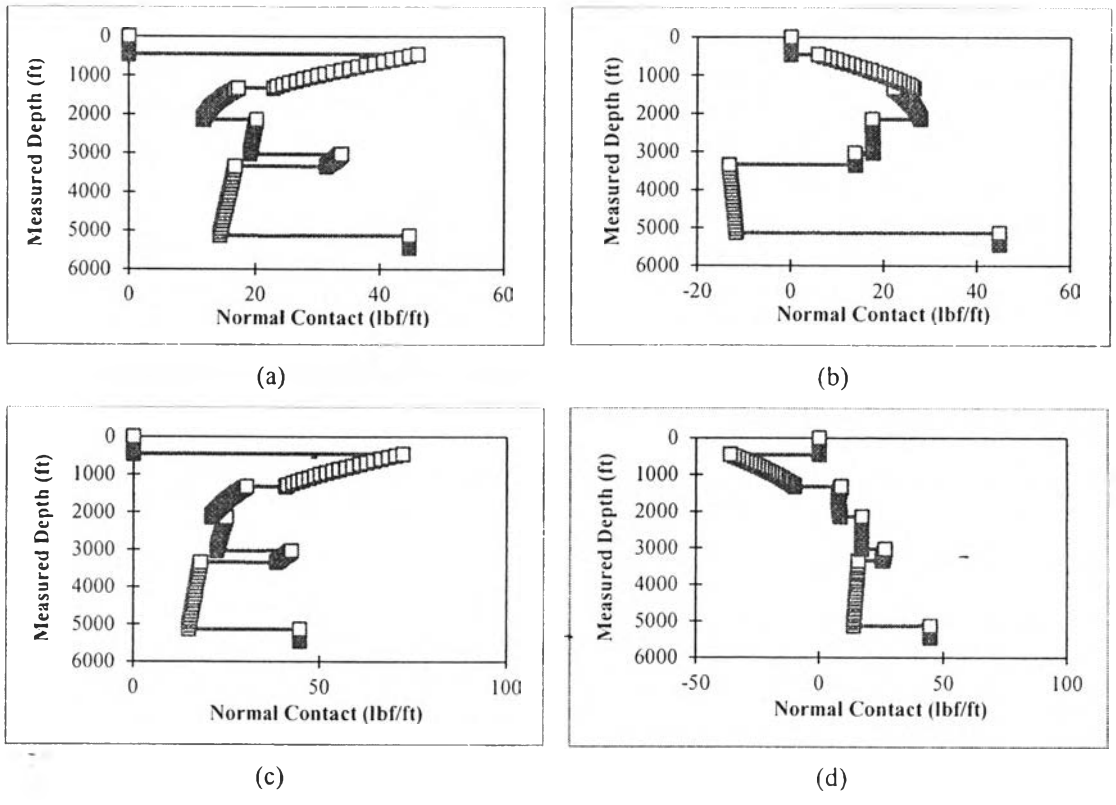

Figure A3 The normal contact force of different operations; (a) RoffB, (b) RonB, (c) POH, and (d) RIH at the FF of 0.2 of well A.

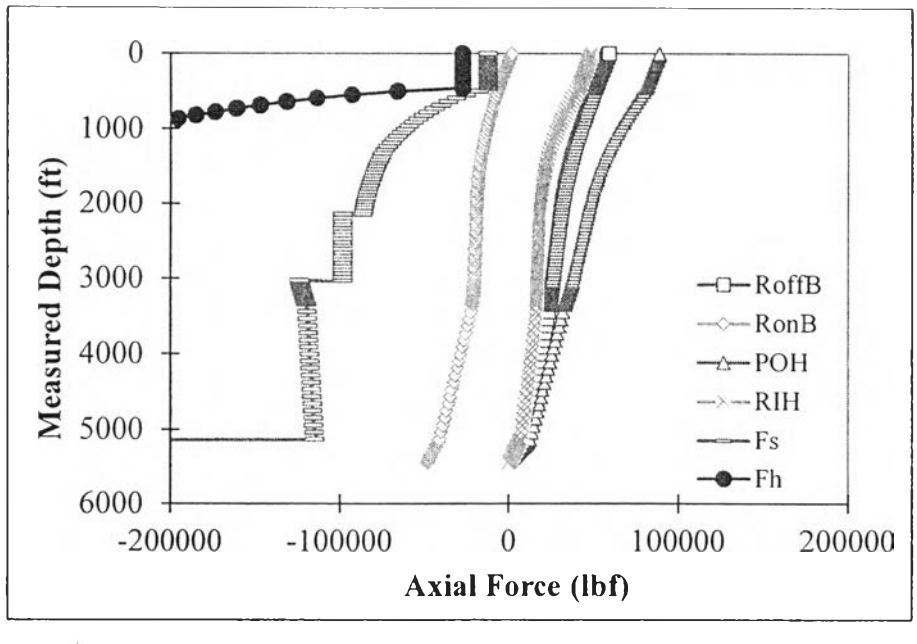

Figure A4 The axial force of different operation at the FF of 0.2 of well A.

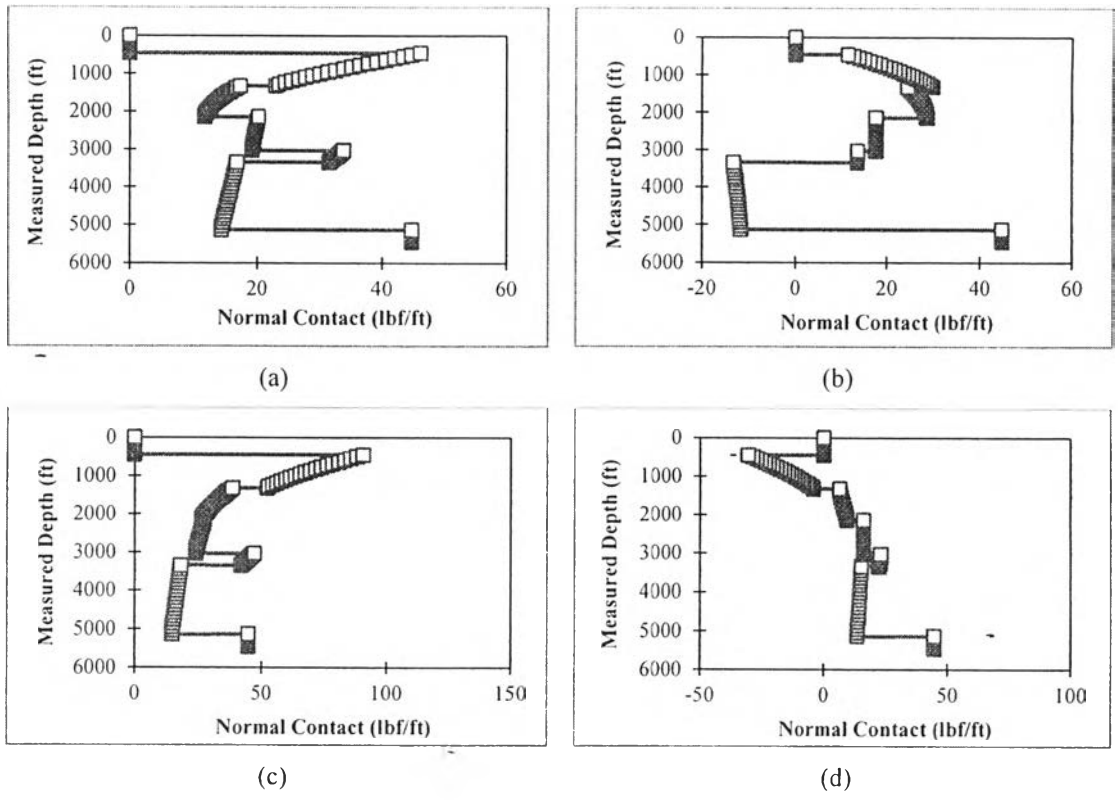

Figure A5 The normal contact force of different operations; (a) RoffB, (b) RonB, (c) POH, and (d) RIH at the FF of 0.3 of well A.

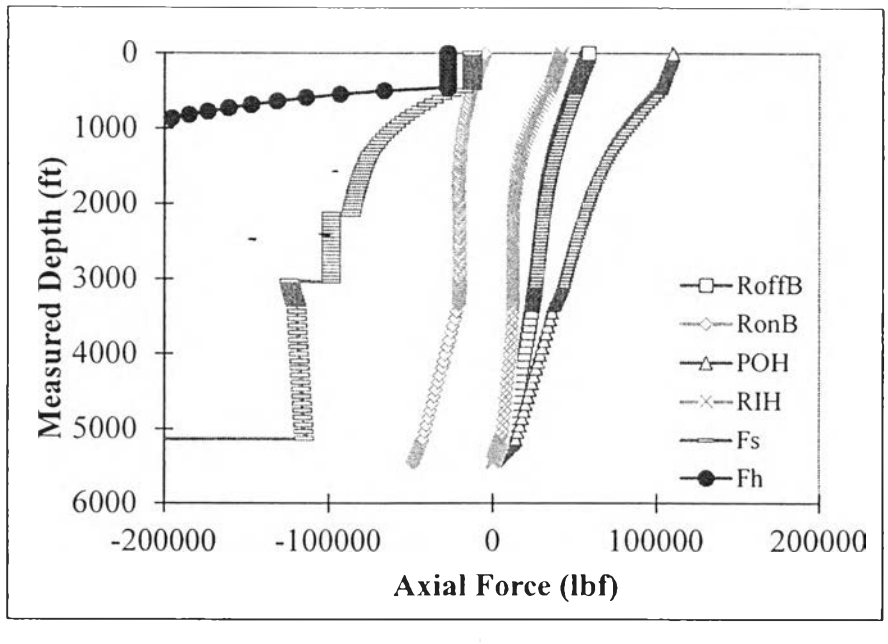

Figure A6 The axial force of different operation at the FF of 0.3 of well A.

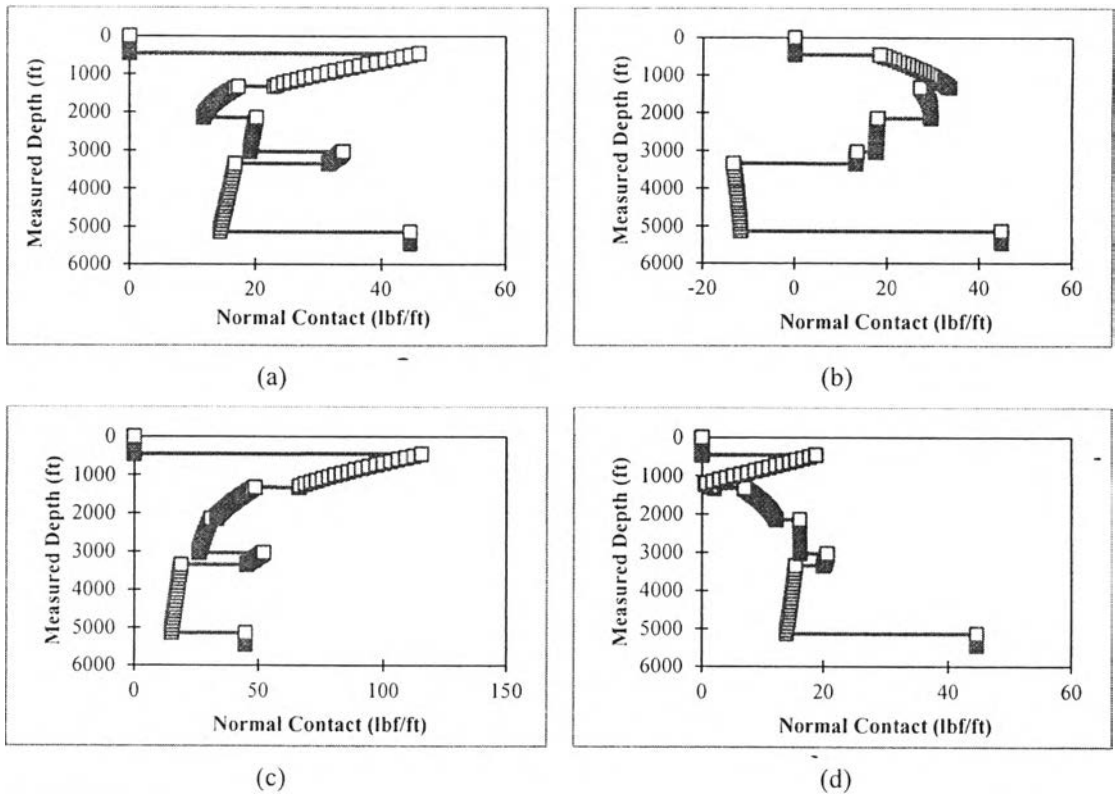

Figure A7 The normal contact force of different operations; (a) RoffB, (b) RonB, (c) POH, and (d) RIH at the FF of 0.4 of well A.

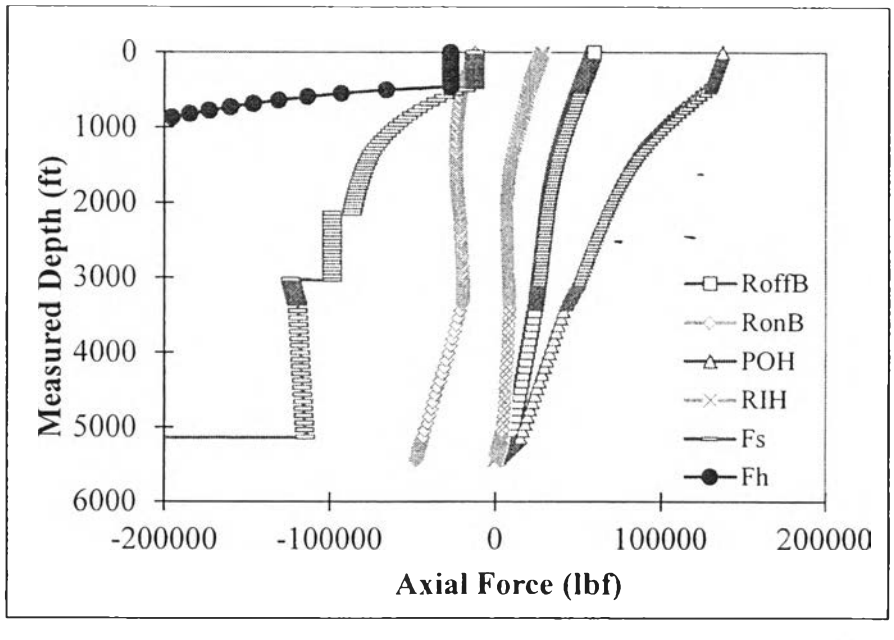

Figure A8 The axial force of different operation at the FF of 0.4 of well A.

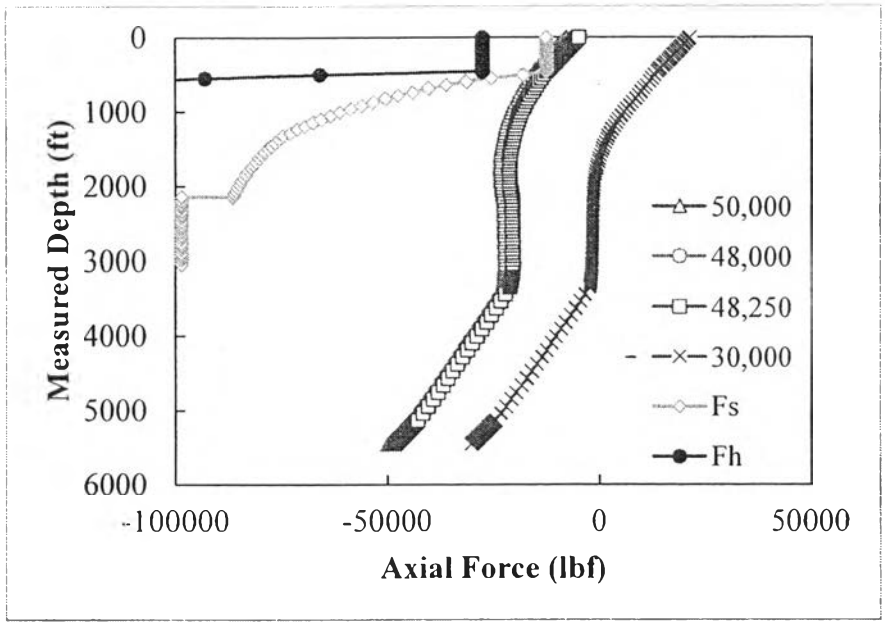

Figure A9 The axial force of RonB at the FF of 0.3 of well A at maximum WOB.

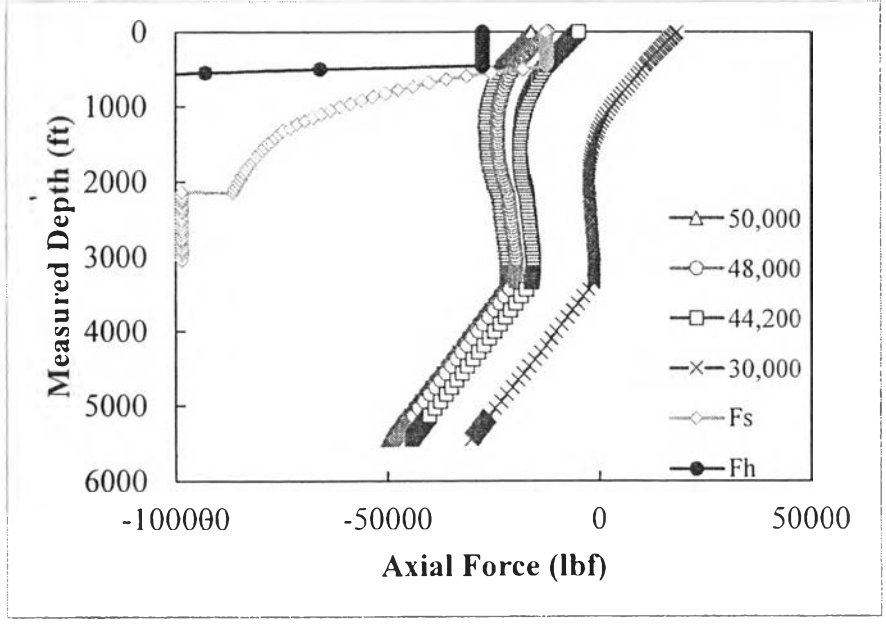

Figure A10 The axial force of RonB at the FF of 0.3 of well A at maximum WOB.

Appendix B Field Experience

Pan Orient Energy Siam (POES) provided the actual field data, which is the old field, for this research in order to verify the software. The next collaboration is that actual field experince of drilling operations phase in concession L53 Onshore Thailand (Pan Orient Operator and 100 percent Working Interest). This well is called L53AC-G1 located in central of Thailand. This is an exploration well prospected as the large oil well followed by the seismic data. The L53AC-G1 well is currently being abandoned after failing to encounter commercial hydrocarbons. The well was vertical and drilled to a total depth of 3,169 feet (966 meters), reached March 2.

From this opportunity, I gained a lot of experience collaborated with company man and the field engineer of POES, and services company such as Schlumberger, Weatherford, Scomi, DHI, and ELETE. Schlumberger operates a cementing job for this well. Weatherford runs logging to evaluate the formation with their tool i.e. gramma ray, resitivity, and porosity. Scomi controls mud to keep everything balance between borehole and formation and also cleaning hole and cooperate cementing job with cementer. DHI monitors every parameter associate with drilling operation and evaluate the cuttings coming out of the downhole providing the mud logger to geologist of POES. ELETE is a drilling rig company to providing a rig operation and workforce for every unit consisting of tool pusher, driller, krane controller, mud engineer supporter, and pipe. Tool pusher controls drilling operation with company man who makes a decistion for all operation at the rig site. Driller keeps controlling the drilling parameter follow by company man decision and reports every situation on the rig floor to company man.

In this well site, I got a new knowledge from the actual field that can not learn from school. I would like to thank my advisor to bring me involved in the real operation and all of POES people for supporting me.

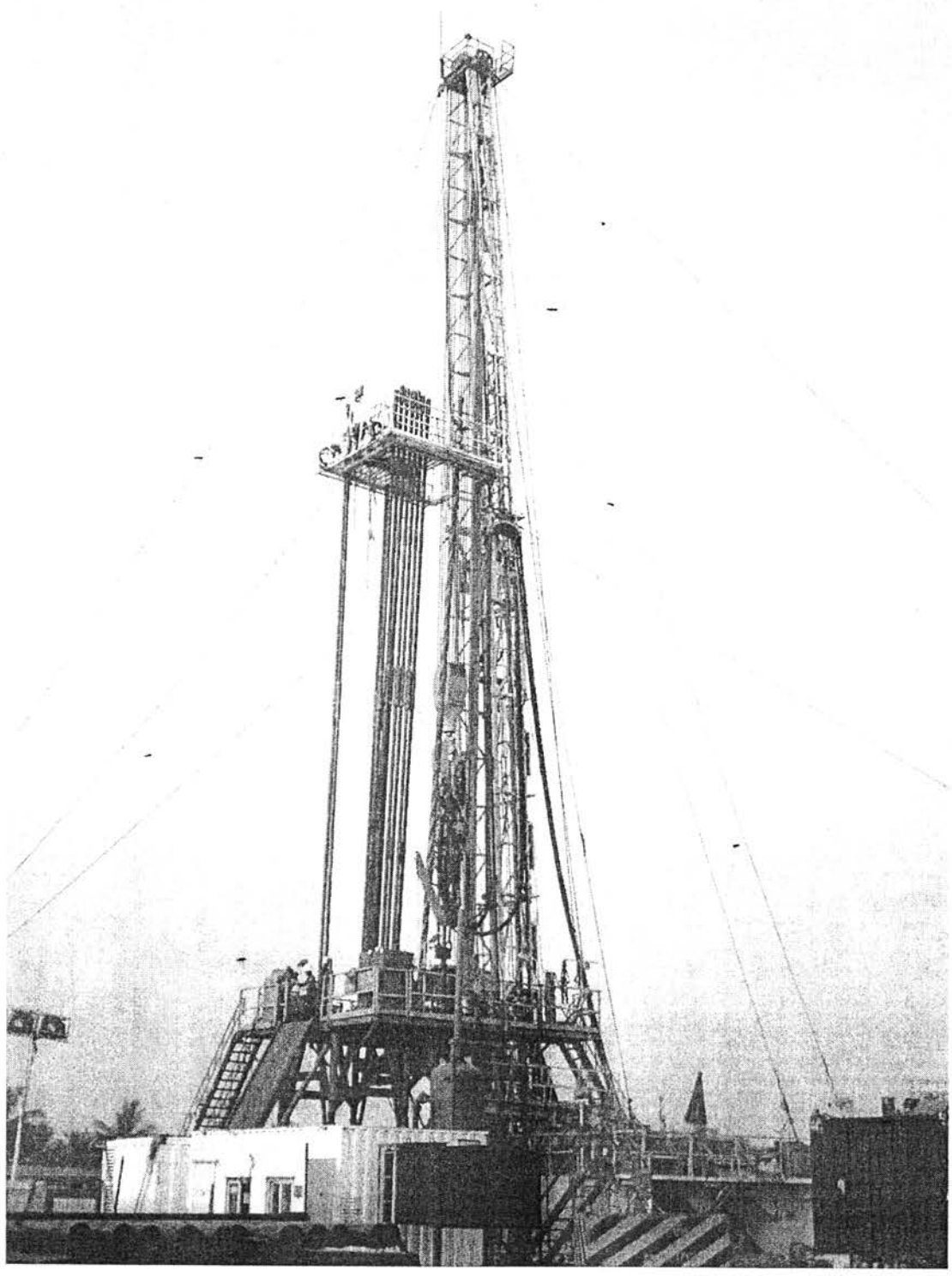

Figure B1 The on-shored rig.

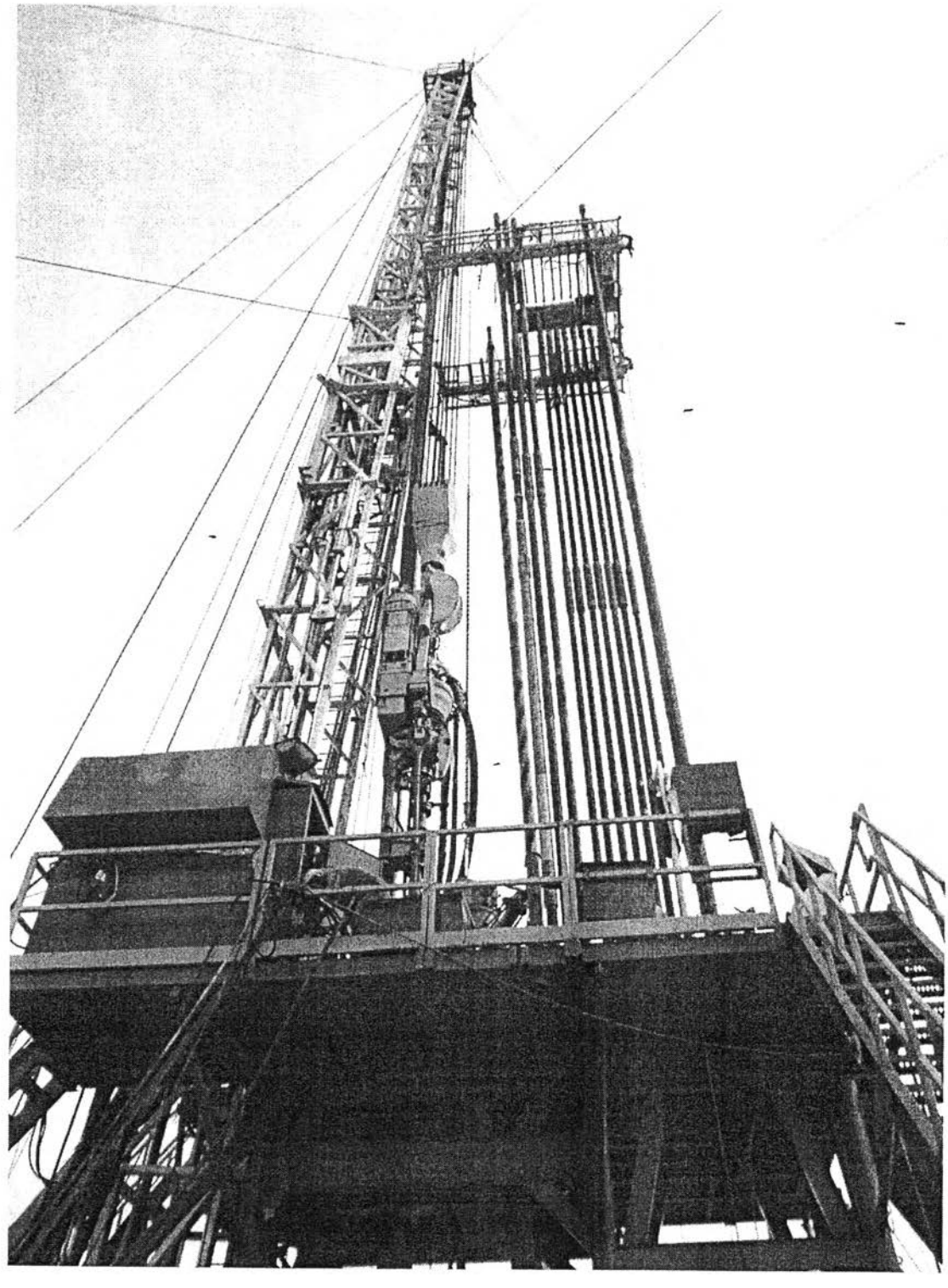

Figure B2 The on-shored rig floor and the hoisting component.

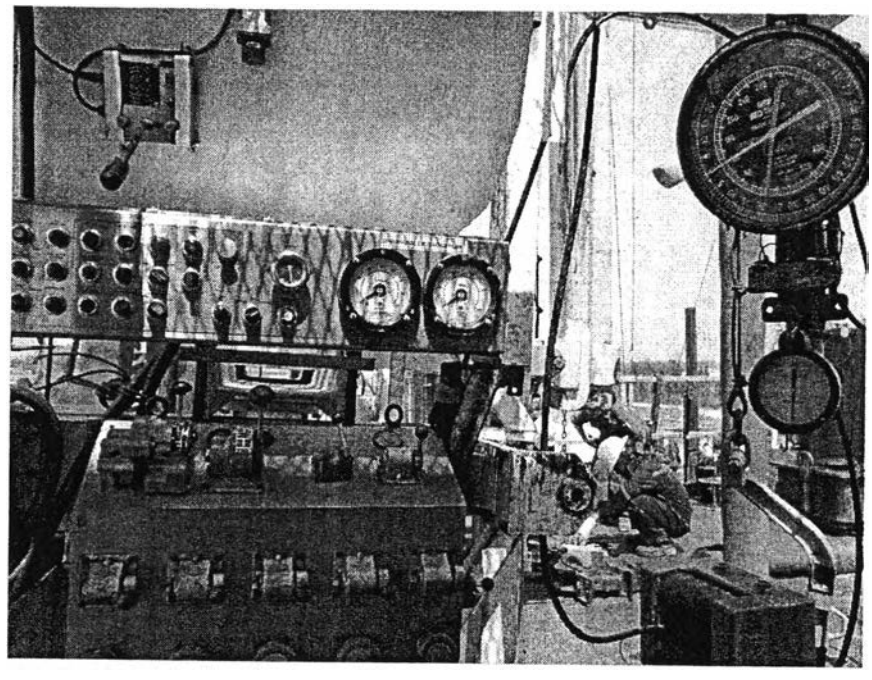

Figure B3 The control panel of at the rig floor.

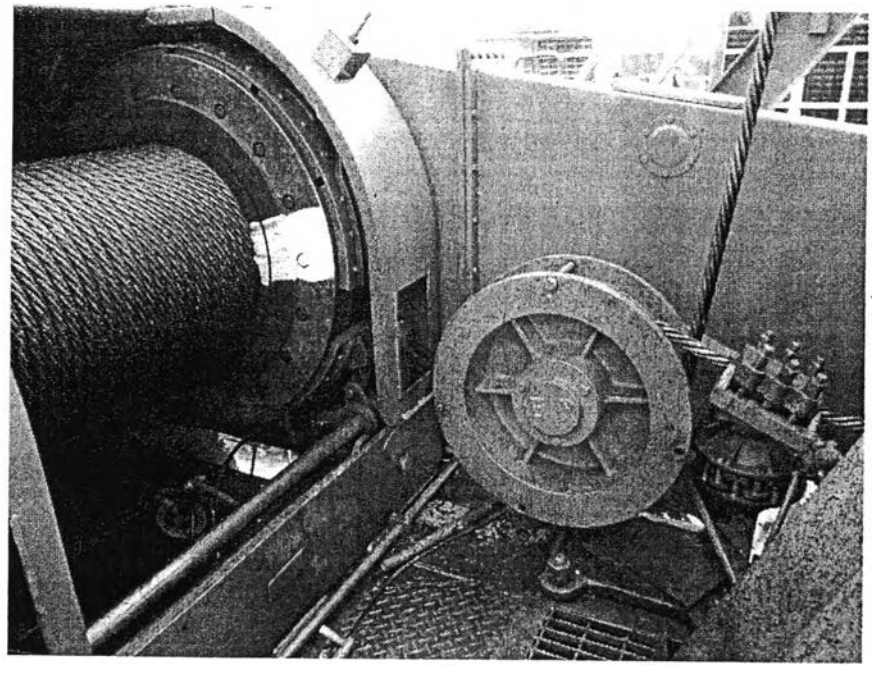

Figure B4 The draw work of rig and dead line for indicating the hookload.

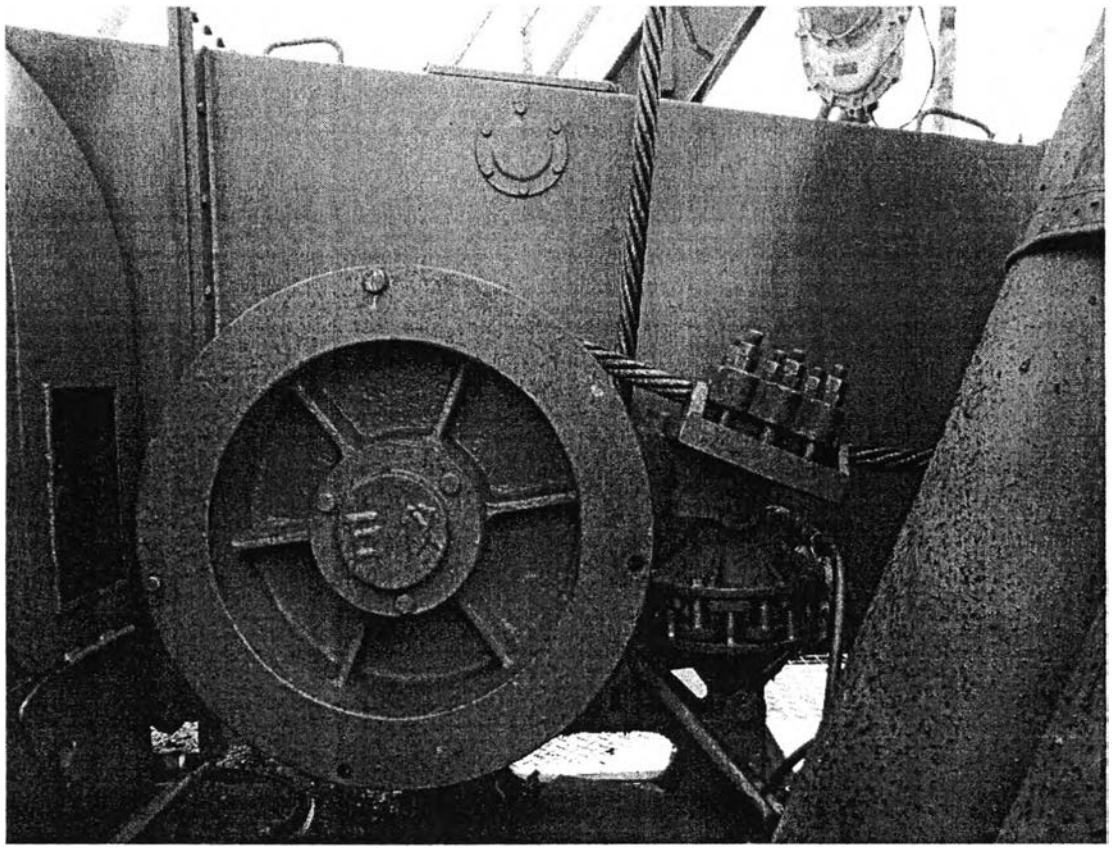

Figure B5 The anchor of dead line for indicating the hookload.

CURRICULUM VITAE

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	Company name:	Energy Thai Trading Hub Ltd.

Proceedings:

1. Klayhan, A.; Saiwan, C., and Prurapark, R. (2014, April 22) Torque and Drag Analysis of Oil and Gas Well Planning in Three – Dimensional Wellbore. Proceedings of the 5th Research Symposium on Petrochemical and Materials Technology and the 20th PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.

Presentations:

1. Klayhan, A.; Ek-udomsuphan, S.; Saiwan, C., and Prurapark, R (2013, September 11-12) New Drilling Technology in Three-Dimensional Wellbore. Paper presented at 17th PTTEP Technical Forum, Bangkok, Thailand.
2. Klayhan, A.; Saiwan, C., and Prurapark, R. (2014, June 17-26) Torque and Drag Analysis for Well Planning Through Three – Dimensional Sub-Surface Basin. Paper presented at 14th International Multidisciplinary Scientific GeoConference, Albena, Bulgaria.