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APPENDICES

Appendix A MALAB Code of the Software

Tables A1-A2 show input and output parameter of the software.

Table A1 MATLAB code of input parameter

Well Description Panel			
Well Section			
Parameter	MATLAB Function	MATLAB Variable	Unit
Measure			
depth		handles.MD	m
Inclination		handles.AIn	degree
Azimuth		handles.AAz	degree
Vertical		handles.AVd	m
depth		handles.AVd	degrees/ 100 MD
Build rate	<code>real_time_OpeningFcn</code>	handles.BUR	ft
Weight on bit		handles.WOB	lbf
Fluid density		handles.Denfluid	lb/gal
Bit diameter		handles.Bitdim	in
Delta torque		handles.delT	ft-lbf

Table A2 MATLAB code of output parameters

Surface Data Panel			
Parameter	MATLAB Function	MATLAB Variable	Unit
FTop	handles.text1	handles.af	lbf
Torque	handles.text2	handles.at	ft-lbf
Graphical Form			
Well Trajectory	handles.axes1		
- TVD		handles.z	m
- North		handles.y	m
- East		handles.x	m
Compass	handles.axes2		
- X axis		handles.vx	
- Y axis		handles.vy	
Real-time Well Trajectory	handles.axes3		
- TVD		handles.Vert	m
- North		handles.NS	m
- East		handles.EW	m
Compass Rose	handles.axes4		

Appendix B Well A

Tables B1-B6 show actual field data and calculated results.

Table B1 Survey data, average torque and hookload of well A

MD (m)	Incl (°)	Azim Grid (°)	TVD (m)	VSEC (m)	NS ^a (N/S m)	EW ^b (E/W m)	DLS ^c (°/30m)	Torque (ft-lbf)	HookLoad (lbf)
0.00	0.00	100.00	0.00	0.00	N 0.00	E 0.00	N/A	0.00	0.00
6.00	0.00	25.07	6.00	0.00	N 0.00	E 0.00	0.02	3079.02	27909.98
118.89	0.07	25.07	118.89	0.06	N 0.07	E 0.03	0.02	806.34	54041.58
138.63	0.28	57.24	138.63	0.12	N 0.10	E 0.08	0.34	822.94	54345.87
156.60	2.39	100.40	156.59	0.44	N 0.06	E 0.48	3.66	1381.38	54698.76
175.28	5.85	103.16	175.22	1.41	S 0.23	E 1.79	5.56	1042.14	58537.96
194.22	8.86	102.65	194.01	3.14	S 0.77	E 4.16	4.77	1100.00	59016.79
212.05	11.81	102.48	211.54	5.44	S 1.46	E 7.28	4.96	1447.49	61613.31
232.69	15.80	102.58	231.58	8.98	S 2.53	E 12.08	5.80	1772.29	60750.33
250.65	20.27	103.16	248.66	12.94	S 3.77	E 17.50	7.47	2113.02	61045.76
269.96	24.76	103.95	266.49	18.16	S 5.51	E 24.69	6.99	2540.70	62593.62
289.20	27.75	103.80	283.74	24.13	S 7.55	E 32.95	4.66	2706.64	62971.22
308.37	30.36	102.49	300.50	30.76	S 9.66	E 42.02	4.20	3078.03	62983.26
327.50	33.08	102.87	316.77	37.96	S 11.87	E 51.83	4.28	3625.23	62081.05
365.86	40.03	102.84	347.58	54.26	S 16.95	E 74.06	5.58	3592.82	60980.76
385.09	42.71	102.47	362.01	63.37	S 19.73	E 86.46	4.20	4162.62	60253.48
404.06	45.35	101.92	375.65	72.90	S 22.51	E 99.35	4.22	4315.40	60188.55
423.46	47.66	100.57	389.00	83.23	S 25.25	E 113.15	3.88	4913.55	56016.58

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

Table B1 (Cont.) Survey data, average torque and hookload of well A

MD (m)	Incl (°)	Azim Grid (°)	TVD (m)	VSEC (m)	NS ^a (N/S m)	EW ^b (E/W m)	DLS ^c (°/30m)	Torque (ft-lbf)	HookLoad (lbf)
442.49	50.16	100.02	401.51	93.92	S 27.82	E 127.26	3.99	4970.72	58147.72
461.88	52.30	99.62	413.65	105.27	S 30.39	E 142.16	3.35	4870.27	57666.99
480.34	55.11	99.14	424.58	116.51	S 32.82	E 156.84	4.61	4604.40	58787.00
500.73	58.60	97.86	435.73	129.58	S 35.34	E 173.72	5.37	4683.75	58878.11
519.49	61.22	97.23	445.13	142.18	S 37.47	E 189.81	4.28	4429.37	54424.00
538.15	63.64	96.87	453.77	155.11	S 39.50	E 206.22	3.92	3806.90	52981.13
557.15	64.73	94.59	462.04	168.72	S 41.20	E 223.24	3.67	4815.41	50173.55
576.45	65.46	91.89	470.17	183.10	S 42.19	E 240.71	3.97	5584.35	44172.16
595.51	67.55	89.90	477.77	197.85	S 42.46	E 258.19	4.37	5245.84	37101.47
614.54	69.80	88.54	484.69	213.08	S 42.22	E 275.91	4.07	4677.74	602.00
633.71	71.10	86.76	491.10	228.85	S 41.48	E 293.96	3.32	4720.65	51614.33
653.08	72.46	84.81	497.16	245.20	S 40.12	E 312.31	3.56	4535.50	44086.43
670.21	74.24	82.89	502.07	260.02	S 38.36	E 328.63	4.48	4754.49	38808.92
691.45	75.83	80.27	507.55	278.90	S 35.36	E 348.92	4.22	4221.98	41919.11
710.67	75.67	77.34	512.29	296.36	S 31.74	E 367.19	4.44	5426.06	37843.05
729.68	74.49	74.57	517.18	313.88	S 27.28	E 385.01	4.62	5078.38	35203.21
748.99	73.53	71.96	522.50	331.82	S 21.94	E 402.79	4.17	5600.86	34774.85
768.35	72.85	69.19	528.10	349.94	S 15.78	E 420.26	4.24	6246.75	32868.26
796.39	72.55	67.02	536.44	376.33	S 5.80	E 445.10	2.24	6382.35	35320.93
816.15	74.41	66.72	542.06	395.07	N 1.64	E 462.52	2.86	5100.60	40343.63
835.54	76.01	66.52	547.01	413.63	N 9.08	E 479.73	2.49	6027.79	52383.38
854.68	76.41	66.48	551.57	432.03	N 16.50	E 496.78	0.63	6603.36	48238.07

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

Table B1 (Cont.) Survey data, average torque and hookload of well A

MD (m)	Incl (°)	Azim Grid (°)	TVD (m)	VSEC (m)	NS ^a (N/S m)	EW ^b (E/W m)	DLS ^c (°/30m)	Torque (ft-lbf)	HookLoad (lbf)
873.13	76.34	66.75	555.92	449.78	N 23.61	E 513.23	0.44	4981.55	56308.49
885.61	76.05	66.48	558.90	461.78	N 28.42	E 524.36	0.94	4822.54	57105.52
902.64	74.88	65.68	563.17	478.12	N 35.11	E 539.43	2.47	5915.16	43964.74
904.83	74.73	65.58	563.74	480.22	N 35.98	E 541.35	2.47	4678.75	58495.70
924.09	75.09	64.19	568.76	498.70	N 43.87	E 558.19	2.16	5637.15	42786.65
943.22	71.63	61.58	574.24	516.96	N 52.22	E 574.50	6.69	5024.97	41865.91
962.49	68.53	58.49	580.80	535.07	N 61.26	E 590.19	6.61	5262.16	37739.01
981.63	65.90	56.42	588.21	552.71	N 70.75	E 605.07	5.09	5096.92	53057.95
1000.87	64.35	53.98	596.31	570.14	N 80.71	E 619.40	4.21	5080.73	56327.13
1020.38	62.91	52.80	604.97	587.55	N 91.13	E 633.43	2.75	5424.62	63299.14
1039.30	62.30	51.27	613.68	604.24	N 101.47	E 646.68	2.36	5512.02	59007.62
1058.65	62.84	49.52	622.59	621.24	N 112.41	E 659.91	2.55	5291.82	60470.28
1077.94	62.72	47.67	631.42	638.14	N 123.76	E 672.77	2.57	5030.00	63301.23
1097.17	61.53	45.38	640.41	654.77	N 135.45	E 685.11	3.66	5488.54	50587.77
1123.50	61.91	41.55	652.89	677.16	N 152.28	E 701.05	3.87	5555.21	57438.24
1142.34	61.71	40.54	661.79	693.00	N 164.80	E 711.96	1.45	4739.35	57413.65
1161.63	61.52	37.07	670.96	708.98	N 178.02	E 722.59	4.76	5356.64	51287.59
1180.75	61.42	35.94	680.09	724.56	N 191.52	E 732.58	1.57	6178.89	67206.86
1199.90	61.37	35.98	689.26	740.09	N 205.13	E 742.46	0.10	5690.07	62185.73
1218.89	60.96	35.94	698.42	755.46	N 218.60	E 752.22	0.65	5418.31	49484.51
1238.32	59.53	36.33	708.06	771.07	N 232.22	E 762.17	2.27	5803.41	63675.09
1257.55	59.61	36.38	717.80	786.43	N 245.57	E 772.00	0.14	5784.52	62422.55
1276.59	59.47	36.89	727.45	801.66	N 258.74	E 781.79	0.73	5962.28	61053.35

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

Table B1 (Cont.) Survey data, average torque and hookload of well A

MD (m)	Incl (°)	Azim Grid (°)	TVD (m)	VSEC (m)	NS ^a (N/S m)	EW ^b (E/W m)	DLS ^c (°/30m)	Torque (ft-lbf)	HookLoad (lbf)
1295.81	59.25	36.56	737.25	817.02	N 272.00	E 791.68	0.56	5930.79	59263.18
1315.11	58.89	37.01	747.17	832.41	N 285.26	E 801.60	0.82	6012.03	60462.59
1333.44	59.03	36.89	756.62	847.02	N 297.81	E 811.04	0.28	6388.84	54089.46
962.49	68.53	58.49	580.80	535.07	N 61.26	E 590.19	6.61	5262.16	37739.01
981.63	65.90	56.42	588.21	552.71	N 70.75	E 605.07	5.09	5096.92	53057.95
1000.87	64.35	53.98	596.31	570.14	N 80.71	E 619.40	4.21	5080.73	56327.13
1020.38	62.91	52.80	604.97	587.55	N 91.13	E 633.43	2.75	5424.62	63299.14
1039.30	62.30	51.27	613.68	604.24	N 101.47	E 646.68	2.36	5512.02	59007.62
1058.65	62.84	49.52	622.59	621.24	N 112.41	E 659.91	2.55	5291.82	60470.28
1077.94	62.72	47.67	631.42	638.14	N 123.76	E 672.77	2.57	5030.00	63301.23
1097.17	61.53	45.38	640.41	654.77	N 135.45	E 685.11	3.66	5488.54	50587.77
1123.50	61.91	41.55	652.89	677.16	N 152.28	E 701.05	3.87	5555.21	57438.24
1142.34	61.71	40.54	661.79	693.00	N 164.80	E 711.96	1.45	4739.35	57413.65
1161.63	61.52	37.07	670.96	708.98	N 178.02	E 722.59	4.76	5356.64	51287.59
1180.75	61.42	35.94	680.09	724.56	N 191.52	E 732.58	1.57	6178.89	67206.86
1199.90	61.37	35.98	689.26	740.09	N 205.13	E 742.46	0.10	5690.07	62185.73
1218.89	60.96	35.94	698.42	755.46	N 218.60	E 752.22	0.65	5418.31	49484.51
1238.32	59.53	36.33	708.06	771.07	N 232.22	E 762.17	2.27	5803.41	63675.09
1257.55	59.61	36.38	717.80	786.43	N 245.57	E 772.00	0.14	5784.52	62422.55
1276.59	59.47	36.89	727.45	801.66	N 258.74	E 781.79	0.73	5962.28	61053.35
1295.81	59.25	36.56	737.25	817.02	N 272.00	E 791.68	0.56	5930.79	59263.18
1315.11	58.89	37.01	747.17	832.41	N 285.26	E 801.60	0.82	6388.84	54089.46
1449.69	58.78	38.25	816.79	939.97	N 376.60	E 871.74	0.09	7101.03	32542.00
1468.12	58.67	38.79	826.36	954.78	N 388.92	E 881.55	0.77	6045.38	53395.54

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

Table B1 (Cont.) Survey data, average torque and hookload of well A

MD (m)	Incl (°)	Azim Grid (°)	TVD (m)	VSEC (m)	NS ^a (N/S m)	EW ^b (E/W m)	DLS ^c (°/30m)	Torque (ft-lbf)	HookLoad (lbf)
1478.48	58.63	38.85	831.75	963.11	N 395.82	E 887.10	0.19	6657.74	50177.47
1506.71	58.40	39.07	846.49	985.80	N 414.54	E 902.24	0.32	8380.68	44969.74
1526.57	57.12	39.33	857.09	1001.66	N 427.55	E 912.85	1.96	8383.83	48948.87
1545.55	55.64	39.44	867.59	1016.60	N 439.77	E 922.88	2.34	8496.96	46113.71
1564.23	55.27	39.20	878.19	1031.13	N 451.67	E 932.63	0.67	8900.70	50722.12
1583.40	55.41	39.52	889.09	1046.03	N 463.86	E 942.63	0.47	7434.48	61163.15
1602.47	54.10	40.05	900.09	1060.78	N 475.83	E 952.60	2.17	8870.10	54176.73
1617.94	54.06	40.41	909.17	1072.69	N 485.40	E 960.69	0.56	8489.06	57408.97
1621.59	54.05	40.49	911.31	1075.49	N 487.65	E 962.60	0.56	8699.01	57556.13
1640.25	54.32	40.61	922.23	1089.89	N 499.14	E 972.44	0.46	9723.47	56899.30
1661.13	54.62	40.74	934.36	1106.07	N 512.03	E 983.52	0.46	10770.90	56298.69

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

Table B2 Example ascii data of well A

MD	VD	WOB	HookLoad	MWIn	MWOut	Torque	ROP	GPM	Total RPM	TempIn	TempOut
6.25	6.25	7.8	49	9.00	9.00	9863	10	722	40	31.7	33.5
6.50	6.50	1.0	51	9.00	9.00	11239	25	723	40	31.7	33.5
6.75	6.75	5.1	53	9.00	9.00	10940	18	721	52	31.7	33.5
7.00	7.00	3.6	55	9.00	9.00	11222	44	723	52	31.7	33.5
7.25	7.25	28.1	24	9.00	9.00	11194	34	721	52	31.7	33.5
7.50	7.50	5.5	53	9.00	9.00	11556	35	724	52	31.7	33.5

Table B2 (cont.) Example ascii data of well A

MD	VD	WOB	HookLoad	MWIn	MWOut	Torque	ROP	GPM	Total_RPM	TempIn	TempOut
7.75	7.75	19.9	25	9.00	9.00	10987	58	723	51	31.7	33.5
8.00	8.00	33.9	26	9.00	9.00	11101	47	721	51	31.7	33.5
8.25	8.25	34.3	24	9.00	9.00	11197	47	362	54	31.7	33.5
8.50	8.50	33.8	25	9.00	9.00	11173	74	362	54	31.7	33.5
8.75	8.75	34.0	26	9.00	9.00	11462	48	362	54	31.7	33.5
9.00	9.00	33.7	24	9.00	9.00	11442	50	181	51	31.7	33.5
9.25	9.25	32.4	27	9.00	9.00	11705	72	340	48	31.7	33.5
9.50	9.50	33.4	25	9.00	9.00	1889	83	361	45	31.7	33.5
9.75	9.75	32.9	26	9.00	9.00	1884	70	362	45	31.7	33.5
10.00	10.00	33.8	24	9.00	9.00	594	76	720	50	31.7	33.5
10.25	10.25	34.2	23	9.00	9.00	158	43	720	57	31.7	33.5
10.50	10.50	38.2	20	9.00	9.00	1941	28	721	55	31.6	33.4
10.75	10.75	34.3	24	9.00	9.00	1431	40	721	61	31.6	33.4
11.00	11.00	3.9	29	9.00	9.00	370	13	355	31	31.6	33.4
11.25	11.25	3.9	30	9.00	9.00	168	13	355	34	31.6	33.4
11.50	11.50	4.4	25	9.00	9.00	2544	15	355	31	31.6	33.4
11.75	11.75	9.3	21	9.00	9.00	1937	13	366	18	31.6	33.3
12.00	12.00	8.8	22	9.00	9.00	1941	15	363	17	31.5	33.3
12.25	12.25	5.7	22	9.00	9.00	2649	8	363	56	31.5	33.3
12.50	12.50	6.0	21	9.00	9.00	2613	22	445	61	31.5	33.3
12.75	12.75	7.4	20	9.00	9.00	2596	35	438	61	31.5	33.3

Table B3 Software input data of well A from depth 341 ft to 2631 ft

MD (m)	Inc (°)	Azim Grid (°)	WOB	DF (lbm/gal)	Bit diameter(in.)	Deltatorque (ft-lbf)	Nominal weight(lb/ft)	DLS ^a (o/100 ft)	Mode
20.00	0.00	100.12	10726.71	9.06	26.00	325.96	147.00	0.02	4
40.00	0.00	100.13	9764.94	9.10	17.50	239.97	147.00	0.02	
60.00	0.00	100.14	6628.00	9.10	17.50	204.94	50.00	0.02	
80.00	0.00	100.15	14633.88	9.10	17.50	535.72	50.00	0.02	
100.00	0.00	100.16	9470.74	9.22	12.25	385.04	50.00	0.02	
118.89	0.07	100.17	11314.57	9.50	12.25	313.89	19.50	0.02	
138.63	0.28	100.18	11101.51	9.50	12.25	243.35	19.50	0.34	
156.60	2.39	100.40	12021.43	9.50	12.25	375.62	19.50	3.66	
175.28	5.85	103.16	7524.67	9.50	12.25	297.72	19.50	5.56	
194.22	8.86	102.65	9361.67	9.50	12.25	314.46	19.50	4.77	
212.05	11.81	102.48	13295.79	9.50	12.25	473.45	19.50	4.96	
232.69	15.80	102.58	13745.00	9.50	12.25	514.15	19.50	5.80	
250.65	20.27	103.16	13832.00	9.50	12.25	699.70	19.50	7.47	
269.96	24.76	103.95	14792.86	9.50	12.25	495.76	19.50	6.99	
289.20	27.75	103.80	14451.15	9.50	12.25	780.79	19.50	4.66	
308.37	30.36	102.49	13444.58	9.50	12.25	560.30	19.50	4.20	
327.50	33.08	102.87	16590.45	9.50	12.25	562.36	19.50	4.28	
346.73	36.47	102.86	12900.59	9.50	12.25	828.42	19.50	5.29	
365.86	40.03	102.84	13281.11	9.50	12.25	412.38	19.50	5.58	
385.09	42.71	102.47	17817.59	9.57	12.25	532.28	19.50	4.20	
404.06	45.35	101.92	19580.31	9.70	12.25	610.98	50.00	4.22	
423.46	47.66	100.57	15970.71	9.70	12.25	862.00	50.00	3.88	

^a Dog leg severity

Table B3 (Cont.) Software input data of well A from depth 341 ft to 2631 ft

MD (m)	Inc (°)	Azim Grid (°)	WOB	DF (lbm/gal)	Bit diameter(in.)	Deltatorque (ft-lbf)	Nominal weight(lb/ft)	DLS ^a (o/100 ft)	Mode
442.49	50.16	100.02	15903.33	9.70	12.25	726.50	50.00	3.99	
461.88	52.30	99.62	18307.59	9.70	12.25	624.43	50.00	3.35	
480.34	55.11	99.14	16669.52	9.70	12.25	654.38	50.00	4.61	
500.73	58.60	97.86	17992.94	9.70	12.25	892.91	50.00	5.37	
519.49	61.22	97.23	14886.36	9.70	12.25	574.86	50.00	4.28	
538.15	63.64	96.87	11577.69	9.70	12.25	541.96	50.00	3.92	
557.15	64.73	94.59	27803.18	9.70	12.25	669.79	19.50	3.67	
576.45	65.46	91.89	21130.77	9.70	12.25	781.20	19.50	3.97	
595.51	67.55	89.90	31144.44	9.72	12.25	599.64	19.50	4.37	
614.54	69.80	88.54	9540.00	10.00	12.25	600.00	19.50	4.07	
633.71	71.10	86.76	12473.89	9.80	12.25	610.73	19.50	3.32	
653.08	72.46	84.81	5545.71	9.80	12.25	1028.32	19.50	3.56	
670.21	74.24	82.89	21547.78	9.80	12.25	817.70	19.50	4.48	
691.45	75.83	80.27	13525.38	9.80	12.25	696.38	19.50	4.22	
710.67	75.67	77.34	14541.43	9.80	12.25	356.01	19.50	4.44	
729.68	74.49	74.57	18621.00	9.85	12.25	380.64	19.50	4.62	
748.99	73.53	71.96	19475.71	9.90	12.25	435.13	19.50	4.17	
768.35	72.85	69.19	12648.75	9.90	12.25	789.07	19.50	4.24	
796.39	72.55	67.02	13275.33	9.92	12.25	629.97	19.50	2.24	

^a Dog leg severity

Table B4 Software input data of well A from depth 2631 ft to 5450 ft

MD (m)	Inc (°)	Azim Grid (°)	WOB	DF (lbm/gal)	Bit diameter(in.)	Deltatorque (ft-lbf)	Nominal weight(lb/ft)	DLS ^a (°/100 ft)	Mode
20.00	0.00	100.12	10726.71	9.06	26.00	325.96	147.00	0.02	4
40.00	0.00	100.13	9764.94	9.10	17.50	239.97	147.00	0.02	
60.00	0.00	100.14	6628.00	9.10	17.50	204.94	50.00	0.02	
80.00	0.00	100.15	14633.88	9.10	17.50	535.72	50.00	0.02	
100.00	0.00	100.16	9470.74	9.22	12.25	385.04	50.00	0.02	
118.89	0.07	100.17	11314.57	9.50	12.25	313.89	50.00	0.02	
138.63	0.28	100.18	11101.51	9.50	12.25	243.35	50.00	0.34	
156.60	2.39	100.40	12021.43	9.50	12.25	375.62	50.00	3.66	
175.28	5.85	103.16	7524.67	9.50	12.25	297.72	50.00	5.56	
194.22	8.86	102.65	9361.67	9.50	12.25	314.46	50.00	4.77	
212.05	11.81	102.48	13295.79	9.50	12.25	473.45	50.00	4.96	
232.69	15.80	102.58	13745.00	9.50	12.25	514.15	50.00	5.80	
250.65	20.27	103.16	13832.00	9.50	12.25	699.70	50.00	7.47	
269.96	24.76	103.95	14792.86	9.50	12.25	495.76	50.00	6.99	
289.20	27.75	103.80	14451.15	9.50	12.25	780.79	19.50	4.66	
308.37	30.36	102.49	13444.58	9.50	12.25	560.30	19.50	4.20	
327.50	33.08	102.87	16590.45	9.50	12.25	562.36	19.50	4.28	
346.73	36.47	102.86	12900.59	9.50	12.25	828.42	19.50	5.29	
365.86	40.03	102.84	13281.11	9.50	12.25	412.38	19.50	5.58	
385.09	42.71	102.47	17817.59	9.57	12.25	532.28	19.50	4.20	
404.06	45.35	101.92	19580.31	9.70	12.25	610.98	19.50	4.22	
423.46	47.66	100.57	15970.71	9.70	12.25	862.00	19.50	3.88	

^a Dog leg severity

Table B4 (Cont.) Software input data of well A from depth from depth 2631 ft to 5450 ft

MD (m)	Inc (°)	Azim Grid (°)	WOB	DF (lbm/gal)	Bit diameter(in.)	Deltatorque (ft-lbf)	Nominal weight(lb/ft)	DLS ^a (°/100 ft)	Mode
442.49	50.16	100.02	15903.33	9.70	12.25	726.50	19.50	3.99	
461.88	52.30	99.62	18307.59	9.70	12.25	624.43	19.50	3.35	
480.34	55.11	99.14	16669.52	9.70	12.25	654.38	19.50	4.61	
500.73	58.60	97.86	17992.94	9.70	12.25	892.91	19.50	5.37	
519.49	61.22	97.23	14886.36	9.70	12.25	574.86	19.50	4.28	
538.15	63.64	96.87	11577.69	9.70	12.25	541.96	19.50	3.92	
557.15	64.73	94.59	27803.18	9.70	12.25	669.79	19.50	3.67	
576.45	65.46	91.89	21130.77	9.70	12.25	781.20	19.50	3.97	
595.51	67.55	89.90	31144.44	9.72	12.25	599.64	19.50	4.37	
614.54	69.80	88.54	9540.00	10.00	12.25	600.00	19.50	4.07	
633.71	71.10	86.76	12473.89	9.80	12.25	610.73	19.50	3.32	
653.08	72.46	84.81	5545.71	9.80	12.25	1028.32	19.50	3.56	
670.21	74.24	82.89	21547.78	9.80	12.25	817.70	19.50	4.48	
691.45	75.83	80.27	13525.38	9.80	12.25	696.38	19.50	4.22	
710.67	75.67	77.34	14541.43	9.80	12.25	356.01	19.50	4.44	
729.68	74.49	74.57	18621.00	9.85	12.25	380.64	19.50	4.62	
748.99	73.53	71.96	19475.71	9.90	12.25	435.13	19.50	4.17	
768.35	72.85	69.19	12648.75	9.90	12.25	789.07	19.50	4.24	
796.39	72.55	67.02	13275.33	9.92	12.25	629.97	19.50	2.24	
816.15	74.41	66.72	14053.70	10.00	8.50	673.37	19.50	2.86	
835.54	76.01	66.52	29170.41	10.00	8.50	655.23	19.50	2.49	
854.68	76.41	66.48	31892.63	10.00	8.50	661.39	19.50	0.63	

^a Dog leg severity

Table B4 (Cont.) Software input data of well A from depth from depth 2631 ft to 5450 ft

MD (m)	Inc (°)	Az (°)	WOB	DF (lbm/gal)	Bit diameter(in.)	Deltatorque (ft-lbf)	Nominal weight(lb/ft)	DLS ^a (°/100 ft)	Mode
873.13	76.34	66.75	25473.81	10.00	8.50	358.72	19.50	0.44	
885.61	76.05	66.48	26099.31	10.00	8.50	306.04	19.50	0.94	
902.64	74.88	65.68	24270.00	10.00	8.50	402.26	19.50	2.47	
904.83	74.73	65.58	16366.88	10.00	8.50	510.02	19.50	2.47	
924.09	75.09	64.19	21176.52	10.00	8.50	598.28	19.50	2.16	
943.22	71.63	61.58	22029.13	10.00	8.50	530.67	19.50	6.69	
962.49	68.53	58.49	24652.22	10.00	8.50	602.85	19.50	6.61	
981.63	65.90	56.42	20606.84	10.00	8.50	459.21	19.50	5.09	
1000.87	64.35	53.98	16945.50	10.09	8.50	473.44	19.50	4.21	
1020.38	62.91	52.80	19326.11	10.10	8.50	364.82	19.50	2.75	
1039.30	62.30	51.27	21263.20	10.10	8.50	421.47	19.50	2.36	
1058.65	62.84	49.52	18758.20	10.10	8.50	378.83	19.50	2.55	
1077.94	62.72	47.67	17903.33	10.10	8.50	388.64	19.50	2.57	
1097.17	61.53	45.38	17946.25	10.13	8.50	428.05	19.50	3.66	
1123.50	61.91	41.55	20168.40	10.20	8.50	425.65	19.50	3.87	
1142.34	61.71	40.54	19293.04	10.20	8.50	352.31	19.50	1.45	
1161.63	61.52	37.07	21577.06	10.20	8.50	518.05	19.50	4.76	
1180.75	61.42	35.94	17014.42	10.20	8.50	407.07	19.50	1.57	
1199.90	61.37	35.98	16975.06	10.20	8.50	482.58	19.50	0.10	
1218.89	60.96	35.94	17214.15	10.20	8.50	147.26	19.50	0.65	
1238.32	59.53	36.33	16307.27	10.20	8.50	343.63	19.50	2.27	
1257.55	59.61	36.38	18956.49	10.29	8.50	201.36	19.50	0.14	

^a Dog leg severity

Table B4 (Cont.) Software input data of well A from depth 2631 ft to 5450 ft

MD (m)	Inc (°)	Az (°)	WOB	DF (lbm/gal)	Bit diameter(in.)	Deltatorque (ft-lbf)	Nominal weight(lb/ft)	DLS ^a (° /100 ft)	Mode
1276.59	59.47	36.89	19548.18	10.30	8.50	231.31	19.50	0.73	
1295.81	59.25	36.56	19307.18	10.30	8.50	204.84	19.50	0.56	
1315.11	58.89	37.01	18101.58	10.30	8.50	196.29	19.50	0.82	
1333.44	59.03	36.89	24354.19	10.30	8.50	276.19	19.50	0.28	
1353.24	58.84	37.07	44245.38	10.30	8.50	252.48	19.50	0.37	
1372.48	58.82	37.20	23611.79	10.30	8.50	304.93	19.50	0.18	
1391.40	58.96	37.71	26741.67	10.30	8.50	382.53	19.50	0.73	
1410.79	58.74	37.86	31969.09	10.30	8.50	709.05	19.50	0.39	
1429.84	58.72	38.27	29092.66	10.37	8.50	886.68	19.50	0.55	
1449.69	58.78	38.25	35047.95	10.40	8.50	933.13	19.50	0.09	
1468.12	58.67	38.79	30103.62	10.43	8.50	657.99	19.50	0.77	
1478.48	58.63	38.85	24633.29	10.50	8.50	420.99	19.50	0.19	
1506.71	58.40	39.07	32991.55	10.50	8.50	517.05	19.50	0.32	
1526.57	57.12	39.33	31095.26	10.50	8.50	431.26	19.50	1.96	
1545.55	55.64	39.44	29540.67	10.50	8.50	671.89	19.50	2.34	
1564.23	55.27	39.20	32904.16	10.50	8.50	672.72	19.50	0.67	
1583.40	55.41	39.52	38239.61	10.50	8.50	618.31	19.50	0.47	
1602.47	54.10	40.05	41442.14	10.50	8.50	448.23	19.50	2.17	
1617.94	54.06	40.41	41708.46	10.50	8.50	1084.54	19.50	0.56	
1621.59	54.05	40.49	33584.44	10.50	8.50	1070.29	19.50	0.56	
1640.25	54.32	40.61	33544.56	10.47	8.50	891.68	19.50	0.46	
1661.13	54.62	40.74	35658.81	10.40	8.50	545.63	19.50	0.46	

^a Dog leg severity

Table B5 The bottom hole assembly (BHA) of well A from depth 341 ft to 2631 ft

BHA Description	Qty	OD (in)	ID (in)	Length (m)	Cumm (m)
12-1/4" Bit	1	12.25	-	0.31	0.31
Mud motor 1.5 deg bend	1	12.12	6.25	9.71	10.02
11 3/4" String Stab	1	11.75	2.81	2.38	12.40
8-1/4" Pony NMDC	2	8.25	2.88	8.53	20.93
Slim pulse MWD	1	8.50	5.00	10.33	31.26
8-1/4" NMDC	2	8.50	2.88	18.52	49.78
Crossover	1	8.00	3.00	0.46	50.24
5" HWDP	2	5.00	3.00	18.82	69.06
11-1/4" String Stab	1	11.25	2.88	1.82	70.88
5" HWDP	2	5.00	3.00	18.79	89.67
6-1/2" Hydraulic Jar	1	6.50	2.75	9.92	99.59
5" HWDP	1	5.00	3.00	9.35	108.94
5" DP	30	4.93	4.28	287.58	396.52
5" HWDP	18	4.93	4.28	168.39	564.91

Table B6 The bottom hole assembly (BHA) of well A from depth 2631 ft to 5450 ft

BHA Description	Qty	OD (in)	ID (in)	Length (m)	Cumm (m)
8-1/2" Varelinert 117 bit	1	8.50	-	0.25	0.25
Mud motor 1.5 deg bend	1	8.38	5.50	8.23	8.48
SLB String Stabilizer	1	8.00	3.00	1.52	10.00
SLB Pony NMDC	1	6.75	2.79	4.58	14.58

Table B6 (Cont.) The bottom hole assembly (BHA) of well A from depth 2631 ft to 5450 ft

BHA Description	Qty	OD (in)	ID (in)	Length (m)	Cumm (m)
CLPS 675 Flex Stabilizer	1	8.38	2.83	10.33	24.91
SLB NMDC	1	6.75	2.88	9.49	34.40
5" HWDP	2	6.50	2.88	18.75	53.15
SLB String Stabilizer	1	7.75	3.00	1.82	54.97
5" HWDP	2	6.50	3.00	18.64	73.61
WFRD Hydraulic Jar	1	6.50	2.75	9.92	83.53
5" HWDP	1	6.50	3.00	9.35	92.88

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