DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Harold 3120 1-26H	0.90						9/7/12
Job Number	**Type of Survey**	**Tie-in Point**				**Directional Co.**	
0							

Meaured Depth	Hole Angle	Hole Direction	Course Length	True Vertical Depth	Vertical Section	Total Coordinate N + / S -	Total Coordinate E + / W -	Dogleg Severity	Build Up °/100 ft	Walk/ °/100 ft
0	0	0	0	0.00	0.00			<< TIE-IN POINT >>		
0	0	0		0.00	0.00	0.00	0.00			
1161	1	6	1161	1,160.93	11.10	11.09	1.13	0.09	0.09	0.50
1628	1	357	467	1,627.82	21.26	21.24	1.27	0.08	0.06	75.18
2102	1	356	474	2,101.73	30.33	30.33	0.71	0.13	-0.13	-0.25
2578	1	356	476	2,577.69	36.54	36.54	0.28	0.02	-0.02	0.15
3053	1	10	475	3,052.65	42.71	42.70	0.68	0.04	0.02	-72.91
3528	1	163	475	3,527.63	44.01	43.98	1.86	0.27	-0.06	32.23
4003	0	129	475	4,002.62	41.26	41.21	3.42	0.06	-0.04	-7.16
4173	1	99	170	4,172.61	40.74	40.66	5.52	0.56	0.53	-17.94
4194	1	100	21	4,193.60	40.68	40.59	5.94	0.49	-0.48	6.19
4226	1	73	32	4,225.60	40.72	40.62	6.51	1.57	-0.31	-84.69
4257	2	31	31	4,256.59	41.18	41.07	6.99	3.48	1.94	-134.19
4289	4	17	32	4,288.56	42.50	42.39	7.50	6.23	5.94	-45.94
4321	6	10	32	4,320.44	45.12	45.00	8.09	8.27	8.13	-19.38
4352	8	10	31	4,351.21	48.87	48.74	8.77	6.13	6.13	-0.32
4384	10	10	32	4,382.81	53.84	53.69	9.67	6.56	6.56	-0.31
4416	12	12	32	4,414.21	59.90	59.74	10.84	6.31	6.25	4.38
4447	16	14	31	4,444.29	67.18	66.99	12.54	11.81	11.61	9.03
4479	18	17	32	4,474.94	76.07	75.84	15.02	6.61	6.25	7.50
4511	19	17	32	4,505.33	85.70	85.43	17.92	3.44	3.44	0.00
4542	20	17	31	4,534.59	95.56	95.25	20.87	3.23	3.23	-0.32
4574	21	17	32	4,564.62	106.19	105.82	24.06	2.51	2.50	0.62
4606	22	16	32	4,594.41	117.43	117.01	27.41	5.03	5.00	-1.56
4637	24	16	31	4,622.92	129.17	128.70	30.84	6.13	6.13	-0.32
4669	26	15	32	4,651.93	142.23	141.70	34.46	5.62	5.31	-4.38
4700	27	13	31	4,679.66	155.72	155.15	37.82	5.42	4.84	-5.48
4732	29	12	32	4,707.90	170.45	169.83	41.11	4.96	4.69	-3.44
4763	31	12	31	4,734.81	185.56	184.88	44.27	6.18	6.13	-1.61
4795	33	10	32	4,762.01	202.16	201.44	47.45	7.25	6.88	-4.38
4827	35	8	32	4,788.57	219.82	219.05	50.31	7.07	6.25	-5.94
4858	37	7	31	4,813.66	237.89	237.09	52.70	7.35	6.77	-4.84
4890	40	7	32	4,838.74	257.66	256.83	55.05	8.75	8.75	0.00
4922	43	7	32	4,862.74	278.71	277.84	57.56	10.00	10.00	0.00
4953	46	7	31	4,884.87	300.31	299.40	60.09	9.37	9.35	-0.65
4985	49	6	32	4,906.55	323.74	322.80	62.60	9.30	9.06	-2.81
5048	53	5	63	4,946.23	372.52	371.51	66.98	6.96	6.83	-1.75
5080	53	5	32	4,965.37	398.10	397.07	69.06	0.97	0.94	0.31
5112	53	5	32	4,984.50	423.71	422.64	71.12	0.80	-0.62	-0.63
5143	53	4	31	5,003.07	448.48	447.39	73.02	0.52	0.00	-0.65
5175	53	4	32	5,022.28	474.03	472.91	74.92	0.67	-0.63	-0.31
5198	53	4	23	5,036.09	492.39	491.26	76.26	0.87	0.87	0.00
5207	53	4	9	5,041.48	499.59	498.44	76.78	1.78	0.00	-2.22
5238	53	4	31	5,060.01	524.41	523.24	78.47	0.83	0.65	-0.65
5270	56	3	32	5,078.47	550.51	549.32	80.09	8.53	8.44	-1.56
5302	60	3	32	5,095.52	577.57	576.36	81.45	10.83	10.63	-2.50
5334	63	2	32	5,110.94	605.60	604.37	82.60	10.66	10.63	-0.94
5365	67	3	31	5,124.09	633.65	632.42	83.80	12.99	12.90	1.61
5429	74	0	64	5,145.49	693.92	692.66	85.41	11.60	11.09	-3.59
5492	82	358	63	5,158.64	755.44	754.21	84.42	13.17	12.54	567.30
5520	86	358	28	5,161.71	783.23	782.01	83.28	12.90	12.86	-1.07
5619	91	357	99	5,164.38	881.94	880.82	78.44	5.99	5.96	-0.61
5713	92	357	94	5,161.27	975.66	974.63	73.45	1.07	1.06	0.11
5808	94	357	95	5,155.80	1,070.29	1,069.35	68.65	1.91	1.89	0.21
5903	94	357	95	5,148.84	1,164.83	1,163.97	63.94	0.10	0.00	-0.11
5998	94	357	95	5,141.88	1,259.37	1,258.60	59.14	0.00	0.00	0.00
6093	94	357	95	5,134.84	1,353.88	1,353.20	54.02	0.43	0.11	-0.42
6188	95	358	95	5,127.06	1,448.35	1,447.76	49.31	1.27	0.84	0.95

DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Harold 3120 1-26H	0.90						9/7/12
Job Number	**Type of Survey**	**Tie-in Point**				**Directional Co.**	
0							

Meaured Depth	Hole Angle	Hole Direction	Course Length	True Vertical Depth	Vertical Section	Total Coordinate N + / S -	Total Coordinate E + / W -	Dogleg Severity	Build Up °/100 ft	Walk/ °/100 ft
0	0	0	0	0.00	0.00			<< TIE-IN POINT >>		
6283	93	358	95	5,120.18	1,542.95	1,542.43	45.51	2.01	-2.00	0.21
6473	95	359	190	5,107.26	1,732.30	1,731.89	39.72	0.88	0.74	0.47
6663	92	1	190	5,096.32	1,921.92	1,921.55	38.73	1.73	-1.37	-188.42
6853	90	359	190	5,093.84	2,111.84	2,111.51	37.74	1.68	-1.32	188.42
6948	90	360	95	5,094.42	2,206.79	2,206.49	36.24	0.90	0.32	0.84
7044	90	360	96	5,094.42	2,302.76	2,302.49	35.41	0.42	0.42	0.00
7138	92	360	94	5,092.70	2,396.72	2,396.47	34.83	1.84	1.81	0.32
7233	93	1	95	5,088.63	2,491.63	2,491.38	35.49	1.71	1.16	-377.68
7328	92	2	95	5,084.57	2,586.53	2,586.26	37.81	1.43	-1.16	0.84
7423	91	2	95	5,082.33	2,681.49	2,681.19	40.71	1.16	-1.16	-0.11
7518	91	2	95	5,080.93	2,776.48	2,776.14	43.37	0.24	0.11	-0.21
7613	90	1	95	5,080.18	2,871.47	2,871.10	45.77	0.95	-0.95	-0.11
7708	91	1	95	5,079.60	2,966.46	2,966.07	48.01	0.74	0.74	-0.11
7803	91	2	95	5,078.19	3,061.44	3,061.01	51.07	1.20	0.32	1.16
7898	91	2	95	5,076.37	3,156.40	3,155.93	54.72	0.47	0.21	-0.42
7993	92	2	95	5,074.13	3,251.35	3,250.84	58.03	0.32	0.32	0.00
8088	90	2	95	5,072.72	3,346.33	3,345.78	61.10	1.40	-1.37	-0.32
8183	90	1	95	5,072.80	3,441.32	3,440.75	63.26	0.99	-0.53	-0.84
8278	90	0	95	5,072.72	3,536.32	3,535.75	64.17	1.04	0.74	-0.74
8373	90	1	95	5,072.22	3,631.32	3,630.74	65.49	1.28	-0.21	1.26
8468	90	1	95	5,072.30	3,726.32	3,725.72	67.15	0.99	-0.53	-0.84
8563	89	360	95	5,073.55	3,821.30	3,820.71	67.65	1.14	-0.95	378.32
8658	89	359	95	5,075.79	3,916.25	3,915.68	67.15	0.71	-0.32	-0.63
8778	91	360	120	5,076.73	4,036.21	4,035.67	66.21	1.77	1.75	0.25
8873	93	360	95	5,074.16	4,131.15	4,130.63	65.80	2.00	2.00	0.11
8968	92	359	95	5,070.35	4,226.04	4,225.54	64.72	1.04	-0.42	-0.95
9063	93	359	95	5,066.04	4,320.89	4,320.43	63.23	1.13	1.05	0.42
9158	93	360	95	5,060.73	4,415.72	4,415.28	62.57	0.66	0.21	0.63
9253	93	1	95	5,055.76	4,510.58	4,510.15	62.90	0.89	-0.63	-378.32
9339	92	0	86	5,052.09	4,596.50	4,596.07	63.50	0.63	-0.58	-0.23
9389	92	0	50	5,050.17	4,646.46	4,646.03	63.76	0.00	0.00	0.00
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			

DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Harold 3120 1-26H	0.90						9/7/12
Job Number	Type of Survey	Tie-in Point				Directional Co.	
0							

Meaured Depth	Hole Angle	Hole Direction	Course Length	True Vertical Depth	Vertical Section	Total Coordinate N + / S -	E + / W -	Dogleg Severity	Build Up °/100 ft	Walk/ °/100 ft
0	0	0	0	0.00	0.00			<< TIE-IN POINT >>		
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			

DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Harold 3120 1-26H	0.90						9/7/12
Job Number	**Type of Survey**	**Tie-in Point**				**Directional Co.**	
0							

Meaured Depth	Hole Angle	Hole Direction	Course Length	True Vertical Depth	Vertical Section	Total Coordinate N + / S -	Total Coordinate E + / W -	Dogleg Severity	Build Up °/100 ft	Walk/ °/100 ft
0	0	0	0	0.00	0.00			<< TIE-IN POINT >>		
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			
0	0	0		5,050.17	4,646.46	4,646.03	63.76			