DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Ellis 3119 2-19H	181.63						11/14/12
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 >>		
250	1	345	250	249.99	-1.67	1.68	-0.46	0.32	0.32	137.88
500	1	345	250	499.97	-4.80	4.84	-1.32	0.04	-0.04	0.00
744	1	345	244	743.96	-7.24	7.30	-2.00	0.08	-0.08	0.00
1053	1	345	309	1,052.94	-10.08	10.17	-2.78	0.03	0.03	0.00
1343	1	345	290	1,342.93	-12.99	13.09	-3.58	0.00	0.00	0.00
1816	0	345	473	1,815.91	-16.15	16.28	-4.45	0.08	-0.08	0.00
2291	0	322	475	2,290.91	-17.90	18.06	-5.44	0.03	0.02	-4.76
2766	0	15	475	2,765.90	-20.07	20.24	-5.88	0.06	0.00	-64.72
3241	0	128	475	3,240.90	-21.28	21.45	-5.57	0.06	-0.06	23.92
4192	1	293	951	4,191.88	-23.39	23.71	-10.92	0.07	0.07	17.31
4246	1	301	54	4,245.87	-23.65	23.98	-11.47	0.26	-0.19	15.56
4287	0	286	41	4,286.87	-23.79	24.14	-11.79	0.58	-0.49	-36.59
4318	2	202	31	4,317.87	-23.44	23.79	-12.04	4.88	3.55	-270.97
4350	3	195	32	4,349.84	-22.23	22.59	-12.42	4.77	4.69	-23.75
4382	5	191	32	4,381.77	-20.18	20.55	-12.87	4.75	4.69	-11.87
4413	6	187	31	4,412.64	-17.31	17.69	-13.29	5.63	5.48	-13.87
4445	9	187	32	4,444.37	-13.23	13.63	-13.79	7.19	7.19	2.50
4477	11	186	32	4,475.90	-7.81	8.22	-14.41	8.17	8.13	-5.00
4508	14	185	31	4,506.19	-1.22	1.64	-15.02	7.76	7.74	-2.58
4540	16	184	32	4,537.12	6.97	-6.53	-15.63	8.51	8.44	-4.38
4572	19	183	32	4,567.64	16.56	-16.11	-16.21	7.82	7.81	-0.94
4603	21	183	31	4,596.78	27.14	-26.67	-16.77	8.08	8.06	-1.61
4635	23	182	32	4,626.43	39.18	-38.70	-17.27	5.70	5.63	-2.50
4667	25	183	32	4,655.72	52.06	-51.58	-17.80	4.77	4.69	2.19
4698	27	182	31	4,683.68	65.43	-64.93	-18.39	6.79	6.77	-0.97
4730	29	181	32	4,712.00	80.33	-79.82	-18.87	7.36	7.19	-3.44
4762	31	181	32	4,739.71	96.32	-95.82	-19.11	6.99	6.88	-2.50
4793	33	181	31	4,766.00	112.75	-112.25	-19.29	5.82	5.81	0.65
4825	34	181	32	4,792.70	130.38	-129.88	-19.49	3.44	3.44	-0.31
4857	36	181	32	4,818.93	148.71	-148.21	-19.73	5.96	5.94	0.94
4888	37	181	31	4,843.85	167.15	-166.65	-20.00	3.88	3.87	-0.32
4920	39	181	32	4,869.10	186.81	-186.30	-20.35	5.06	5.00	1.25
4952	41	182	32	4,893.72	207.25	-206.74	-20.86	6.33	6.25	1.56
4983	43	183	31	4,916.79	227.95	-227.42	-21.63	7.93	7.74	2.58
5015	46	183	32	4,939.65	250.33	-249.78	-22.70	8.20	8.13	1.56
5047	48	183	32	4,961.56	273.65	-273.08	-23.82	6.97	6.87	-1.56
5078	48	182	31	4,982.30	296.69	-296.10	-24.74	1.16	0.65	-1.29
5110	48	182	32	5,003.61	320.56	-319.96	-25.62	0.94	0.94	0.00
5142	48	182	32	5,024.87	344.47	-343.86	-26.41	0.98	-0.31	-1.25
5173	49	182	31	5,045.43	367.67	-367.04	-27.18	1.37	0.97	1.29
5205	48	181	32	5,066.72	391.56	-390.93	-27.85	2.99	-1.88	-3.13
5237	49	181	32	5,087.93	415.52	-414.89	-28.18	3.43	3.13	-1.87
5268	52	180	31	5,107.71	439.38	-438.76	-28.35	8.72	8.71	-0.65
5300	55	180	32	5,126.87	465.00	-464.38	-28.44	9.39	9.38	-0.63
5332	58	180	32	5,144.60	491.62	-491.01	-28.53	10.33	10.31	0.63
5363	61	181	31	5,160.26	518.36	-517.76	-28.74	10.68	10.65	0.97
5395	65	182	32	5,174.81	546.86	-546.25	-29.34	10.84	10.31	3.75
5427	68	183	32	5,187.62	576.18	-575.54	-30.47	11.48	11.25	2.50
5458	72	182	31	5,198.07	605.35	-604.69	-31.74	13.56	13.55	-0.65
5490	76	182	32	5,206.73	636.15	-635.47	-32.95	11.91	11.88	-0.94
5522	80	182	32	5,213.38	667.45	-666.75	-34.07	11.25	11.25	-0.31
5553	83	181	31	5,218.04	698.09	-697.38	-34.95	10.25	10.00	-2.26
5585	86	181	32	5,221.25	729.92	-729.21	-35.51	8.64	8.44	-1.88
5591	86	181	6	5,221.70	735.90	-735.19	-35.58	3.72	3.33	-1.67
5673	88	181	82	5,226.06	817.77	-817.06	-36.36	2.81	2.80	-0.12
5735	89	181	62	5,227.79	879.73	-879.04	-36.96	0.98	0.97	0.16
5827	91	182	92	5,228.11	971.72	-971.01	-38.88	2.72	2.39	1.30

DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Ellis 3119 2-19H	181.63						11/14/12
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 >>		
5921	90	182	94	5,227.62	1,065.72	-1,064.96	-41.75	1.28	-1.28	-0.11
6016	90	183	95	5,227.62	1,160.71	-1,159.89	-45.32	1.14	0.63	0.95
6109	91	182	93	5,226.81	1,253.71	-1,252.82	-48.81	1.06	0.43	-0.97
6202	91	181	93	5,225.67	1,346.70	-1,345.79	-51.00	0.75	0.00	-0.75
6294	91	182	92	5,224.71	1,438.69	-1,437.76	-53.33	1.00	-0.22	0.98
6386	89	181	92	5,224.87	1,530.69	-1,529.72	-55.90	1.46	-1.30	-0.65
6481	88	182	95	5,226.94	1,625.66	-1,624.66	-58.55	1.32	-1.16	0.63
6574	89	183	93	5,228.97	1,718.63	-1,717.56	-62.20	1.40	1.18	0.75
6669	89	182	95	5,230.30	1,813.62	-1,812.47	-66.17	0.47	-0.21	-0.42
6764	90	182	95	5,231.13	1,908.61	-1,907.41	-69.24	1.12	0.84	-0.74
6859	91	181	95	5,230.63	2,003.61	-2,002.38	-71.56	0.87	0.84	-0.21
6954	90	181	95	5,229.88	2,098.60	-2,097.35	-73.72	0.53	-0.53	0.00
7049	89	181	95	5,230.46	2,193.60	-2,192.33	-75.79	1.16	-1.16	-0.11
7144	90	182	95	5,231.62	2,288.59	-2,287.29	-78.11	0.60	0.42	0.42
7239	90	181	95	5,232.20	2,383.59	-2,382.26	-80.60	0.38	0.32	-0.21
7333	89	181	94	5,233.19	2,477.58	-2,476.23	-82.65	0.91	-0.85	-0.32
7428	90	183	95	5,234.02	2,572.57	-2,571.18	-85.63	1.81	1.05	1.47
7523	90	183	95	5,233.69	2,667.55	-2,666.07	-90.19	0.67	0.42	0.53
7618	90	182	95	5,233.27	2,762.54	-2,760.97	-94.50	0.90	-0.32	-0.84
7713	89	180	95	5,234.35	2,857.52	-2,855.93	-96.65	2.47	-1.58	-1.89
7808	90	180	95	5,235.43	2,952.49	-2,950.92	-97.23	1.58	1.58	-0.11
7903	90	180	95	5,235.10	3,047.46	-3,045.92	-97.65	0.24	0.21	-0.11
7998	90	181	95	5,235.10	3,142.44	-3,140.91	-98.56	0.97	-0.63	0.74
8093	89	181	95	5,236.01	3,237.43	-3,235.89	-100.05	0.53	-0.53	0.00
8189	90	181	96	5,236.76	3,333.42	-3,331.88	-101.65	0.74	0.73	0.10
8283	91	182	94	5,236.27	3,427.42	-3,425.84	-104.11	1.36	0.85	1.06
8378	91	183	95	5,235.11	3,522.39	-3,520.73	-108.50	1.37	0.00	1.37
8473	91	183	95	5,234.11	3,617.35	-3,615.57	-113.88	0.24	-0.21	-0.11
8568	90	182	95	5,233.70	3,712.33	-3,710.47	-118.28	1.27	-0.53	-1.16
8663	90	181	95	5,234.11	3,807.33	-3,805.43	-120.93	1.18	-0.53	-1.05
8758	89	181	95	5,235.69	3,902.31	-3,900.40	-122.75	0.95	-0.95	0.00
8855	91	183	97	5,235.69	3,999.30	-3,997.34	-125.80	3.23	2.89	1.44
8950	91	183	95	5,233.37	4,094.25	-4,092.19	-130.60	0.84	0.00	0.84
9046	90	182	96	5,232.28	4,190.22	-4,188.06	-135.29	1.88	-1.56	-1.04
9141	90	182	95	5,232.36	4,285.21	-4,283.01	-138.44	0.85	0.11	-0.84
9237	90	181	96	5,232.61	4,381.21	-4,378.98	-140.79	0.38	-0.31	-0.21
9333	88	180	96	5,234.62	4,477.17	-4,474.95	-141.96	2.25	-1.88	-1.25
9429	88	179	96	5,237.89	4,573.04	-4,570.88	-140.79	1.69	0.31	-1.67
9525	88	176	96	5,241.24	4,668.66	-4,666.68	-135.85	3.05	-0.42	-3.02
9554	87	175	29	5,242.61	4,697.45	-4,695.55	-133.43	4.41	-3.45	-2.76
9605	87	175	51	5,245.45	4,748.00	-4,746.26	-128.81	0.00	0.00	0.00
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			

DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Ellis 3119 2-19H	181.63						11/14/12
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		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			

DIRECTIONAL SURVEY CALCULATION

MINIMUM CURVATURE METHOD

Well Name	Target Direction	Slot Coordinate	N / S	E / W	Hole Size	Calculation by	Date
Ellis 3119 2-19H	181.63						11/14/12
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		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			
0	0	0		5,245.45	4,748.00	-4,746.26	-128.81			