

Job Number: ID1969-1
 Company: Ameredev
 Lease/Well: Firethorn Fed Com 26-36-04 113H
 Location: 32° 4' 48.467 N / 103° 16' 23.268 W
 Rig Name: H&P 616
 RKB: 27
 G.L. or M.S.L.: 3025

State/Country: TX. USA
 Declination: 6.67
 Grid: .56
 File name: C:\WINSERVE\ID1969-1.SV
 Date 03-Nov-18
 Curve Name: Work Curve

Intrepid Directional Drilling

WINSERV SURVEY CALCULATIONS

Minimum Curvature Method
 Vertical Section Plane 179.42
 Vertical Section Reference to Wellhead
 Rectangular Coordinate Reference to Wellhead

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TRUE Vertical Depth	Vertical N-S FT	CLOSURE E-W FT	CLOSURE Section FT	Dogleg Distance FT	Direction Deg
0	0	0	0	0	0	0	0	0
109	0.6	82.15	109	0.08	0.57	-0.07	0.57	82.15
205	0.3	182.15	205	-0.1	1.05	0.12	1.06	95.66
423	0.4	169.15	422.99	-1.42	1.18	1.43	1.85	140.42
546	0.4	252.15	545.99	-1.98	0.85	1.98	2.15	156.77
610	0.6	253.15	609.99	-2.14	0.31	2.14	2.16	171.64
704	0.2	253.15	703.98	-2.33	-0.31	2.33	2.35	187.66
799	0.5	283.15	798.98	-2.29	-0.88	2.28	2.45	200.97
925	0.6	290.15	924.98	-1.93	-2.03	1.91	2.8	226.41
1018	0.6	264.15	1017.97	-1.81	-2.97	1.78	3.48	238.59
1113	0.3	232.15	1112.97	-2.02	-3.66	1.98	4.18	241.15
1207	0.1	352.15	1206.97	-2.09	-3.87	2.05	4.4	241.65
1302	0.7	315.15	1301.97	-1.59	-4.29	1.55	4.58	249.61
Tie	in	to	Invictus	Surveys				
1347		0.9	278.15	1346.96	-1.35	-4.83	1.3	5.02
Start	Scout	Surveys						
1401	0.3	23.1	1400.96	-1.16	-5.2	1.11	5.33	257.43
1493	0.3	51.2	1492.96	-0.79	-4.92	0.74	4.98	260.91
1588	0.7	61.9	1587.95	-0.36	-4.21	0.32	4.22	265.14
1682	1.4	55.4	1681.94	0.56	-2.76	-0.59	2.82	281.58
1776	2.1	55.5	1775.89	2.19	-0.39	-2.2	2.23	349.83
1873	2.5	52.6	1872.82	4.48	2.75	-4.46	5.26	31.54
1967	2.8	43.6	1966.72	7.39	5.96	-7.33	9.5	38.9

2061	2.9	47.6	2060.6	10.66	9.3	-10.56	14.15	41.12
2158	2.6	40.4	2157.49	13.99	12.54	-13.86	18.79	41.88
2251	2.6	22.3	2250.39	17.55	14.71	-17.4	22.9	39.97
2345	2.2	10.9	2344.31	21.29	15.86	-21.13	26.55	36.68
2442	2.5	19.2	2441.23	25.12	16.91	-24.94	30.28	33.95
2537	2.1	11.3	2536.15	28.78	17.93	-28.6	33.91	31.92
2630	2.1	4.4	2629.09	32.15	18.39	-31.96	37.04	29.78
2725	1.9	9.7	2724.03	35.44	18.79	-35.25	40.11	27.94
2819	2.3	27.6	2817.97	38.65	19.93	-38.44	43.48	27.28
2913	2.1	25.1	2911.9	41.88	21.53	-41.66	47.09	27.21
3008	1.8	34.3	3006.85	44.69	23.11	-44.45	50.31	27.35
3102	1.7	39.6	3100.8	46.98	24.83	-46.73	53.14	27.86
3196	1.7	51.3	3194.76	48.93	26.81	-48.65	55.79	28.72
3290	1	43	3288.74	50.4	28.46	-50.11	57.88	29.45
3386	0.8	15.8	3384.72	51.65	29.21	-51.36	59.34	29.49
3480	0.6	358.6	3478.72	52.78	29.38	-52.48	60.4	29.1
3575	0.3	33.8	3573.71	53.48	29.5	-53.18	61.08	28.88
3670	0.4	82.3	3668.71	53.73	29.97	-53.43	61.53	29.15
3765	0.4	133.4	3763.71	53.55	30.54	-53.24	61.65	29.7
3829	0	219.6	3827.71	53.4	30.7	-53.08	61.59	29.9
3928	0.2	339.8	3926.71	53.56	30.64	-53.25	61.71	29.78
4022	0	72.3	4020.71	53.71	30.59	-53.4	61.81	29.66
4115	0	140.8	4113.71	53.71	30.59	-53.4	61.81	29.66
4209	0.1	105.7	4207.71	53.69	30.67	-53.38	61.83	29.73
4303	0.1	78.6	4301.71	53.68	30.83	-53.37	61.9	29.86
4398	0.2	111.9	4396.71	53.64	31.06	-53.32	61.98	30.07
4492	0.7	330	4490.71	54.07	30.93	-53.76	62.29	29.77
4587	0.3	42.7	4585.7	54.76	30.8	-54.45	62.83	29.36
4682	0.2	147.9	4680.7	54.8	31.06	-54.49	62.99	29.54
4776	0.3	36.7	4774.7	54.86	31.3	-54.54	63.16	29.7
4871	0.1	72.1	4869.7	55.09	31.52	-54.76	63.47	29.78
4965	0.3	213.1	4963.7	54.9	31.47	-54.58	63.28	29.82
5059	0.1	105.5	5057.7	54.68	31.41	-54.36	63.06	29.88
5118	0.1	202	5116.7	54.62	31.44	-54.29	63.02	29.93
5192	0.3	65.2	5190.7	54.64	31.59	-54.31	63.11	30.04
5285	0.3	24.5	5283.7	54.96	31.92	-54.63	63.55	30.14
5379	0.3	75.3	5377.7	55.25	32.26	-54.92	63.97	30.28
5473	0.2	286.8	5471.7	55.36	32.34	-55.03	64.11	30.29
5569	0.3	161.6	5567.7	55.17	32.26	-54.84	63.9	30.31
5662	0.3	228.2	5660.7	54.77	32.15	-54.44	63.51	30.41
5757	0.3	139.6	5755.7	54.42	32.13	-54.09	63.19	30.56
5851	0.3	211.1	5849.7	54.02	32.16	-53.69	62.87	30.77
5946	0.2	272.7	5944.69	53.81	31.86	-53.49	62.54	30.63
6040	0.2	256.7	6038.69	53.78	31.54	-53.46	62.35	30.39
6137	0.2	251.2	6135.69	53.69	31.22	-53.37	62.11	30.17
6229	0	319.2	6227.69	53.64	31.06	-53.32	61.99	30.08
6325	0.1	297	6323.69	53.68	30.99	-53.36	61.98	30
6431	0.3	64.9	6429.69	53.84	31.16	-53.52	62.2	30.06
6513	0.1	10.6	6511.69	54	31.37	-53.68	62.45	30.15
6608	0.2	193.1	6606.69	53.92	31.34	-53.6	62.37	30.17
6703	0.4	119.4	6701.69	53.59	31.59	-53.27	62.21	30.52
6796	0.4	43.3	6794.69	53.67	32.1	-53.34	62.54	30.88

	6891	0.6	22.3	6889.69	54.37	32.52	-54.04	63.35	30.88
	6987	0.4	8.9	6985.68	55.17	32.76	-54.83	64.16	30.7
	7081	0.7	41.4	7079.68	55.92	33.19	-55.58	65.03	30.69
	7176	1.2	30.2	7174.66	57.22	34.07	-56.87	66.6	30.77
	7271	1.1	37.6	7269.65	58.8	35.13	-58.44	68.5	30.86
	7365	1.3	12.9	7363.63	60.56	35.92	-60.19	70.41	30.67
	7460	1.6	38.7	7458.6	62.64	36.99	-62.26	72.75	30.56
	7554	1.3	48.4	7552.57	64.37	38.61	-63.98	75.06	30.95
	7649	1.2	44.9	7647.54	65.79	40.11	-65.38	77.06	31.37
	7743	1.6	42	7741.51	67.47	41.69	-67.04	79.31	31.71
	7836	1.7	43.4	7834.48	69.43	43.5	-68.99	81.94	32.07
	7933	1.4	41	7931.44	71.37	45.27	-70.91	84.52	32.39
	8028	1.4	50.4	8026.41	72.99	46.93	-72.51	86.77	32.74
	8123	1.5	18.6	8121.38	74.91	48.22	-74.41	89.08	32.77
	8216	1.6	47.2	8214.35	76.94	49.56	-76.44	91.52	32.79
	8311	1.9	35.2	8309.31	79.13	51.44	-78.61	94.38	33.03
Tie	in	Scout	Surveys						
	8407	1.4	48.1	8405.27	81.21	53.23	-80.67	97.1	33.24
Start	Intrepid	Surveys							
	8462	1.6	36.1	8460.25	82.28	54.18	-81.73	98.52	33.36
	8556	1.3	37.7	8554.22	84.19	55.61	-83.62	100.89	33.45
	8650	1.3	45.2	8648.19	85.78	57.02	-85.2	103	33.61
	8745	1.2	39.6	8743.17	87.31	58.41	-86.71	105.05	33.78
	8839	1.1	34.9	8837.15	88.81	59.56	-88.2	106.93	33.85
	8934	0.9	24.6	8932.14	90.23	60.39	-89.62	108.58	33.79
	9028	1.1	11.7	9026.12	91.79	60.88	-91.17	110.14	33.56
	9123	1.1	6.6	9121.11	93.59	61.17	-92.96	111.8	33.17
	9218	1.1	4.2	9216.09	95.4	61.34	-94.78	113.42	32.74
	9313	1.1	1.4	9311.07	97.22	61.43	-96.6	115	32.29
	9408	1.3	13	9406.05	99.18	61.7	-98.55	116.81	31.88
	9502	1.4	21.9	9500.02	101.29	62.36	-100.65	118.95	31.62
	9597	1.5	24.7	9594.99	103.49	63.32	-102.85	121.33	31.46
	9691	1.2	19.3	9688.97	105.54	64.16	-104.89	123.51	31.29
	9786	1.1	3.5	9783.95	107.39	64.54	-106.73	125.29	31.01
	9881	0.9	349.7	9878.93	109.03	64.46	-108.38	126.66	30.59
	9975	0.7	350.5	9972.93	110.33	64.24	-109.67	127.66	30.21
	10070	0.5	343.2	10067.92	111.3	64.02	-110.64	128.4	29.91
	10165	0.1	262.9	10162.92	111.68	63.82	-111.03	128.63	29.74
	10259	0.2	254	10256.92	111.63	63.58	-110.98	128.46	29.66
	10354	0.4	324.9	10351.92	111.85	63.23	-111.21	128.49	29.48
	10448	0.5	334.9	10445.91	112.49	62.87	-111.85	128.87	29.2
	10543	0.9	356.3	10540.91	113.61	62.64	-112.97	129.74	28.87
	10604	0.9	357.4	10601.9	114.57	62.59	-113.93	130.55	28.65
	10721	0.6	324.9	10718.89	115.99	62.2	-115.35	131.61	28.2
	10816	0.4	328.5	10813.89	116.68	61.74	-116.05	132	27.88
	10911	0.4	2.1	10908.88	117.29	61.58	-116.66	132.47	27.7
	11005	0.8	7.9	11002.88	118.27	61.68	-117.64	133.39	27.54
	11062	1	352.5	11059.87	119.16	61.67	-118.53	134.17	27.36
	11100	4	200.34	11097.85	118.24	61.16	-117.62	133.13	27.35
	11147	12.22	198.84	11144.34	111.99	58.98	-111.39	126.57	27.78
	11194	18.99	202.8	11189.58	100.22	54.41	-99.66	114.03	28.5
	11241	25.63	196.12	11233.04	83.38	48.61	-82.88	96.52	30.24

11289	32.4	189.18	11275.01	60.68	43.67	-60.23	74.76	35.74
11336	39.08	188.21	11313.13	33.55	39.54	-33.15	51.86	49.68
11383	44.53	189.79	11348.16	2.63	34.62	-2.28	34.72	85.66
11430	50.73	189.62	11379.81	-31.58	28.77	31.87	42.73	137.66
11478	54.37	187.95	11409	-69.24	22.97	69.46	72.95	161.65
11525	55.96	185.75	11435.85	-107.53	18.38	107.71	109.09	170.3
11572	57.14	185.92	11461.75	-146.55	14.39	146.68	147.25	174.39
11619	58.9	185.66	11486.64	-186.21	10.37	186.3	186.5	176.81
11667	60.92	184.61	11510.71	-227.57	6.66	227.62	227.67	178.32
11714	62.46	181.62	11533	-268.88	4.41	268.91	268.92	179.06
11762	63.16	179.33	11554.94	-311.57	4.06	311.59	311.6	179.25
11856	71.3	176.87	11591.64	-397.94	7.55	398	398.02	178.91
11903	76.44	176.78	11604.69	-443.01	10.05	443.09	443.12	178.7
11951	83.6	178.63	11613	-490.21	11.94	490.31	490.36	178.61
12045	94.29	183.29	11614.73	-584.02	10.36	584.1	584.11	178.98
12140	91.91	182.94	11609.6	-678.74	5.2	678.75	678.76	179.56
12171	92.35	182.58	11608.44	-709.68	3.71	709.68	709.69	179.7
12246	94.02	182.58	11604.28	-784.48	0.34	784.45	784.48	179.98
12341	94.42	182.06	11597.29	-879.15	-3.49	879.07	879.16	180.23
12435	93.49	180.83	11590.8	-972.89	-5.86	972.78	972.91	180.34
12530	88.13	179.6	11589.46	-1067.85	-6.21	1067.73	1067.86	180.33
12624	87.47	178.81	11593.07	-1161.77	-4.91	1161.66	1161.78	180.24
12719	88.09	180.39	11596.75	-1256.69	-4.25	1256.58	1256.7	180.19
12816	86.24	180.74	11601.55	-1353.56	-5.2	1353.44	1353.57	180.22
12911	88.26	186.28	11606.11	-1448.23	-11.01	1448.05	1448.27	180.44
13005	86.15	187.15	11610.69	-1541.47	-21.99	1541.17	1541.63	180.82
13099	80.7	188.91	11621.45	-1633.9	-35.02	1633.46	1634.27	181.23
13194	81.14	185.57	11636.45	-1726.95	-46.84	1726.38	1727.58	181.55
13289	82.24	184.69	11650.18	-1820.57	-55.25	1819.92	1821.41	181.74
13383	83.25	180.83	11662.05	-1913.69	-59.73	1912.99	1914.62	181.79
13478	82.42	175.9	11673.91	-2007.88	-57.05	2007.2	2008.69	181.63
13573	81.27	174.67	11687.39	-2101.6	-49.32	2100.99	2102.17	181.34
13667	80.97	174.59	11701.9	-2194.06	-40.63	2193.54	2194.44	181.06
13762	81.27	175.03	11716.56	-2287.54	-32.14	2287.1	2287.76	180.8
13856	82.42	174.67	11729.89	-2380.21	-23.78	2379.85	2380.33	180.57
13951	83.3	174.59	11741.7	-2474.06	-14.96	2473.78	2474.1	180.35
14045	84.84	173.71	11751.41	-2567.07	-5.43	2566.88	2567.07	180.12
14140	85.93	176.78	11759.06	-2661.42	2.42	2661.31	2661.42	179.95
14234	86.95	176.43	11764.9	-2755.07	7.97	2755.01	2755.08	179.83
14329	87.12	178.63	11769.81	-2849.85	12.06	2849.83	2849.88	179.76
14423	85.98	178.63	11775.47	-2943.65	14.3	2943.65	2943.69	179.72
14518	85.58	178.45	11782.46	-3038.36	16.72	3038.38	3038.41	179.68
14612	84.84	178.72	11790.31	-3132	19.03	3132.04	3132.06	179.65
14707	84.75	178.72	11798.92	-3226.59	21.14	3226.64	3226.66	179.62
14801	84.26	178.45	11807.93	-3320.13	23.45	3320.2	3320.21	179.6
14896	83.82	178.54	11817.79	-3414.58	25.94	3414.67	3414.68	179.56
14990	82.51	178.19	11828.98	-3507.87	28.6	3507.98	3507.99	179.53
15085	81.41	178.81	11842.26	-3601.91	31.06	3602.04	3602.04	179.51
15179	81.01	178.98	11856.63	-3694.78	32.85	3694.93	3694.93	179.49
15279	80.35	179.16	11872.82	-3793.45	34.45	3793.61	3793.61	179.48
15373	81.32	179.6	11887.8	-3886.24	35.46	3886.4	3886.41	179.48
15468	83.38	179.95	11900.44	-3980.39	35.83	3980.55	3980.55	179.48

15563	85.71	179.51	11909.47	-4074.95	36.27	4075.11	4075.12	179.49
15657	87.74	179.33	11914.84	-4168.79	37.22	4168.95	4168.96	179.49
15752	87.25	177.49	11918.99	-4263.66	39.86	4263.84	4263.85	179.46
15847	90.2	178.28	11921.11	-4358.56	43.36	4358.78	4358.78	179.43
15942	91.6	179.07	11919.62	-4453.52	45.56	4453.75	4453.75	179.41
16036	90.24	178.45	11918.11	-4547.48	47.59	4547.73	4547.73	179.4
16131	88.84	177.84	11918.87	-4642.43	50.67	4642.7	4642.7	179.37
16226	89.58	177.57	11920.18	-4737.34	54.47	4737.65	4737.65	179.34
16320	91.3	177.93	11919.46	-4831.26	58.16	4831.6	4831.61	179.31
16415	93.01	178.89	11915.88	-4926.15	60.79	4926.52	4926.53	179.29
16509	92.31	178.28	11911.52	-5020.02	63.11	5020.41	5020.42	179.28
16604	90.64	178.72	11909.08	-5114.96	65.6	5115.36	5115.38	179.27
16699	90.42	179.6	11908.2	-5209.94	66.99	5210.35	5210.37	179.26
16793	88.13	179.24	11909.39	-5303.92	67.94	5304.34	5304.36	179.27
16888	91.03	180.21	11910.08	-5398.91	68.4	5399.32	5399.34	179.27
16982	93.93	181.71	11906.02	-5492.79	66.83	5493.19	5493.2	179.3
17077	93.76	180.83	11899.65	-5587.55	64.73	5587.92	5587.93	179.34
17171	93.32	180.04	11893.84	-5681.37	64.01	5681.73	5681.73	179.35
17266	90.51	178.45	11890.67	-5776.3	65.27	5776.66	5776.67	179.35
17361	89.76	179.51	11890.44	-5871.28	66.96	5871.66	5871.66	179.35
17455	86.86	179.51	11893.22	-5965.23	67.76	5965.61	5965.61	179.35
17550	88.04	179.51	11897.44	-6060.13	68.57	6060.51	6060.51	179.35
17644	89.14	179.16	11899.76	-6154.09	69.66	6154.48	6154.48	179.35
17739	91.69	179.07	11899.07	-6249.07	71.13	6249.47	6249.47	179.35
17833	91.87	179.16	11896.15	-6343.01	72.58	6343.42	6343.43	179.34
17928	91.12	180.12	11893.67	-6437.98	73.18	6438.39	6438.39	179.35
18022	90.73	179.07	11892.15	-6531.96	73.84	6532.37	6532.38	179.35
18117	90.59	180.65	11891.06	-6626.95	74.07	6627.36	6627.36	179.36
18211	90.59	181.27	11890.09	-6720.93	72.5	6721.32	6721.32	179.38
18306	88.57	180.65	11890.79	-6815.91	70.91	6816.28	6816.28	179.4
18400	88.44	181	11893.24	-6909.87	69.56	6910.22	6910.22	179.42
18495	89.01	181.35	11895.35	-7004.82	67.61	7005.15	7005.15	179.45
18589	92.44	180.83	11894.16	-7098.79	65.82	7099.09	7099.09	179.47
18684	93.23	179.77	11889.46	-7193.67	65.32	7193.96	7193.96	179.48
18778	90.51	179.16	11886.4	-7287.6	66.2	7287.9	7287.9	179.48
18873	90.64	178.63	11885.44	-7382.58	68.03	7382.89	7382.89	179.47
18968	90.59	178.63	11884.42	-7477.55	70.3	7477.88	7477.88	179.46
19062	89.98	178.72	11883.96	-7571.52	72.48	7571.87	7571.87	179.45
19157	88.66	179.16	11885.08	-7666.5	74.23	7666.85	7666.85	179.45
19252	92.75	180.12	11883.91	-7761.46	74.83	7761.82	7761.83	179.45
19346	89.85	179.95	11881.78	-7855.43	74.77	7855.79	7855.79	179.45
19441	90.2	179.33	11881.74	-7950.43	75.37	7950.78	7950.79	179.46
19535	93.67	178.37	11878.57	-8044.34	77.26	8044.71	8044.71	179.45
19630	92.48	178.54	11873.47	-8139.17	79.81	8139.56	8139.56	179.44
19724	93.89	179.33	11868.25	-8233	81.56	8233.41	8233.41	179.43
19819	93.63	179.6	11862.02	-8327.79	82.44	8328.2	8328.2	179.43
19913	88.7	179.24	11860.11	-8421.74	83.39	8422.15	8422.15	179.43
20008	88.75	180.74	11862.22	-8516.71	83.41	8517.12	8517.12	179.44
20102	90.02	179.42	11863.23	-8610.7	83.28	8611.11	8611.11	179.45
20196	89.93	178.37	11863.27	-8704.69	85.09	8705.1	8705.1	179.44
20291	90.51	177.84	11862.91	-8799.63	88.23	8800.07	8800.07	179.43
20385	94.37	178.19	11858.91	-8893.47	91.49	8893.94	8893.94	179.41

20479	95.21	178.54	11851.06	-8987.11	94.16	8987.6	8987.6	179.4
20574	93.19	177.84	11844.1	-9081.8	97.15	9082.32	9082.32	179.39
20664	92.22	178.54	11839.85	-9171.65	99.99	9172.19	9172.2	179.38
20758	89.63	185.75	11838.33	-9265.5	96.47	9266	9266	179.4
20853	91.08	187.51	11837.74	-9359.86	85.51	9360.25	9360.25	179.48
20947	90.33	185.57	11836.59	-9453.24	74.8	9453.51	9453.53	179.55
21041	91.16	187.77	11835.36	-9546.58	63.89	9546.74	9546.8	179.62
21136	89.36	187.33	11834.93	-9640.76	51.4	9640.78	9640.89	179.69
21231	87.3	182.67	11837.7	-9735.32	43.13	9735.26	9735.42	179.75
21325	86.07	181.71	11843.14	-9829.09	39.54	9828.99	9829.17	179.77
21420	84.53	181.88	11850.92	-9923.73	36.58	9923.59	9923.79	179.79
21514	83.47	182.14	11860.75	-10017.2	33.3	10016.98	10017.21	179.81
21609	82.15	181.62	11872.64	-10111.4	30.21	10111.14	10111.4	179.83
21638	80.97	181.71	11876.9	-10140	29.37	10139.8	10140.07	179.83
Straight	Line	PTB	@	TD:	3'	Below	&	77'
21730	80.97	181.71	11891.33	-10230.8	26.66	10230.59	10230.88	179.85