

Multi-Shot

(A BWWC COMPANY)

**P. O. BOX 630
BROUSSARD, LOUISIANA 70518
(318) 839-8400**

SAGE ENERGY

Company

NVANU # 163 (Leg 2)

Well Name

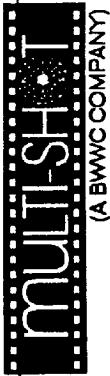
850/W & 1982/W
D-1-17-34

LEA COUNTY, NEW MEXICO

Well Location

NORTON # 8

Rig Name



P. O. Drawer 630
Broussard, LA 70518
Phone: 318-839-8400
Fax: 318-839-8401

Job Number: 9922436-32

Company: Sage Energy

Lease/Well: NVANU # 163 - Leg 2

Location: Lea County

Rig Name: Norton # 8

RKB:

G.L. or M.S.L.: GL

State/Country: New Mexico, USA

Declination: 9.06 Degrees East to True

Grid:

File name: C:\SURV-99\SAGEEN~1\NV163-L2.SVY

Date/Time: 25-Oct-99 / 16:20

Curve Name: Sage Energy; NVANU # 163 - (Leg 2); Lea County, New Mexico; Nort

WINSERVE SURVEY CALCULATIONS

Minimum Curvature Method

Vertical Section Plane 140.00

Vertical Section Referenced to Wellhead

Rectangular Coordinates Referenced to Wellhead

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Course Length FT	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
.00	.00	.00	.00		.00	.00	.00	.00	.00	.00	.00
100.00	.73	261.21	100.00	100.00	-100.00	-.10	-.63	-.33	.64	261.21	.73
200.00	.60	231.24	199.99	100.00	-199.99	-.52	-1.67	-.67	1.75	252.60	.37
300.00	.72	217.44	299.98	100.00	-299.98	-1.35	-2.46	-.55	2.80	241.23	.20
400.00	.85	227.85	399.97	100.00	-399.97	-2.35	-3.39	-.38	4.12	235.31	.19
500.00	.84	214.92	499.96	100.00	-499.96	-3.44	-4.36	-.16	5.56	231.68	.19
600.00	.89	221.36	599.95	100.00	-599.95	-4.63	-5.29	.14	7.03	228.83	.11
700.00	1.03	209.61	699.94	100.00	-699.94	-5.99	-6.25	.57	8.66	226.20	.24
800.00	.98	199.16	799.92	100.00	-799.92	-7.58	-6.97	1.33	10.30	222.61	.19
900.00	.87	201.61	899.91	100.00	-899.91	-9.10	-7.53	2.12	11.81	219.64	.12

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Course Length FT	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
1000.00	.89	197.59	999.90	100.00	-999.90	-10.54	-8.05	2.90	13.26	217.36	.06
1100.00	.89	209.23	1099.89	100.00	-1099.89	-11.96	-8.66	3.59	14.77	215.92	.18
1200.00	.82	200.73	1199.88	100.00	-1199.88	-13.31	-9.29	4.22	16.23	214.93	.14
1300.00	.87	206.66	1299.86	100.00	-1299.86	-14.65	-9.89	4.87	17.68	214.01	.10
1400.00	1.01	208.76	1399.85	100.00	-1399.85	-16.11	-10.65	5.49	19.31	213.48	.14
1500.00	1.08	209.32	1499.83	100.00	-1499.83	-17.70	-11.54	6.14	21.13	213.10	.07
1600.00	1.17	209.26	1599.82	100.00	-1599.82	-19.41	-12.50	6.84	23.09	212.78	.09
1700.00	1.36	218.55	1699.79	100.00	-1699.79	-21.23	-13.74	7.43	25.29	212.91	.28
1800.00	1.23	211.32	1799.77	100.00	-1799.77	-23.08	-15.04	8.01	27.54	213.09	.21
1900.00	1.36	208.21	1899.74	100.00	-1899.74	-25.04	-16.15	8.80	29.80	212.83	.15
2000.00	1.49	210.64	1999.71	100.00	-1999.71	-27.20	-17.38	9.67	32.28	212.57	.14
2100.00	1.69	208.33	2099.67	100.00	-2099.67	-29.62	-18.74	10.64	35.05	212.32	.21
2200.00	1.64	217.55	2199.63	100.00	-2199.63	-32.05	-20.31	11.50	37.95	212.36	.27
2300.00	1.68	224.70	2299.59	100.00	-2299.59	-34.23	-22.22	11.94	40.81	212.98	.21
2400.00	1.47	231.63	2399.55	100.00	-2399.55	-36.07	-24.25	12.04	43.46	213.92	.28
2500.00	1.60	243.44	2499.51	100.00	-2499.51	-37.49	-26.51	11.68	45.91	215.26	.34
2600.00	1.68	256.57	2599.47	100.00	-2599.47	-38.45	-29.18	10.70	48.27	217.19	.38
2700.00	1.30	271.29	2699.44	100.00	-2699.44	-38.77	-31.74	9.29	50.10	219.31	.54
2800.00	1.25	279.69	2799.41	100.00	-2799.41	-38.56	-33.95	7.71	51.37	221.36	.19
2900.00	.97	291.23	2899.40	100.00	-2899.40	-38.07	-35.81	6.14	52.27	223.25	.36
3000.00	.91	305.21	2999.38	100.00	-2999.38	-37.30	-37.25	4.63	52.72	224.96	.24
3100.00	.52	295.27	3099.37	100.00	-3099.37	-36.65	-38.31	3.45	53.02	226.27	.41
3200.00	.48	280.41	3199.37	100.00	-3199.37	-36.38	-39.13	2.72	53.43	227.09	.14
3300.00	.46	289.76	3299.37	100.00	-3299.37	-36.17	-39.92	2.05	53.87	227.82	.08
3400.00	.29	282.41	3399.36	100.00	-3399.36	-35.98	-40.55	1.50	54.21	228.42	.18
3500.00	.31	322.71	3499.36	100.00	-3499.36	-35.71	-40.96	1.03	54.34	228.92	.21
3600.00	.36	298.06	3599.36	100.00	-3599.36	-35.35	-41.40	.47	54.44	229.51	.15
3700.00	.49	317.34	3699.36	100.00	-3699.36	-34.89	-41.97	-.25	54.57	230.26	.19
3800.00	.34	312.63	3799.36	100.00	-3799.36	-34.37	-42.48	-.97	54.64	231.02	.15
3900.00	.40	322.38	3899.35	100.00	-3899.35	-33.89	-42.91	-1.62	54.68	231.69	.09

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Course Length FT	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
									Distance FT	Direction Deg	
4000.00	.29	292.90	3999.35	100.00	-3999.35	-33.52	-43.35	-2.19	54.80	232.29	.21
4100.00	.34	267.89	4099.35	100.00	-4099.35	-33.43	-43.88	-2.60	55.17	232.70	.14
4200.00	.28	256.61	4199.35	100.00	-4199.35	-33.50	-44.42	-2.89	55.63	232.98	.09
4300.00	.35	245.41	4299.35	100.00	-4299.35	-33.68	-44.93	-3.08	56.16	233.14	.09
4400.00	.47	237.99	4399.35	100.00	-4399.35	-34.03	-45.56	-3.22	56.86	233.24	.13
4500.00	.47	250.39	4499.34	100.00	-4499.34	-34.38	-46.29	-3.42	57.66	233.40	.10
4600.00	.56	251.45	4599.34	100.00	-4599.34	-34.67	-47.14	-3.74	58.52	233.66	.09
4700.00	.65	255.53	4699.33	100.00	-4699.33	-34.97	-48.15	-4.16	59.51	234.01	.10
4800.00	.77	256.81	4799.33	100.00	-4799.33	-35.27	-49.36	-4.71	60.66	234.45	.12
4900.00	.72	256.64	4899.32	100.00	-4899.32	-35.57	-50.62	-5.30	61.87	234.91	.05
5000.00	.68	260.55	4999.31	100.00	-4999.31	-35.81	-51.82	-5.88	62.99	235.36	.06
5100.00	.82	268.15	5099.30	100.00	-5099.30	-35.93	-53.12	-6.62	64.13	235.93	.17
5200.00	.75	268.88	5199.29	100.00	-5199.29	-35.96	-54.49	-7.48	65.29	236.57	.07
5300.00	.77	272.38	5299.28	100.00	-5299.28	-35.95	-55.82	-8.34	66.39	237.22	.05
5400.00	.87	276.00	5399.27	100.00	-5399.27	-35.84	-57.24	-9.34	67.54	237.95	.11
5500.00	.67	274.72	5499.26	100.00	-5499.26	-35.71	-58.58	-10.30	68.61	238.63	.20
5600.00	.72	274.51	5599.26	100.00	-5599.26	-35.62	-59.79	-11.15	69.59	239.22	.05
5700.00	.76	265.12	5699.25	100.00	-5699.25	-35.62	-61.08	-11.97	70.71	239.75	.13
5800.00	.77	276.57	5799.24	100.00	-5799.24	-35.60	-62.40	-12.84	71.85	240.29	.15
5900.00	.71	254.12	5899.23	100.00	-5899.23	-35.70	-63.67	-13.58	72.99	240.72	.29
6000.00	.90	257.85	5999.22	100.00	-5999.22	-36.03	-65.03	-14.20	74.35	241.01	.20
6100.00	.80	241.37	6099.21	100.00	-6099.21	-36.53	-66.41	-14.70	75.80	241.19	.26
6200.00	.87	241.60	6199.20	100.00	-6199.20	-37.23	-67.69	-14.99	77.25	241.19	.07
6300.00	1.04	233.04	6299.19	100.00	-6299.19	-38.13	-69.09	-15.20	78.91	241.10	.22
6400.00	.99	238.59	6399.17	100.00	-6399.17	-39.13	-70.55	-15.37	80.67	240.99	.11
6500.00	1.03	230.75	6499.15	100.00	-6499.15	-40.15	-71.98	-15.51	82.42	240.85	.14
6600.00	1.08	230.47	6599.14	100.00	-6599.14	-41.32	-73.40	-15.53	84.23	240.63	.05
6700.00	.97	226.24	6699.12	100.00	-6699.12	-42.50	-74.74	-15.49	85.98	240.38	.13
6800.00	.93	226.70	6799.11	100.00	-6799.11	-43.64	-75.94	-15.38	87.59	240.11	.04
6900.00	1.01	231.81	6899.09	100.00	-6899.09	-44.75	-77.23	-15.36	89.25	239.91	.12

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Course Length FT	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
7000.00	.89	222.02	6999.08	100.00	-6999.08	-45.87	-78.44	-15.28	90.87	239.68	.20
7100.00	.97	228.96	7099.07	100.00	-7099.07	-47.00	-79.60	-15.16	92.44	239.44	.14
7200.00	1.06	221.18	7199.05	100.00	-7199.05	-48.25	-80.85	-15.00	94.15	239.17	.16
7300.00	1.11	221.50	7299.03	100.00	-7299.03	-49.67	-82.10	-14.72	95.96	238.82	.05
7400.00	.93	224.27	7399.02	100.00	-7399.02	-50.98	-83.31	-14.49	97.67	238.53	.19
7500.00	1.16	227.11	7499.00	100.00	-7499.00	-52.25	-84.61	-14.36	99.45	238.30	.24
7600.00	1.08	220.70	7598.98	100.00	-7598.98	-53.65	-85.97	-14.16	101.34	238.03	.15
7700.00	1.18	214.93	7698.96	100.00	-7698.96	-55.21	-87.17	-13.74	103.19	237.65	.15
7800.00	1.29	224.45	7798.94	100.00	-7798.94	-56.86	-88.55	-13.36	105.24	237.30	.23
7900.00	1.08	226.52	7898.92	100.00	-7898.92	-58.31	-90.02	-13.20	107.26	237.07	.21
8000.00	1.07	212.60	7998.90	100.00	-7998.90	-59.75	-91.21	-12.86	109.04	236.77	.26
8100.00	1.19	216.86	8098.88	100.00	-8098.88	-61.36	-92.34	-12.35	110.87	236.39	.15
8200.00	1.23	214.70	8198.86	100.00	-8198.86	-63.08	-93.57	-11.83	112.85	236.02	.06
8300.00	1.19	211.95	8298.84	100.00	-8298.84	-64.84	-94.73	-11.22	114.80	235.61	.07
8400.00	1.43	211.77	8398.81	100.00	-8398.81	-66.78	-95.94	-10.51	116.89	235.16	.24
8500.00	1.59	211.20	8498.77	100.00	-8498.77	-69.03	-97.31	-9.67	119.31	234.65	.16
Tie in to Multi-Shot Gyroscopic Multiple shot survey.											
8600.00	1.40	199.50	8598.74	100.00	-8598.74	-71.37	-98.44	-8.60	121.59	234.06	.36
8668.00	18.50	142.80	8665.51	68.00	-8665.51	-80.82	-92.14	2.68	122.57	228.75	26.13
8700.00	32.20	147.10	8694.36	32.00	-8694.36	-92.08	-84.41	16.28	124.91	222.51	43.17
8732.00	45.90	143.70	8719.16	32.00	-8719.16	-108.58	-72.92	36.31	130.79	213.88	43.32
8763.00	58.30	141.60	8738.16	31.00	-8738.16	-127.96	-58.08	60.69	140.52	204.41	40.35
8794.00	69.80	143.30	8751.71	31.00	-8751.71	-150.03	-41.13	88.49	155.57	195.33	37.42
8826.00	77.70	137.80	8760.66	32.00	-8760.66	-173.71	-21.61	119.18	175.05	187.09	29.68
8858.00	79.70	136.70	8766.93	32.00	-8766.93	-196.75	-.31	150.52	196.75	180.09	7.10
8890.00	82.90	136.60	8771.77	32.00	-8771.77	-219.75	21.40	182.09	220.79	174.44	10.00
8921.00	85.90	134.50	8774.80	31.00	-8774.80	-241.77	43.00	212.84	245.56	169.92	11.79
8953.00	86.20	134.00	8777.00	32.00	-8777.00	-264.04	65.87	244.61	272.13	165.99	1.82
8985.00	85.50	134.10	8779.32	32.00	-8779.32	-286.23	88.81	276.35	299.69	162.76	2.21
9016.00	84.50	134.30	8782.02	31.00	-8782.02	-307.76	110.95	307.07	327.15	160.18	3.29

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Course Length FT	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
9048.00	89.70	134.70	8783.64	32.00	-8783.64	-330.16	133.73	338.88	356.21	157.95	16.30
9080.00	92.30	135.20	8783.08	32.00	-8783.08	-352.76	156.37	370.74	385.86	156.09	8.27
9112.00	91.70	135.70	8781.96	32.00	-8781.96	-375.55	178.81	402.62	415.94	154.54	2.44
9144.00	90.90	136.00	8781.23	32.00	-8781.23	-398.50	201.09	434.53	446.37	153.22	2.67
9176.00	90.90	136.10	8780.73	32.00	-8780.73	-421.54	223.30	466.45	477.03	152.09	.31
9208.00	90.90	136.10	8780.23	32.00	-8780.23	-444.59	245.48	498.37	507.86	151.09	.00
9239.00	88.90	136.50	8780.28	31.00	-8780.28	-467.00	266.90	529.31	537.89	150.25	6.58
9271.00	88.80	136.40	8780.93	32.00	-8780.93	-490.19	288.94	561.24	569.01	149.48	.44
9303.00	86.50	136.20	8782.24	32.00	-8782.24	-513.31	311.03	593.14	600.19	148.79	7.21
9333.00	86.70	136.50	8784.02	30.00	-8784.02	-534.97	331.70	623.03	629.46	148.20	1.20
9367.00	88.00	136.00	8785.59	34.00	-8785.59	-559.51	355.19	656.92	662.73	147.59	4.10
9399.00	89.30	135.10	8786.34	32.00	-8786.34	-582.34	377.59	688.81	694.05	147.04	4.94
9430.00	88.80	134.50	8786.86	31.00	-8786.86	-604.19	399.58	719.68	724.37	146.52	2.52
9462.00	90.60	133.30	8787.02	32.00	-8787.02	-626.37	422.64	751.50	755.62	145.99	6.76
9494.00	87.90	132.00	8787.44	32.00	-8787.44	-648.05	446.17	783.23	786.79	145.45	9.36
9525.00	92.20	131.00	8787.42	31.00	-8787.42	-668.58	469.38	813.88	816.90	144.93	14.24
9557.00	94.40	131.10	8785.57	32.00	-8785.57	-689.56	493.47	845.44	847.95	144.41	6.88
9589.00	95.40	130.80	8782.84	32.00	-8782.84	-710.46	517.56	876.92	878.99	143.93	3.26
9621.00	95.00	130.40	8779.94	32.00	-8779.94	-731.20	541.75	908.36	910.03	143.46	1.76
9652.00	94.30	131.00	8777.43	31.00	-8777.43	-751.35	565.18	938.85	940.18	143.05	2.97
9684.00	94.00	131.50	8775.11	32.00	-8775.11	-772.39	589.17	970.40	971.45	142.66	1.82
9716.00	93.50	130.90	8773.02	32.00	-8773.02	-793.42	613.20	1001.95	1002.76	142.30	2.44
9747.00	93.30	133.60	8771.18	31.00	-8771.18	-814.23	636.10	1032.61	1033.24	142.00	8.72
9778.00	92.10	134.70	8769.72	31.00	-8769.72	-835.80	658.32	1063.42	1063.93	141.77	5.25
9810.00	87.30	135.30	8769.89	32.00	-8769.89	-858.42	680.94	1095.28	1095.70	141.58	15.12
9842.00	88.00	136.10	8771.20	32.00	-8771.20	-881.30	703.27	1127.17	1127.51	141.41	3.32
9874.00	91.00	136.40	8771.48	32.00	-8771.48	-904.41	725.39	1159.09	1159.38	141.27	9.42
9905.00	90.90	136.50	8770.96	31.00	-8770.96	-926.88	746.75	1190.03	1190.27	141.14	.46
9937.00	92.00	136.30	8770.15	32.00	-8770.15	-950.04	768.81	1221.96	1222.15	141.02	3.49
9968.00	87.00	135.40	8770.43	31.00	-8770.43	-972.28	790.40	1252.86	1253.02	140.89	16.39