

Wind Resource Summary for Callaway Site

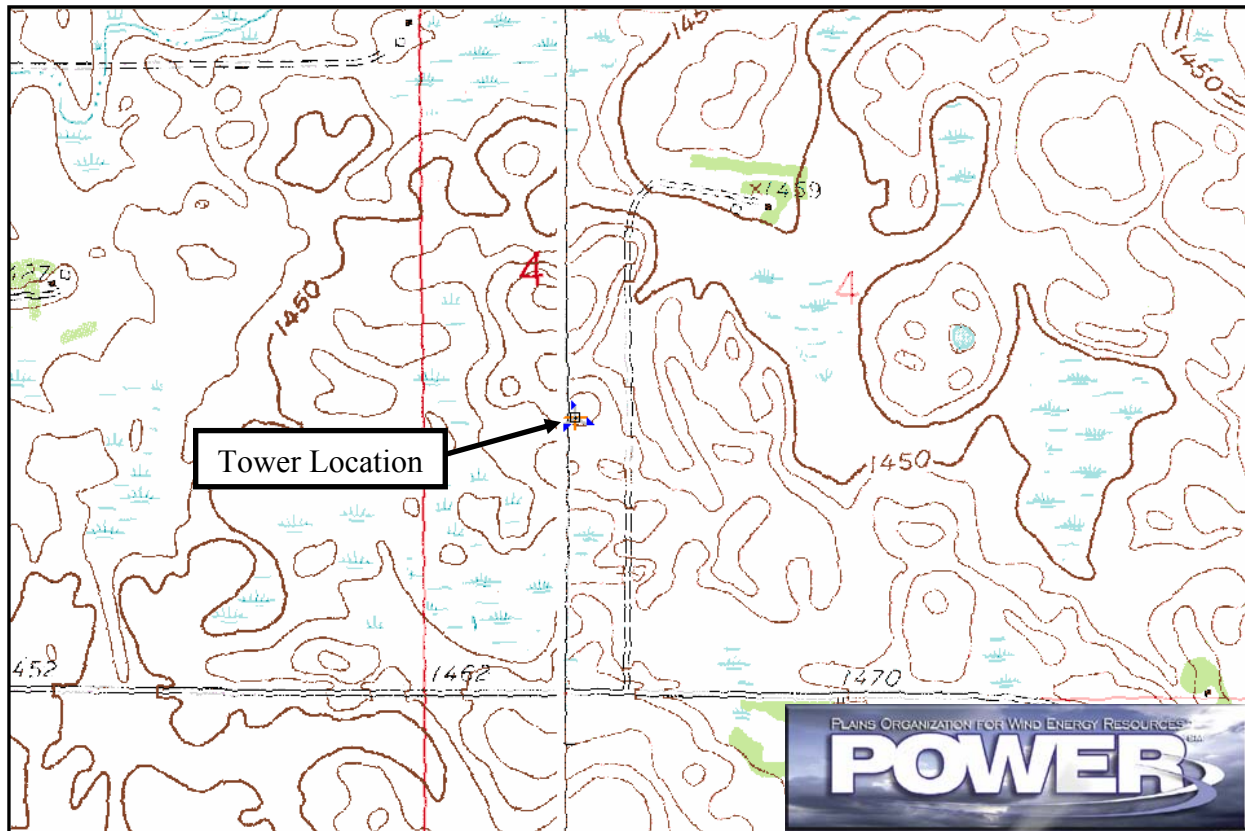
Minnesota Department of Commerce

Monitoring Period:^a 7/31/1994 – 8/18/1998

Site Description:

Latitude: N 46° 58' 6"	Township: 140 N
Longitude: W 95° 52' 31"	Range: 41 W
Elevation: 1,480 feet	Section: 4
Tower Type: NRG tilt-up	Tower Height: 131 feet

The monitoring site was 2 miles southeast of the town of Callaway, Minnesota. The tower was instrumented at 3 levels: 33 feet (10 m), 98 feet (30 m), and 131 feet (40 m). The terrain is hilly with many small lakes and ponds dispersed throughout the countryside. The majority of land is used for agricultural purposes, primarily for crops.



	33 ft AGL ^b	98 ft AGL	131 ft AGL
Mean Wind Speed	11.0 mph	13.1 mph	14.0 mph
Maximum, 60-min Mean Wind Speed	54.5 mph at 131 ft AGL – 7/13/1995 3:00 a.m.		
Estimated Wind Power Class^c	Class 2 (254 W/m ² at 131 ft AGL)		

^a Data recovery rates at 33, 98, and 131 feet were 91%, 90%, and 86%, respectively.

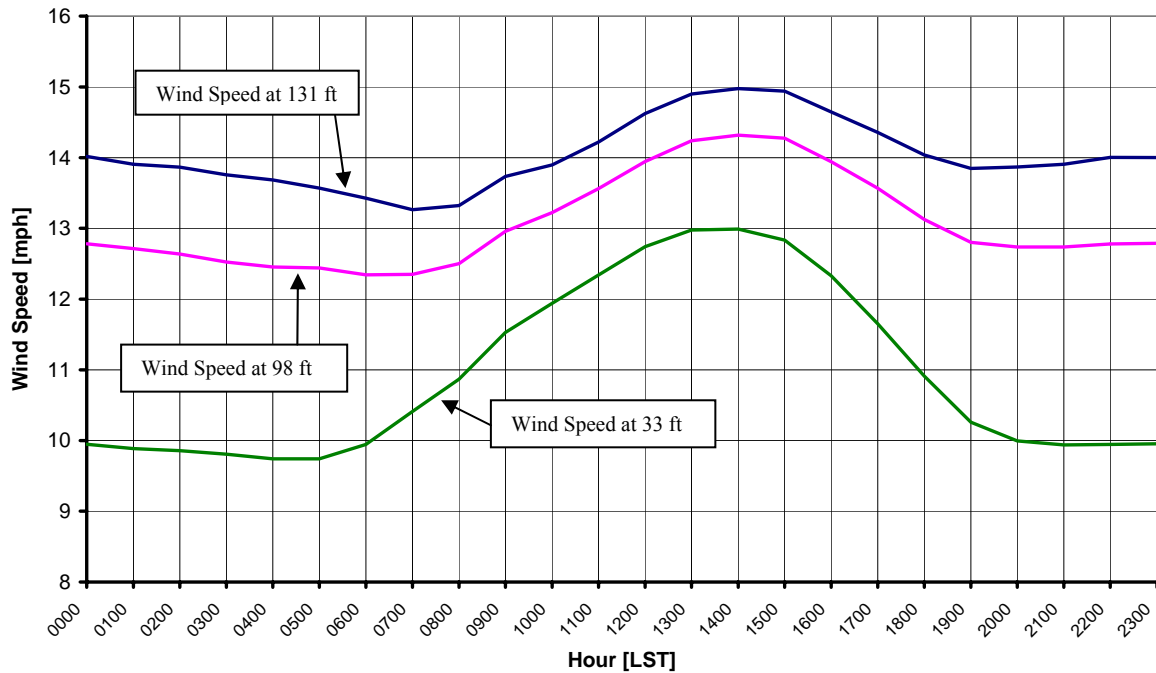
^b Above ground level.

^c Air temperature was not factored into calculation.

Average Hourly Wind Speeds

LST ^d	131 ft AGL		98 ft AGL		33 ft AGL	
	mph	m/s	mph	m/s	mph	m/s
0000	14.0	6.27	12.8	5.71	9.9	4.45
0100	13.9	6.22	12.7	5.68	9.9	4.42
0200	13.9	6.20	12.6	5.65	9.9	4.41
0300	13.8	6.15	12.5	5.60	9.8	4.38
0400	13.7	6.12	12.5	5.57	9.7	4.35
0500	13.6	6.07	12.4	5.56	9.7	4.35
0600	13.4	6.00	12.3	5.52	9.9	4.45
0700	13.3	5.93	12.3	5.52	10.4	4.65
0800	13.3	5.96	12.5	5.59	10.9	4.86
0900	13.7	6.14	13.0	5.79	11.5	5.15
1000	13.9	6.21	13.2	5.91	11.9	5.34
1100	14.2	6.36	13.6	6.06	12.3	5.52
1200	14.6	6.54	13.9	6.23	12.7	5.70
1300	14.9	6.66	14.2	6.36	13.0	5.80
1400	15.0	6.69	14.3	6.40	13.0	5.81
1500	14.9	6.68	14.3	6.38	12.8	5.74
1600	14.6	6.55	13.9	6.23	12.3	5.51
1700	14.4	6.42	13.6	6.06	11.7	5.21
1800	14.0	6.27	13.1	5.87	10.9	4.88
1900	13.8	6.19	12.8	5.72	10.3	4.59
2000	13.9	6.20	12.7	5.69	10.0	4.47
2100	13.9	6.22	12.7	5.69	9.9	4.44
2200	14.0	6.26	12.8	5.71	9.9	4.45
2300	14.0	6.26	12.8	5.72	10.0	4.45

**Minnesota Department of Commerce – Callaway
7/31/1994 – 8/18/1998**



^d Local standard time.



Energy & Environmental Research Center
701-777-5000 or bstevens@underc.org

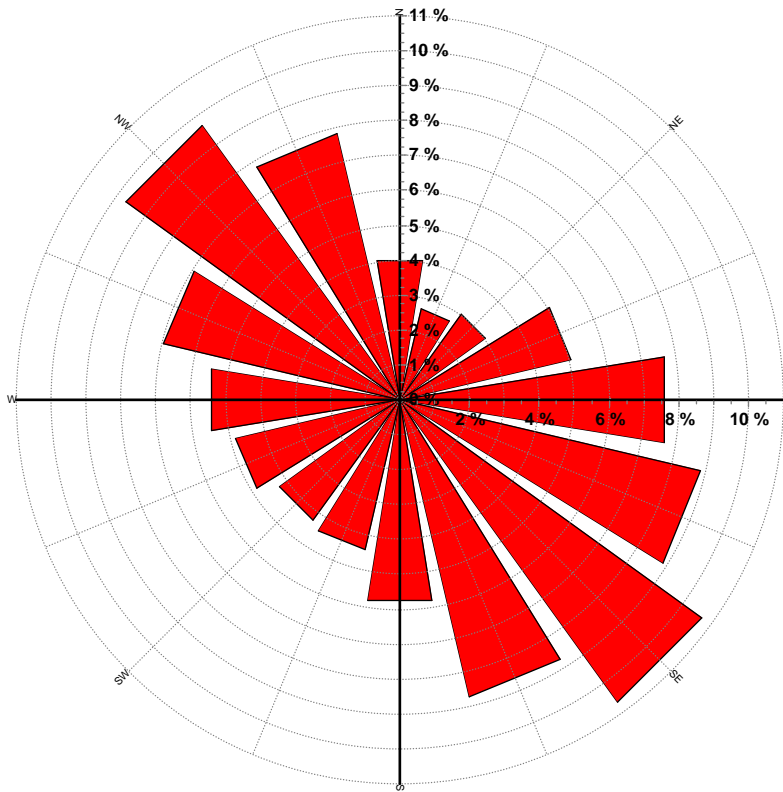
Creation Date: 6/8/2005

Wind Directional Frequency

Winds from the... Frequency (%)

NNW	7.8
NW	9.7
WNW	7.0
W	5.5
WSW	4.8
SW	4.2
SSW	4.4
S	5.8
SSE	8.7
SE	10.7
ESE	8.9
E	7.7
ENE	5.0
NE	3.0
NNE	2.7
N	4.0

Minnesota Department of Commerce – Callaway
Wind Rose for 131 ft AGL
7/31/1994 – 8/18/1998



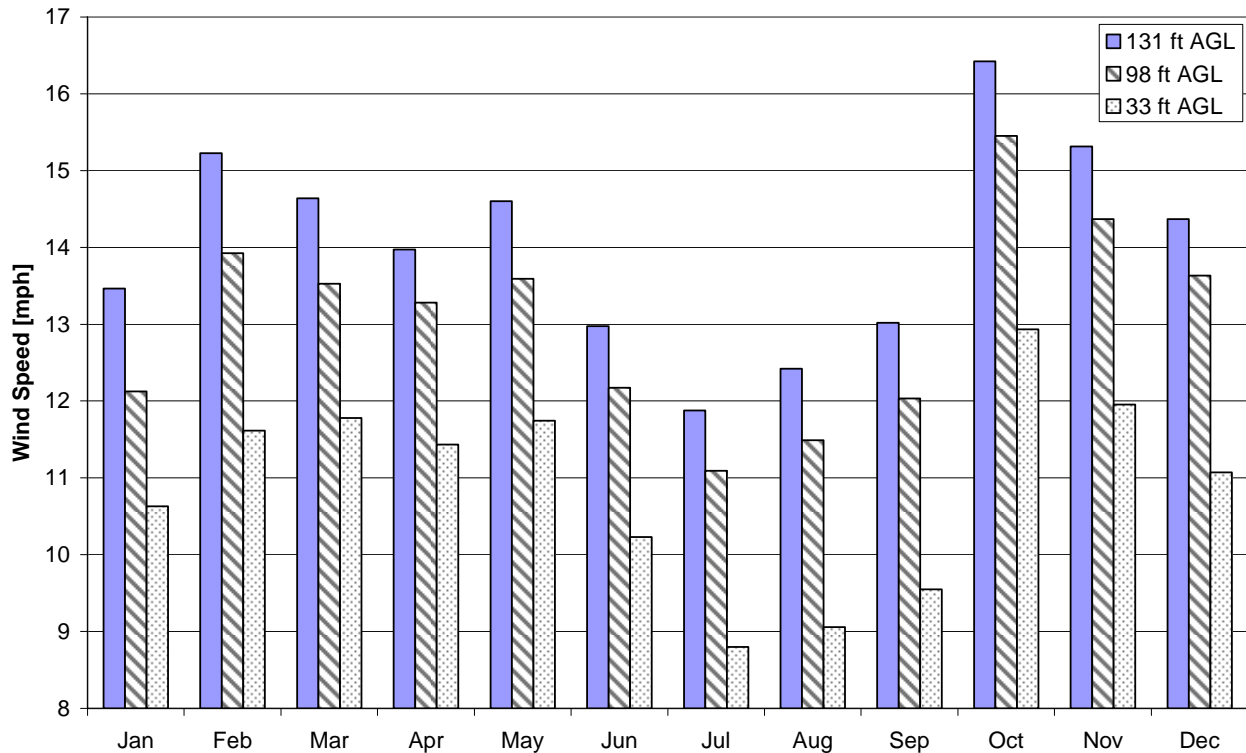
Energy & Environmental Research Center
701-777-5000 or bstevens@underc.org

Creation Date: 6/8/2005

Monthly Wind Speed Averages

Month	131 ft AGL		98 ft AGL		33 ft AGL	
	mph	m/s	mph	m/s	mph	m/s
Jan	13.5	6.02	12.1	5.42	10.6	4.75
Feb	15.2	6.81	13.9	6.23	11.6	5.19
Mar	14.6	6.55	13.5	6.05	11.8	5.27
Apr	14.0	6.25	13.3	5.94	11.4	5.11
May	14.6	6.53	13.6	6.08	11.7	5.25
Jun	13.0	5.80	12.2	5.44	10.2	4.57
Jul	11.9	5.31	11.1	4.96	8.8	3.93
Aug	12.4	5.55	11.5	5.14	9.1	4.05
Sep	13.0	5.82	12.0	5.38	9.5	4.27
Oct	16.4	7.34	15.5	6.91	12.9	5.78
Nov	15.3	6.85	14.4	6.42	12.0	5.34
Dec	14.4	6.42	13.6	6.09	11.1	4.95

**Minnesota Department of Commerce – Callaway
7/31/1994 – 8/18/1998**



Energy & Environmental Research Center
701-777-5000 or bstevens@underc.org

Creation Date: 6/8/2005