

# Wind Resource Summary for Crookston Site

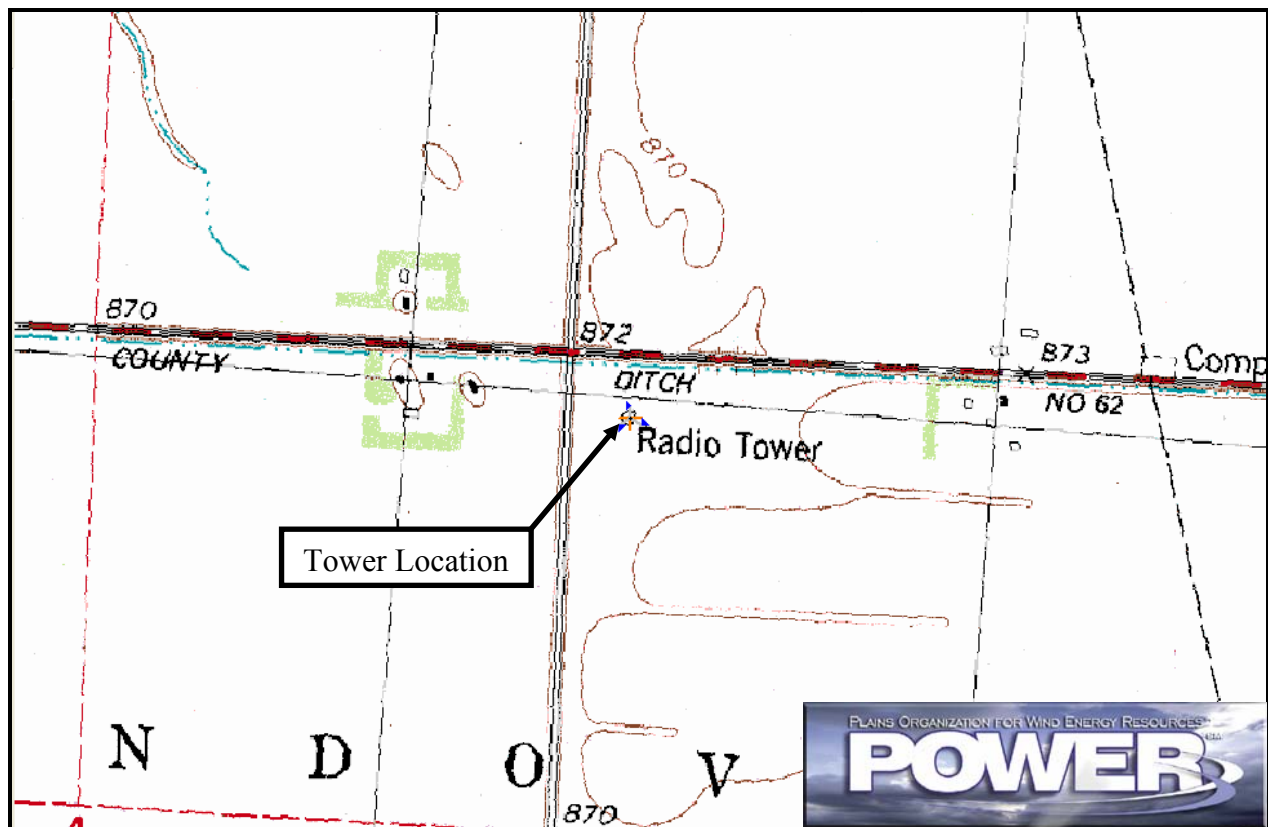
Minnesota Department of Commerce

Monitoring Period:<sup>a</sup> 6/1/1995 – 5/25/2005

## Site Description:

Latitude: N 47° 45' 23"	Township: 149 N
Longitude: W 96° 40' 11"	Range: 47 W
Elevation: 866 feet	Section: 3
Tower Type: Communications Tower	Tower Height: 230 feet

The monitoring site is 3 miles west-southwest of the city of Crookston, Minnesota, and 1 mile southwest of the city's waste water ponds. A radio tower was instrumented at 3 levels: 98 feet (30 m), 164 feet (50 m), and 230 feet (70 m). The site is located near the bottom of a dry glacial lake bed where the terrain is very flat. The land is very fertile and primarily used for growing crops.



Summary Wind Data:	98 ft AGL <sup>b</sup>	164 ft AGL	230 ft AGL
Mean Wind Speed	12.6 mph	14.1 mph	15.1 mph
Maximum, 10-min Mean Wind Speed	50.9 mph at 230 ft AGL – 2/10/1996 1:00 p.m.		
Estimated Wind Power Class <sup>c</sup>	Class 2 (257 W/m <sup>2</sup> at 164 ft AGL)		

<sup>a</sup> Data recovery rates at 98, 164, and 230 feet were 95%, 94%, and 92%, respectively.

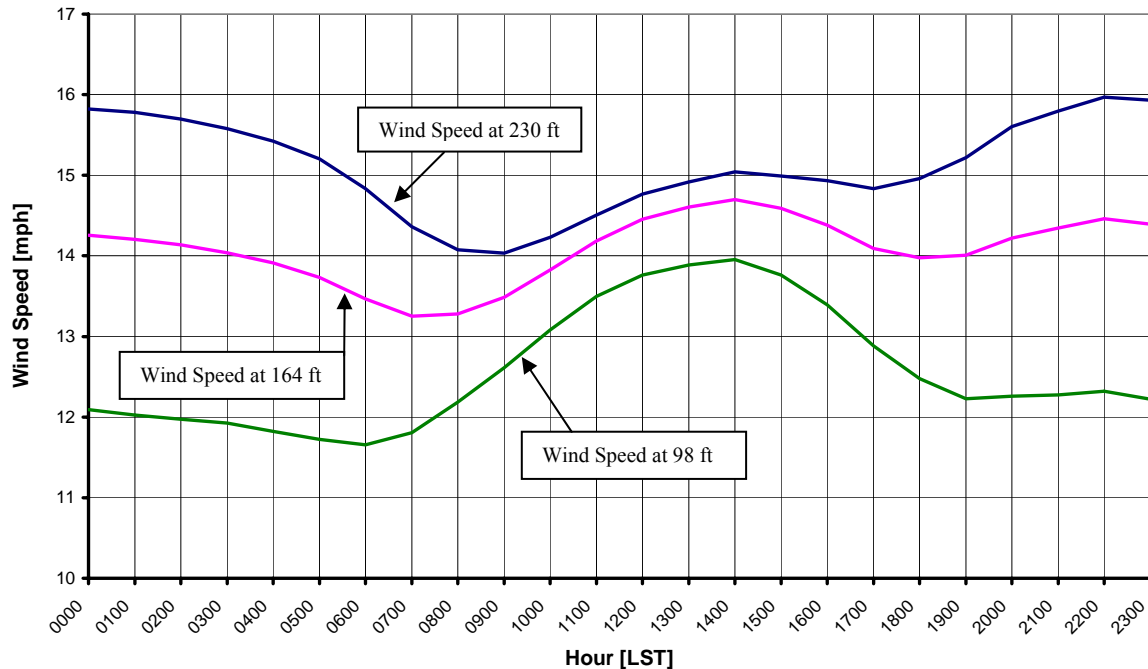
<sup>b</sup> Above ground level.

<sup>c</sup> Air temperature was not factored into calculation.

## Average Hourly Wind Speeds

LST <sup>d</sup>	230 ft AGL		164 ft AGL		98 ft AGL	
	mph	m/s	mph	m/s	mph	m/s
0000	15.8	7.07	14.3	6.37	12.1	5.41
0100	15.8	7.06	14.2	6.35	12.0	5.38
0200	15.7	7.02	14.1	6.32	12.0	5.35
0300	15.6	6.96	14.0	6.28	11.9	5.33
0400	15.4	6.89	13.9	6.22	11.8	5.29
0500	15.2	6.80	13.7	6.14	11.7	5.24
0600	14.8	6.63	13.5	6.02	11.7	5.21
0700	14.4	6.42	13.3	5.92	11.8	5.28
0800	14.1	6.29	13.3	5.94	12.2	5.45
0900	14.0	6.27	13.5	6.03	12.6	5.64
1000	14.2	6.36	13.8	6.18	13.1	5.85
1100	14.5	6.49	14.2	6.34	13.5	6.03
1200	14.8	6.60	14.5	6.46	13.8	6.15
1300	14.9	6.67	14.6	6.53	13.9	6.21
1400	15.0	6.72	14.7	6.57	14.0	6.24
1500	15.0	6.70	14.6	6.52	13.8	6.15
1600	14.9	6.68	14.4	6.43	13.4	5.99
1700	14.8	6.63	14.1	6.30	12.9	5.76
1800	15.0	6.69	14.0	6.25	12.5	5.58
1900	15.2	6.80	14.0	6.26	12.2	5.47
2000	15.6	6.98	14.2	6.36	12.3	5.48
2100	15.8	7.06	14.3	6.41	12.3	5.49
2200	16.0	7.14	14.5	6.46	12.3	5.51
2300	15.9	7.12	14.4	6.43	12.2	5.46

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6/1/1995 – 5/25/2005



<sup>d</sup> Local standard time.



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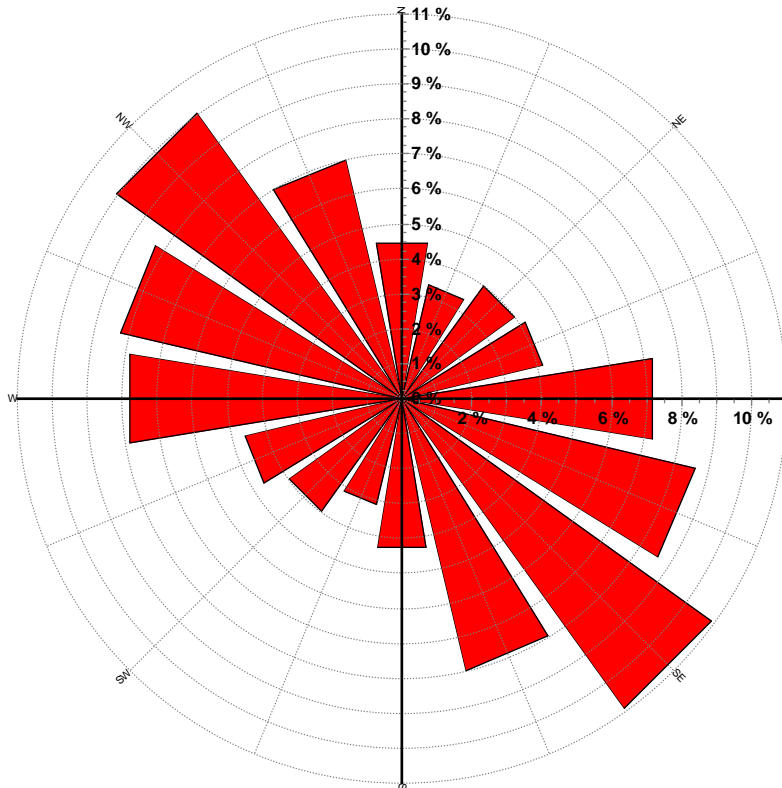
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## Wind Directional Frequency

**Winds from the... Frequency (%)**

NNW	7.0
NW	10.1
WNW	8.3
W	7.9
WSW	4.6
SW	4.0
SSW	3.1
S	4.3
SSE	8.0
SE	10.9
ESE	8.6
E	7.2
ENE	4.2
NE	4.0
NNE	3.3
N	4.5

Minnesota Department of Commerce – Crookston Site  
Wind Rose for 98 ft AGL  
6/1/1995 – 5/25/2005



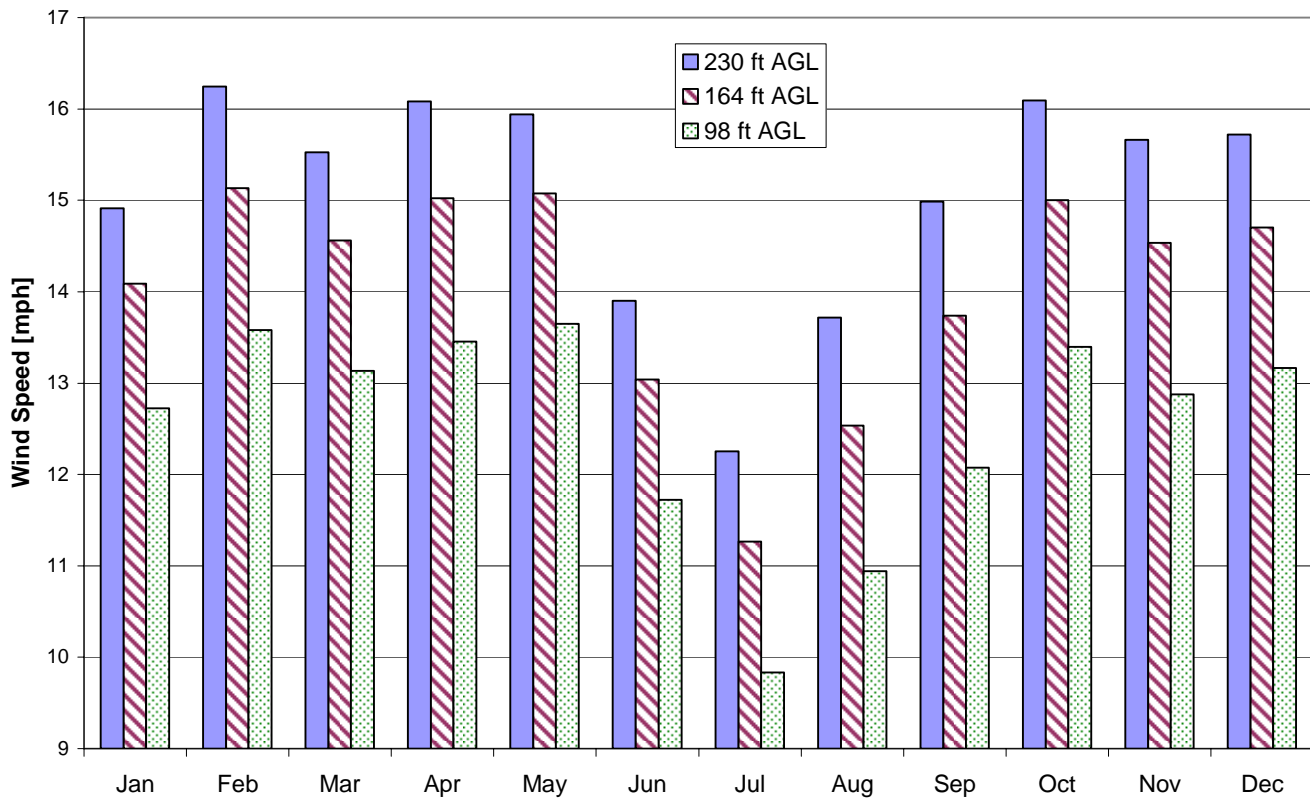
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## Monthly Wind Speed Averages

Month	230 ft AGL		164 ft AGL		98 ft AGL	
	mph	m/s	mph	m/s	mph	m/s
Jan	14.9	6.67	14.1	6.30	12.7	5.69
Feb	16.2	7.26	15.1	6.77	13.6	6.07
Mar	15.5	6.94	14.6	6.51	13.1	5.87
Apr	16.1	7.19	15.0	6.72	13.5	6.02
May	15.9	7.13	15.1	6.74	13.6	6.10
Jun	13.9	6.21	13.0	5.83	11.7	5.24
Jul	12.3	5.48	11.3	5.04	9.8	4.40
Aug	13.7	6.13	12.5	5.60	10.9	4.89
Sep	15.0	6.70	13.7	6.14	12.1	5.40
Oct	16.1	7.19	15.0	6.71	13.4	5.99
Nov	15.7	7.00	14.5	6.50	12.9	5.76
Dec	15.7	7.03	14.7	6.57	13.2	5.89

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