

# Wind Resource Summary for Green River Site

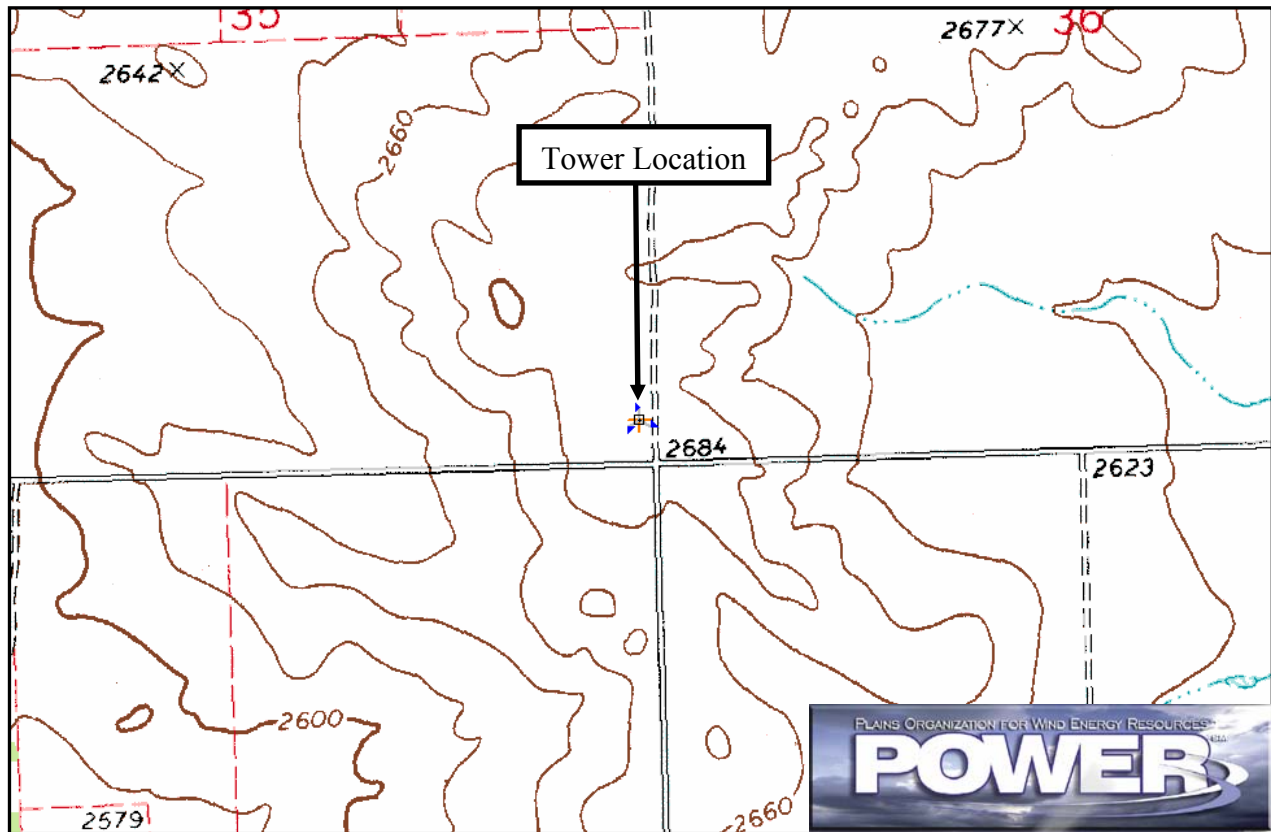
## North Dakota Utility Study

### Falls<sup>a</sup> 1994, 1995, 1996 & 1997

#### Site Description:

Latitude: N 47° 4' 5"	Township: 142 N
Longitude: W 102° 55' 38"	Range: 97 W
Elevation: 2684 feet	Section: 18
Tower Type: Lattice Tower	Tower Height: 271 feet

The monitoring site was 14.3 miles north-northeast of the town of South Heart, North Dakota. An existing tower was used and instrumented at four levels: 33 ft (10 m), 82 ft (25 m), 131 ft (40 m), and 180 ft (55 m). The tower is located on a top of a small hill with good exposure to the wind in all directions. Cultivated fields characterize the area's landscape.



<b>Summary Wind Data:</b>	<b>33 ft AGL<sup>b</sup></b>	<b>82 ft AGL</b>	<b>131 ft AGL</b>	<b>180 ft AGL</b>
<b>Mean Wind Speed</b>	12.4 mph	14.6 mph	16.2 mph	17.4 mph
<b>Maximum, 60-min Mean Wind Speed</b>	50.0 mph at 180 ft AGL – 10/22/1994 11:00 a.m.			
<b>Estimated Wind Power Class<sup>c</sup></b>	Class 3 (410 W/m <sup>2</sup> at 180 ft AGL)			

<sup>a</sup> Fall is defined as the months of September, October, and November. Fall 1994 begins with October 1994.

Data recovery rates at 33, 82, 131 and 180 feet were 96%, 96%, 96% and 74%, respectively.

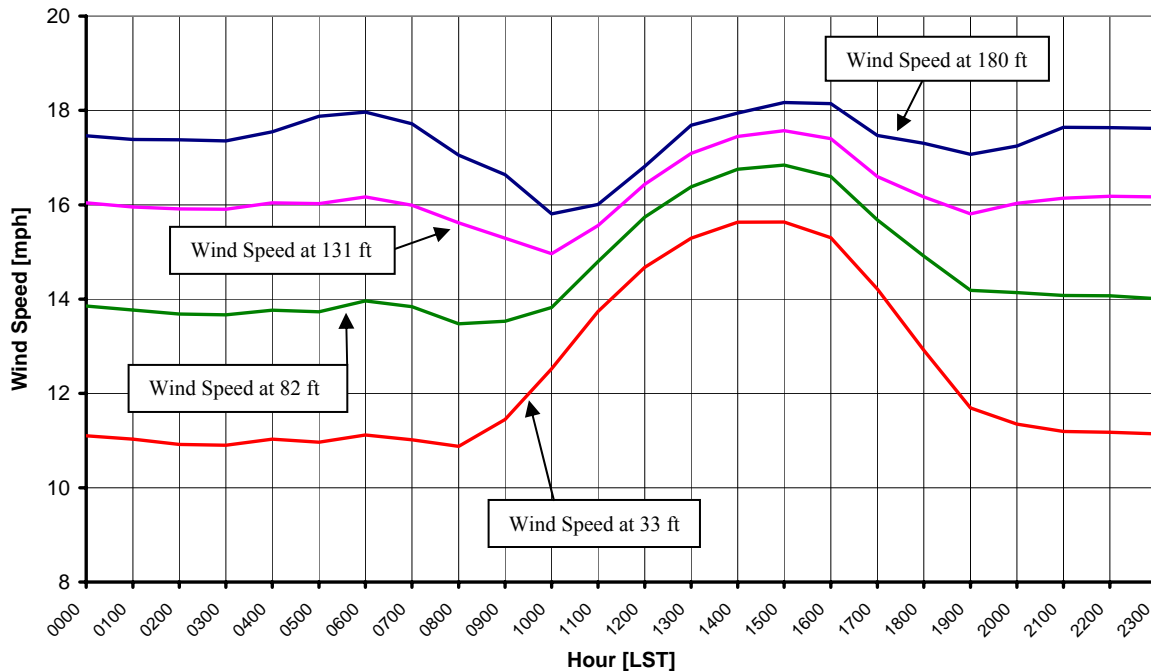
<sup>b</sup> Above ground level.

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

## Average Hourly Wind Speeds

LST <sup>d</sup>	180 ft AGL		131 ft AGL		82 ft AGL		33 ft AGL	
	mph	m/s	mph	m/s	mph	m/s	mph	m/s
0000	17.5	7.81	16.0	7.17	13.9	6.19	11.1	4.96
0100	17.4	7.77	16.0	7.13	13.8	6.15	11.0	4.93
0200	17.4	7.77	15.9	7.12	13.7	6.12	10.9	4.88
0300	17.4	7.76	15.9	7.11	13.7	6.11	10.9	4.87
0400	17.5	7.84	16.0	7.17	13.8	6.15	11.0	4.93
0500	17.9	7.99	16.0	7.16	13.7	6.14	11.0	4.90
0600	18.0	8.03	16.2	7.23	14.0	6.24	11.1	4.97
0700	17.7	7.92	16.0	7.15	13.8	6.19	11.0	4.92
0800	17.1	7.62	15.6	6.98	13.5	6.02	10.9	4.86
0900	16.6	7.44	15.3	6.84	13.5	6.05	11.4	5.12
1000	15.8	7.07	15.0	6.69	13.8	6.18	12.5	5.60
1100	16.0	7.16	15.6	6.96	14.8	6.62	13.7	6.14
1200	16.8	7.52	16.4	7.35	15.7	7.04	14.7	6.56
1300	17.7	7.91	17.1	7.64	16.4	7.32	15.3	6.84
1400	17.9	8.02	17.4	7.80	16.8	7.49	15.6	6.99
1500	18.2	8.12	17.6	7.85	16.8	7.53	15.6	6.99
1600	18.1	8.11	17.4	7.78	16.6	7.42	15.3	6.84
1700	17.5	7.81	16.6	7.42	15.7	7.01	14.2	6.35
1800	17.3	7.74	16.2	7.23	14.9	6.67	12.9	5.77
1900	17.1	7.63	15.8	7.07	14.2	6.34	11.7	5.23
2000	17.2	7.71	16.0	7.17	14.1	6.32	11.3	5.07
2100	17.6	7.89	16.1	7.22	14.1	6.29	11.2	5.00
2200	17.6	7.89	16.2	7.23	14.1	6.29	11.2	5.00
2300	17.6	7.88	16.2	7.23	14.0	6.26	11.1	4.98

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



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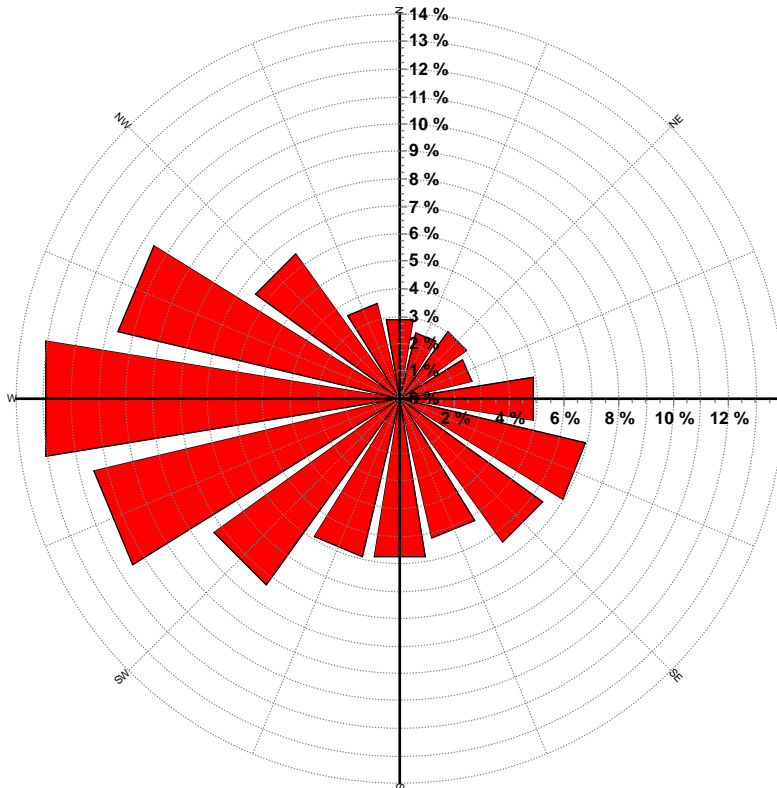
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## Wind Directional Frequency

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

NNW	3.6
NW	6.5
WNW	10.6
W	13.1
WSW	11.5
SW	8.4
SSW	5.9
S	5.8
SSE	5.2
SE	6.4
ESE	7.0
E	5.0
ENE	2.7
NE	3.0
NNE	2.5
N	2.9

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Wind Rose for 180 ft AGL  
Falls 1994, 1995, 1996 & 1997



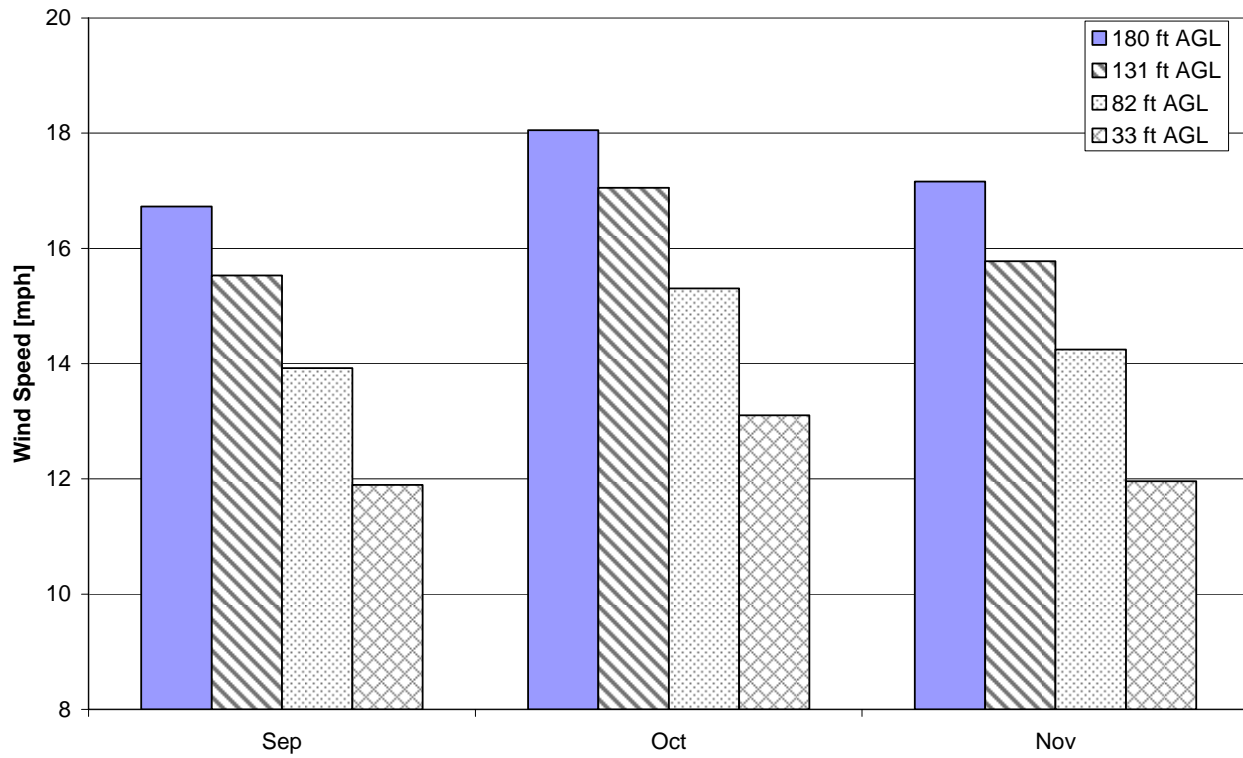
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## Monthly Wind Speed Averages

Month	180 ft AGL		131 ft AGL		82 ft AGL		33 ft AGL	
	mph	m/s	mph	m/s	mph	m/s	mph	m/s
Sep	16.7	7.48	15.5	6.94	13.9	6.22	11.9	5.32
Oct	18.1	8.07	17.1	7.62	15.3	6.84	13.1	5.86
Nov	17.2	7.67	15.8	7.05	14.2	6.37	12.0	5.35

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