

Wind Resource Summary for Olga Site

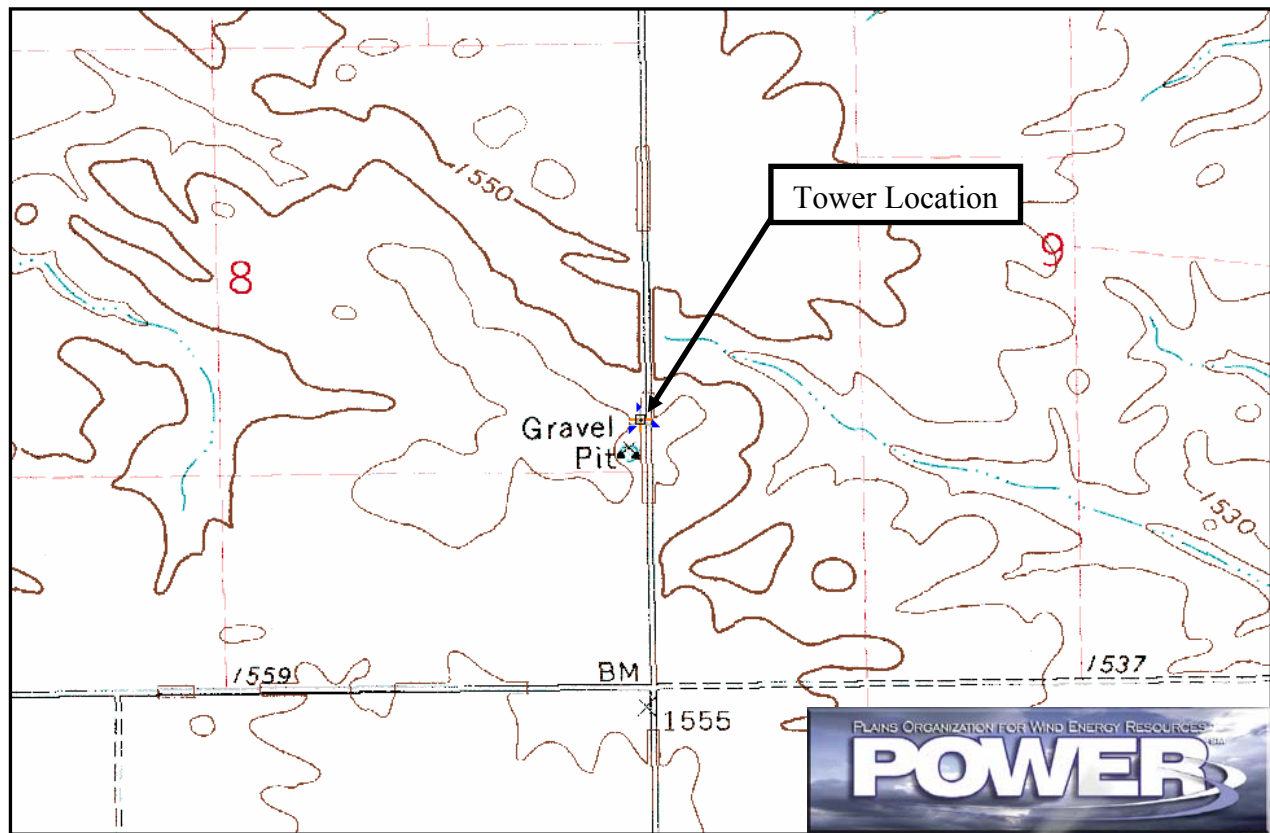
North Dakota Utility Study

Summers^a 1995, 1996, 1997, 1998, 1999, 2000 & 2001

Site Description:

Latitude: N 48° 46' 48"	Township: 161 N
Longitude: W 98° 2' 16"	Range: 57 W
Elevation: 1555 feet	Section: 9
Tower Type: Utility Tower	Tower Height: 300 feet

The monitoring site was 9.1 miles northeast of the town of Osnabrock, North Dakota. The tower was instrumented at four levels: 33 feet (10 m), 82 feet (25 m), 131 feet (40 m), and 180 feet (55 m). A gravel pit is located 200 feet due south of the site, as well as a windbreak roughly 0.3 miles south and southwest.



Summary Wind Data:	33 ft AGL ^b	82 ft AGL	131 ft AGL	180 ft AGL
Mean Wind Speed (mph)	8.5 mph	11.9 mph	13.8 mph	14.5 mph
Maximum, 60-min Mean Wind Speed	43.3 mph at 180 ft AGL – 8/14/1995 9:00 am			
Estimated Wind Power Class ^c	Class 2 (248 W/m ² at 180 ft AGL)			

^a Summer is defined as the months of June, July and August. Summer 1995 begins with June 1995. Data recovery rates at 33, 82, 131 and 180 feet were 64%, 50%, 50% and 64%, respectively.

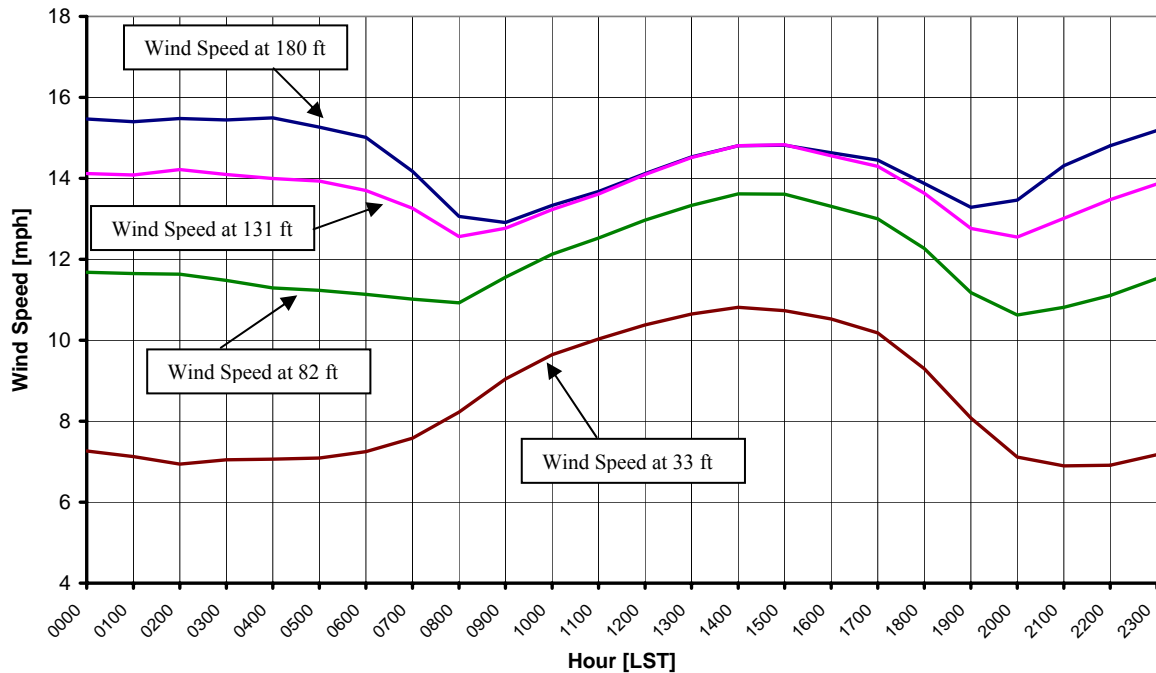
^b Above ground level.

^c Air temperature was not factored into calculations.

Average Hourly Wind Speeds

LST ^d	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	15.5	6.91	14.1	6.31	11.7	5.22	7.3	3.25
0100	15.4	6.88	14.1	6.30	11.6	5.21	7.1	3.19
0200	15.5	6.92	14.2	6.36	11.6	5.20	6.9	3.10
0300	15.4	6.90	14.1	6.30	11.5	5.13	7.0	3.15
0400	15.5	6.93	14.0	6.26	11.3	5.05	7.1	3.16
0500	15.3	6.82	13.9	6.23	11.2	5.02	7.1	3.17
0600	15.0	6.71	13.7	6.12	11.1	4.98	7.2	3.24
0700	14.2	6.33	13.3	5.93	11.0	4.93	7.6	3.39
0800	13.1	5.84	12.6	5.62	10.9	4.88	8.2	3.68
0900	12.9	5.77	12.8	5.71	11.6	5.16	9.0	4.04
1000	13.3	5.96	13.2	5.91	12.1	5.42	9.6	4.31
1100	13.7	6.11	13.6	6.08	12.5	5.60	10.0	4.49
1200	14.1	6.31	14.1	6.30	13.0	5.80	10.4	4.64
1300	14.5	6.49	14.5	6.49	13.3	5.96	10.6	4.76
1400	14.8	6.62	14.8	6.62	13.6	6.09	10.8	4.83
1500	14.8	6.62	14.8	6.63	13.6	6.08	10.7	4.80
1600	14.6	6.54	14.6	6.51	13.3	5.95	10.5	4.70
1700	14.4	6.46	14.3	6.39	13.0	5.81	10.2	4.55
1800	13.9	6.20	13.6	6.09	12.3	5.48	9.3	4.16
1900	13.3	5.94	12.8	5.71	11.2	5.00	8.1	3.61
2000	13.5	6.02	12.5	5.61	10.6	4.75	7.1	3.18
2100	14.3	6.40	13.0	5.82	10.8	4.83	6.9	3.08
2200	14.8	6.62	13.5	6.02	11.1	4.96	6.9	3.09
2300	15.2	6.79	13.9	6.20	11.5	5.15	7.2	3.21

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^d Local standard time.



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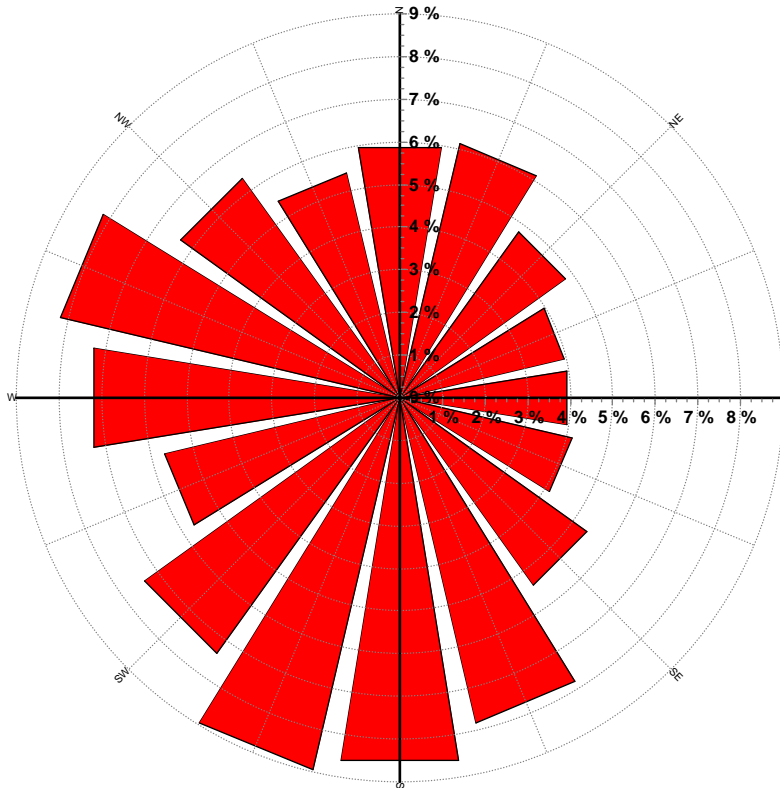
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Wind Directional Frequency

Winds from the... Frequency (%)

NNW	5.4
NW	6.3
WNW	8.2
W	7.3
WSW	5.7
SW	7.4
SSW	9.0
S	8.6
SSE	7.8
SE	5.4
ESE	4.1
E	4.0
ENE	4.0
NE	4.8
NNE	6.1
N	6.0

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Wind Rose for 180 ft AGL
Summers 1995, 1996, 1997, 1998, 1999, 2000 & 2001



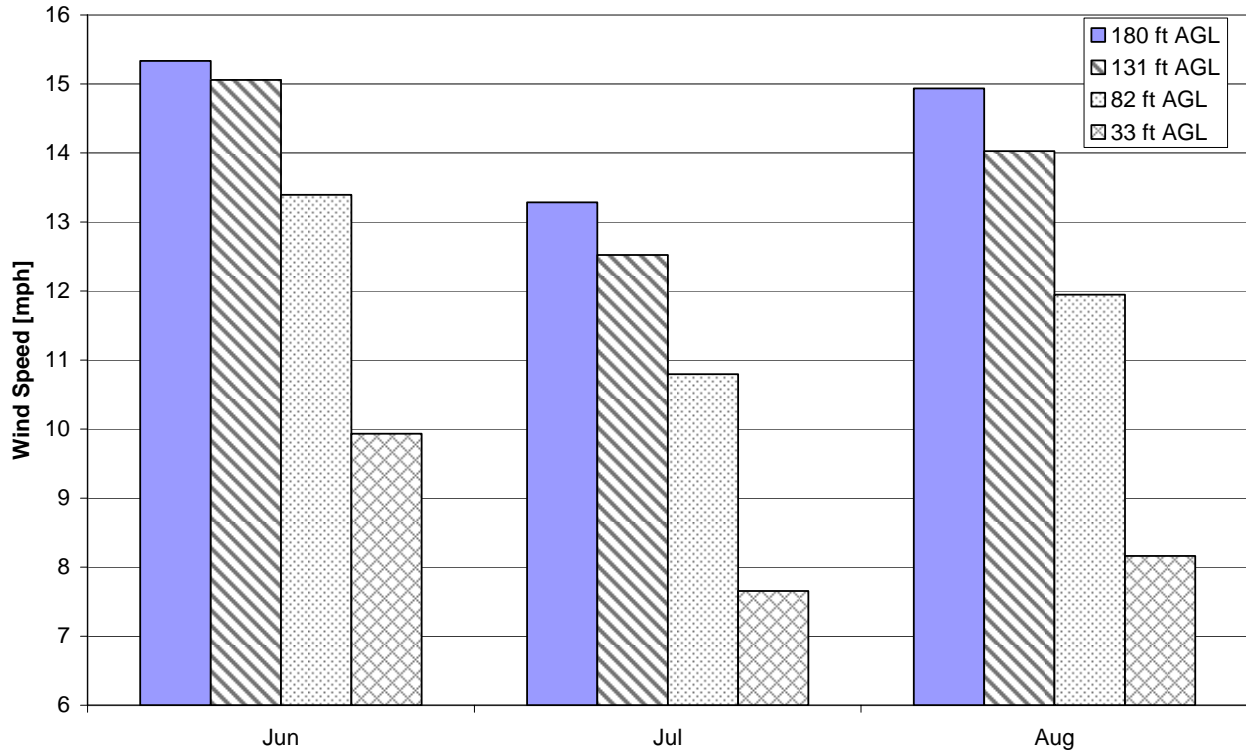
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Monthly Wind Speed Averages

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
Jun	15.3	6.86	15.1	6.73	13.4	5.99	9.9	4.44
Jul	13.3	5.94	12.5	5.60	10.8	4.83	7.7	3.42
Aug	14.9	6.68	14.0	6.27	11.9	5.34	8.2	3.65

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