

Wind Resource Summary for Olga Site

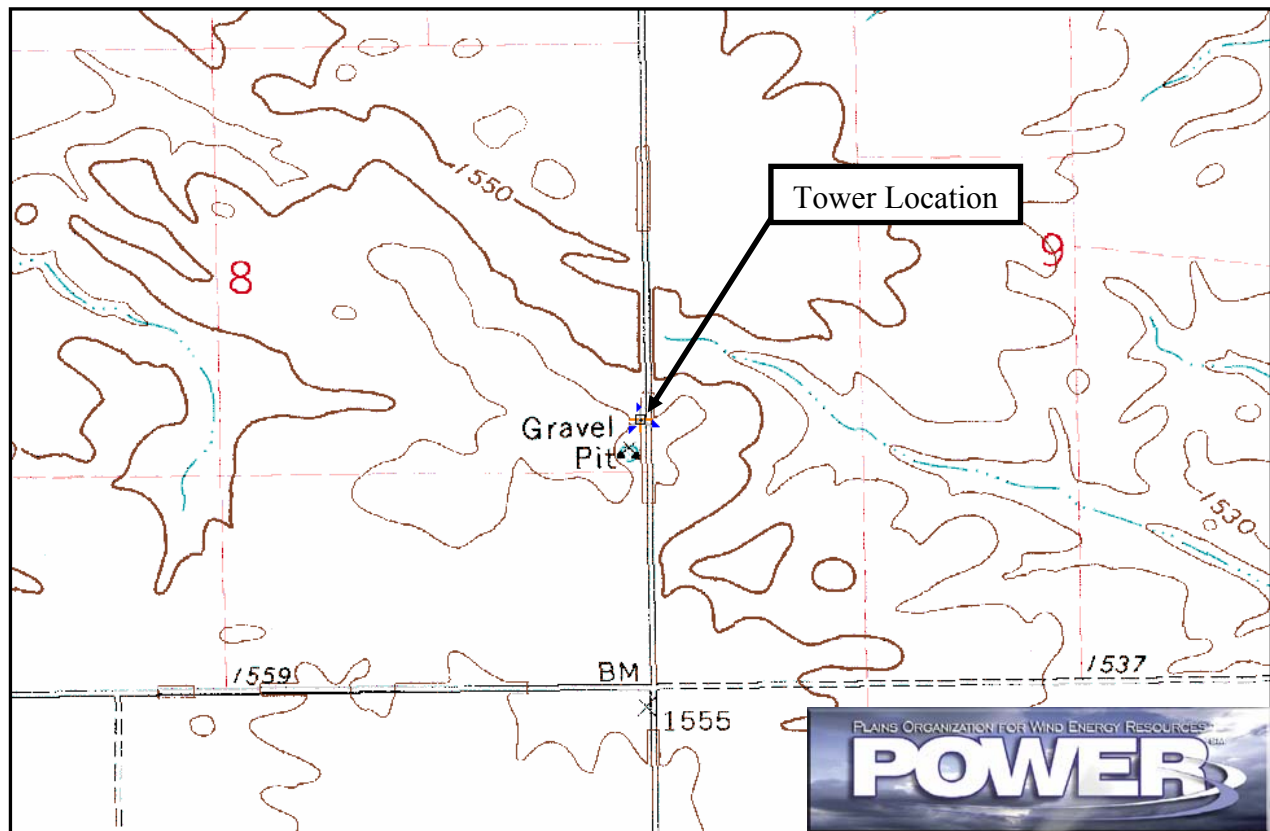
North Dakota Utility Study

Falls^a 1994, 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)	11.4 mph	14.6 mph	16.5 mph	17.5 mph
Maximum, 60-min Mean Wind Speed	50.5 mph at 180 ft AGL – 10/17/1995 11:00 a.m.			
Estimated Wind Power Class ^c	Class 4 (462 W/m ² at 180 ft AGL)			

^a Fall is defined as the months of September, October and November. Fall 1994 begins with September 1994.

Data recovery rates at 33, 82, 131 and 180 feet were 64%, 55%, 53% and 67%, respectively.

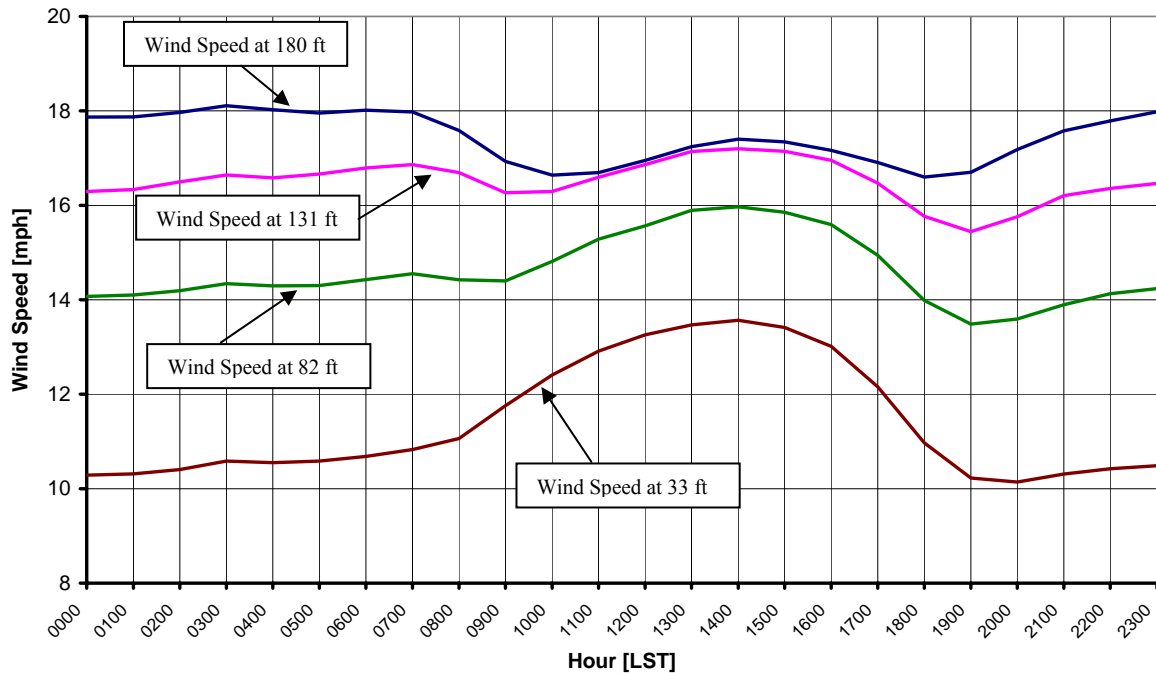
^b Above ground level.

^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	17.9	7.99	16.3	7.28	14.1	6.29	10.3	4.60
0100	17.9	7.99	16.3	7.30	14.1	6.30	10.3	4.61
0200	18.0	8.03	16.5	7.37	14.2	6.34	10.4	4.65
0300	18.1	8.09	16.6	7.44	14.3	6.41	10.6	4.73
0400	18.0	8.06	16.6	7.41	14.3	6.39	10.5	4.72
0500	18.0	8.03	16.7	7.45	14.3	6.39	10.6	4.73
0600	18.0	8.05	16.8	7.51	14.4	6.45	10.7	4.78
0700	18.0	8.04	16.9	7.54	14.6	6.50	10.8	4.84
0800	17.6	7.86	16.7	7.46	14.4	6.45	11.1	4.95
0900	16.9	7.57	16.3	7.27	14.4	6.44	11.8	5.26
1000	16.6	7.44	16.3	7.28	14.8	6.62	12.4	5.55
1100	16.7	7.46	16.6	7.42	15.3	6.83	12.9	5.77
1200	16.9	7.58	16.9	7.54	15.6	6.96	13.3	5.93
1300	17.2	7.71	17.1	7.66	15.9	7.10	13.5	6.02
1400	17.4	7.78	17.2	7.69	16.0	7.14	13.6	6.06
1500	17.3	7.75	17.1	7.66	15.9	7.09	13.4	6.00
1600	17.2	7.67	17.0	7.58	15.6	6.97	13.0	5.82
1700	16.9	7.56	16.5	7.36	14.9	6.68	12.2	5.43
1800	16.6	7.42	15.8	7.05	14.0	6.25	11.0	4.90
1900	16.7	7.47	15.4	6.90	13.5	6.03	10.2	4.57
2000	17.2	7.68	15.8	7.05	13.6	6.08	10.1	4.53
2100	17.6	7.86	16.2	7.24	13.9	6.21	10.3	4.61
2200	17.8	7.95	16.4	7.31	14.1	6.32	10.4	4.66
2300	18.0	8.04	16.5	7.36	14.2	6.36	10.5	4.69

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^d Local standard time.



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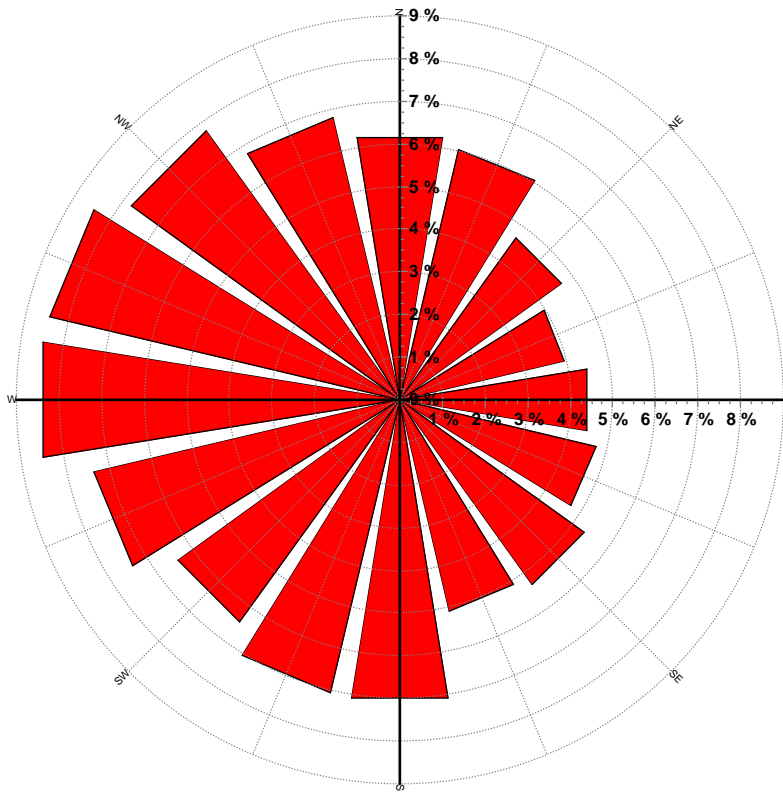
Creation Date: 3/24/2005

Wind Directional Frequency

Winds from the... Frequency (%)

NNW	6.8
NW	7.8
WNW	8.4
W	8.5
WSW	7.4
SW	6.4
SSW	7.1
S	7.1
SSE	5.1
SE	5.3
ESE	4.7
E	4.4
ENE	4.0
NE	4.7
NNE	6.0
N	6.2

North Dakota Utility Study – Olga Site
 Wind Rose for 180 ft AGL
 Falls 1994, 1995, 1996, 1997, 1998, 1999, 2000 & 2001

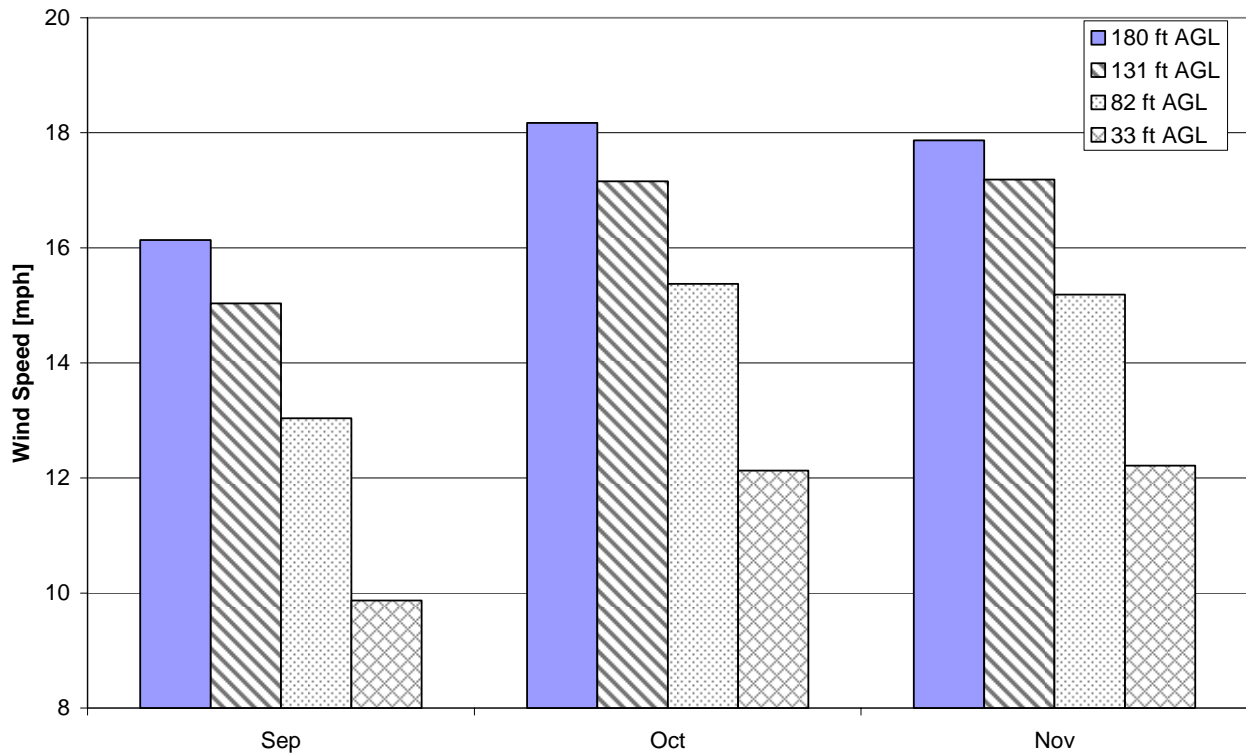


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Monthly Wind Speed Averages

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
Sep	16.1	7.21	15.0	6.72	13.0	5.83	9.9	4.41
Oct	18.2	8.12	17.2	7.67	15.4	6.87	12.1	5.42
Nov	17.9	7.99	17.2	7.68	15.2	6.79	12.2	5.46

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