NRC FORM 195 (2-76)

U.S. NUCLEAR REGULATORY COMMISSION

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

DOCKET NUMBER: 50-220

FILE NUMBER:

TO: Mr. George Lear

FROM: Niagara Mohawk Power Corp.
Syracuse, New York
Mr. Gerald K. Rhode

DATE OF DOCUMENT: 11/1/76

DATE RECEIVED: 11/5/76

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DESCRIPTION

Ltr. w/attached...re our 9/29/76 ltr...
trans the following:

(10-P)

PLANT NAME:
Nine Mile Point Unit #1

ENCLOSURE

Nine Mile Site Combined Annual Grazing Season and Monthly Wind Roses for 1974 and 1975-
Pasquill Stability Classes 30, 100 and 200 Foot Levels-

(300-P) See Rpts

ACKNOWLEDGED

DO NOT REMOVE

SAFETY		FOR ACTION/INFORMATION	ENVIRO 11/5/76 RJL	
	ASSIGNED AD:			ASSIGNED AD:
	BRANCH CHIEF:	Lear		BRANCH CHIEF:
	PROJECT MANAGER:	Nowicki		PROJECT MANAGER:
	LIC. ASST.:	Parrish		LIC. ASST.:

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NRC FORM 195 (2-76)

NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

300 ERIE BOULEVARD WEST
SYRACUSE, N.Y. 13202

November 1, 1976

Director of Nuclear Reactor Regulation
Attn: Mr. George Lear, Chief
Operating Reactors Branch #3
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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NOV 5 1976
U.S. NUCLEAR REGULATORY COMMISSION
Mail Section

Re: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Dear Mr. Lear:

Your letter dated September 29, 1976 requested additional information regarding compliance of Nine Mile Point Unit 1 with 10CFR50, Appendix I. Provided herewith is our response to this request.

Very truly yours,
NIAGARA MOHAWK POWER CORPORATION

GERALD K. RHODE
Vice President - Engineering

MGM/sz
Attachment

DOCKETED
USNRC
11/5/76
U.S. NUCLEAR REGULATORY COMMISSION
Mail Section

Question 1 (B1)

Provide the joint frequency distribution of wind speed and direction by atmospheric stability class (Tables B1-5 through B1-9) such that:

1) *the atmospheric stability classes are as defined in Regulatory Guide 1.23 and include Classes A through G; and*

2) *calms are not included in the 0-3 mph wind speed class, but rather are listed separately for each page of these tables.*

Response

Joint frequency distributions of wind speed and direction by Pasquill Classes A through G in accordance with the atmospheric stability classes listed in Regulatory Guide 1.23 are given for the 30-ft., 100-ft. and 200-ft. levels in Attachment 1. All data are from the Nine Mile Site meteorological tower for 1974 and 1975. The 200-ft. and 30-ft. distributions are presented in response to the Nine Mile Point Unit 1 request and the 100-ft. distributions are presented in response to the James A. FitzPatrick Nuclear Power Plant request.

In addition to the individual stability classes, an all stability wind rose, and a direction versus speed wind rose follow each distribution by time period. Calm hours are not included in the one to three mile per hour wind speed class, but are listed by each stability class.

The joint frequency distribution of wind direction and speed by Pasquill stability classes for the combined years 1974 and 1975 for the 30-ft. level is given in Table 1. Table 2 shows the distribution for the 100-ft. level and Table 3 for the 200-ft. level. Tables 4, 5 and 6 give the combined grazing season wind roses by Pasquill stability classes for the 30-ft., 100-ft. and 200-ft. levels, respectively. Combined monthly stability wind roses for the 30-ft. level are presented in Table 7, for the 100-ft. level in Table 8, and for the 200-ft. level in Table 9.

Question 2 (2)

The stability classes on pages 10, 11, and 12 of Table B2-3 appear mislabeled. Please correct.

Response

The tables were mislabeled; corrected tables are included in this response. In addition, it was necessary to correct page 9 of Table B2-3, which is attached. The Star program for 1967 combined Classes E and F and are so noted on the corrected tables.

TABLE B2-3 (cont.)
ATMOSPHERIC STABILITY FROM STAR PROGRAM
FOR SYRACUSE, 1967

Nine Mile Point Nuclear Station - Unit 2
Niagara Mohawk Power Corporation

Annual | Frequency Distribution | Station = Syracuse N.Y. 1/67-12/67

Speed (Kts)

Direction	1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	Greater than 21	Avg Spd	Total
N	3	19	11	0	0	0	6.2	33
NNE	1	5	1	0	0	0	4.9	7
NE	4	9	1	0	0	0	4.6	14
ENE	3	25	6	0	0	0	5.5	34
E	17	69	30	0	0	0	5.5	116
ESE	14	56	13	0	0	0	5.0	85
SE	12	36	6	0	0	0	4.8	54
SSE	5	17	4	0	0	0	5.1	26
S	7	26	9	0	0	0	5.4	42
SSW	2	6	3	0	0	0	5.5	11
SW	2	13	7	0	0	0	6.0	22
WSW	6	10	18	0	0	0	6.2	34
W	3	10	24	0	0	0	7.3	37
WNW	3	12	11	0	0	0	6.4	26
NW	3	12	17	0	0	0	6.6	32
NNW	3	16	12	0	0	0	6.1	31
AVG	2.7	5.1	8.3	0.0	0.0	0.0	5.3	
TOTAL	88	343	173	0	0	0		

NUMBER OF OCCURRENCES OF E AND F STABILITIES = 645

NUMBER OF CALMS WITH E AND F STABILITIES = 41

TABLE B2-3 (cont.)
ATMOSPHERIC STABILITY FROM STAR PROGRAM
FOR SYRACUSE, 1967

Nine Mile Point Nuclear Station - Unit 2
Niagara Mohawk Power Corporation

Annual

Relative Frequency Distribution

Station = Syracuse N.Y. 1/67-12/67

Direction	Speed (Kts) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	Greater than 21	Total
N	0.001742	0.006500	0.003763	0.000000	0.000000	0.000000	0.012006
NNE	0.000537	0.001711	0.000342	0.000000	0.000000	0.000000	0.002590
NE	0.001792	0.003079	0.000342	0.000000	0.000000	0.000000	0.005213
ENE	0.001938	0.008553	0.002053	0.000000	0.000000	0.000000	0.012543
E	0.008615	0.023606	0.010263	0.000000	0.000000	0.000000	0.042484
ESE	0.007133	0.019843	0.004447	0.000000	0.000000	0.000000	0.031423
SE	0.005668	0.012316	0.002053	0.000000	0.000000	0.000000	0.020036
SSE	0.002427	0.005816	0.001368	0.000000	0.000000	0.000000	0.009611
S	0.003469	0.008895	0.003079	0.000000	0.000000	0.000000	0.015443
SSW	0.000945	0.002053	0.001026	0.000000	0.000000	0.000000	0.004024
SW	0.001172	0.004447	0.002395	0.000000	0.000000	0.000000	0.008015
WSW	0.002573	0.003421	0.006158	0.000000	0.000000	0.000000	0.012153
W	0.001449	0.003421	0.008211	0.000000	0.000000	0.000000	0.013081
WNW	0.001515	0.004105	0.003763	0.000000	0.000000	0.000000	0.009383
NW	0.001515	0.004105	0.005816	0.000000	0.000000	0.000000	0.011436
NNW	0.001645	0.005474	0.004105	0.000000	0.000000	0.000000	0.011224
TOTAL	0.044133	0.117345	0.059186	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCES OF E AND F STABILITIES = 0.220664

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH E AND F STABILITIES = 0.014027

TABLE B2-3 (cont.)
ATMOSPHERIC STABILITY FROM STAR PROGRAM
FOR SYRACUSE, 1967

Nine Mile Point Nuclear Station - Unit 2
Niagara Mohawk Power Corporation

Annual — Frequency Distribution — Station = Syracuse N.Y. 1/67-12/67

Direction	1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	Greater than 21	Avg Spd	Total
N	10	45	53	38	7	1	8.9	154
NNE	4	13	6	4	0	0	6.4	27
NE	6	25	14	1	0	0	6.0	46
ENE	7	47	50	12	0	0	7.0	116
E	26	125	149	55	8	1	7.7	364
ESE	21	92	54	14	1	0	6.1	182
SE	18	62	52	17	2	0	6.9	151
SSE	7	24	42	28	6	0	9.2	107
S	11	47	70	77	22	3	10.2	230
SSW	3	16	54	41	16	0	10.7	130
SW	4	26	55	45	5	1	9.5	136
WSW	8	30	88	72	21	5	10.5	224
W	9	31	134	125	60	32	12.5	391
WNW	6	29	62	85	21	14	11.9	217
NW	5	27	68	81	34	4	11.5	219
NNW	6	27	59	53	18	1	10.4	164
AVG	2.7	5.1	8.4	13.1	18.3	24.9	9.5	
TOTAL	151	666	1010	748	221	62		

TOTAL NUMBER OF OBSERVATIONS = 2923

TOTAL NUMBER OF CALMS = 65

TABLE B2-3 (cont.)
ATMOSPHERIC STABILITY FROM STAR PROGRAM
FOR SYRACUSE, 1967

Nine Mile Point Nuclear Station - Unit 2
Niagara Mohawk Power Corporation

Annual

Relative Frequency Distribution

Station = Syracuse N.Y. 1/67-12/67

Speed (Kts)

Direction	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	Greater than 21	Total
N	0.004918	0.015395	0.018132	0.013000	0.002395	0.000342	0.054183
NNE	0.001831	0.004447	0.002053	0.001368	0.000000	0.000000	0.009700
NE	0.002896	0.008553	0.004790	0.000342	0.000000	0.000000	0.016381
ENE	0.003865	0.016079	0.017106	0.004105	0.000000	0.000000	0.041155
E	0.013005	0.042764	0.050975	0.018816	0.002737	0.000342	0.128639
ESE	0.010260	0.031475	0.018474	0.004790	0.000342	0.000000	0.065340
SE	0.008336	0.021211	0.017790	0.005816	0.000684	0.000000	0.053837
SSE	0.003239	0.008211	0.014369	0.009579	0.002053	0.000000	0.037450
S	0.005342	0.016079	0.023948	0.026343	0.007527	0.001026	0.080265
SSW	0.001543	0.005474	0.018474	0.014027	0.005474	0.000000	0.044992
SW	0.002185	0.008895	0.018316	0.015395	0.001711	0.000342	0.047344
WSW	0.003771	0.010263	0.030106	0.024632	0.007184	0.001711	0.077660
W	0.004168	0.010606	0.045843	0.042764	0.020527	0.010948	0.134855
WNW	0.003005	0.009921	0.021211	0.029080	0.007184	0.004790	0.075191
NW	0.002582	0.009237	0.023264	0.027711	0.011632	0.001368	0.075794
NNW	0.002951	0.009237	0.020185	0.018132	0.006158	0.000342	0.057005
TOTAL	0.073897	0.227848	0.345535	0.255901	0.075607	0.021211	

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000000
TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE = 0.022237

Question 3 (B4)

Provide the starting speeds of all anemometers and wind vanes listed in Table B4-1.

Response

The F400 Climatronics wind set has a threshold speed of 0.58 miles per hour for both the anemometer and vane. This is reported in Air Pollution and Meteorological Instruments by by Climatronics Corporation.

All Bendix Aerovanes on the Nine Mile Site meteorological tower are reported to provide full tracking at 2.5 miles per hour in the Bendix Environmental Catalogue on the specification for Aerovane transmitter Model 120, page ESDO21C. However, research performed by Brookhaven National Laboratory under the auspices of the Atomic Energy Commission found a nominal threshold speed of 1.7 miles per hour for the Aerovane impeller. This is reported in the Wind Tunnel Tests on Seven Aerovanes, BNL 1142.

Question 4

Discuss the land/sea breeze circulation at the site, and its relation to air flow trajectories over the region.

Response

The lake breeze effect at Nine Mile site was considered in the analysis, and our evaluation centered on two key questions. Could the lake breeze (1) affect the X/Q values significantly and (2) is the lake breeze frequent enough to warrant a special analysis. In our judgment the answer to both questions is no. We concluded that it was not necessary to adjust either the meteorological data or the X/Q values to account for the small effects involved.

When a lake breeze exists, the flow of air from Lake Ontario over the land is more stable (having less diffusive capacity) than it is after the flow has moved inland far enough to become heated. This implies that an estimate of X/Q which assumes that the relatively stable conditions existing at the site tower remain unchanged as the effluent moves inland would tend to make X/Q an overestimate progressively with time and distance.

In addition to this change in the diffusive capacity, one of two other effects would be present. If the wind gradient were also onshore, the influence of the lake breeze would simply be to increase the speed of the flow, also favoring greater diffusion. If on the other hand, the gradient flow were in opposition to the lake breeze, the onshore flow would proceed inland and then tend to rise before flowing back out over the lake. Both of these effects would tend to decrease X/Q below the estimates made at inland locations distant from the plant.

The reverse flow pattern occurring at night is known as a land breeze. This flow would carry effluent from the plant out over the lake where it might remain more concentrated in relatively stable air, and it could be brought back inland again at a later time. Such a recirculation could bring radioactivity back over the land after it had passed out over the lake, and might therefore, add an imcrement to the X/Q values. If one were to assume, for example, that the effluent moved out over the lake five miles and returned over the land the following day, the X/Q values in the immediate shore area might be increased by 30 percent on that day. However, the number of days which this would occur is small.

Response *(Continued)*

Another consideration is whether the lake breeze might cause changes in the air flow trajectory so that the apparent wind direction at the site was unrepresentative of the travel of the plume. In a given situation this might be true, so that the X/Q predicted at a given location might really be found somewhere else.

On a long-term climatological basis, however, it is highly unlikely that such changes would affect the X/Q estimates significantly. In the first place, the lake breeze frequency represents no more than 5 percent of all hours at the site for 1974 and 1975. This was derived from the number of hours the wind blew from the 292.5^{o} through 360^{o} sectors with speeds less than 13 miles per hour, regardless of the time of day from April through September, the period of likely lake breezes. Secondly, the initial direction of the onshore breeze itself varies over a wide arc and downwind abberations of these directions are quite likely to smooth out over a number of cases. It seems appropriate to point out also that an extremely accurate definition of X/Q values would in fact require continuous tracer studies over at least a year. At a site having very simple terrain and meteorology, it is very difficult to define three-dimensional trajectories and diffusion precisely, even if a dense network of observational stations are used.