

May 14, 1982
SBN-275
T.F. B 7.1.2

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Frank J. Miraglia, Chief
Licensing Branch #3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket
Nos. 50-443 and 50-444
(b) USNRC Letter, dated February 12, 1982, "Request for
Additional Information," F. J. Miraglia to W. C. Tallman
(c) PSNH Letter, dated March 12, 1982, "Response to 451 Series
RAIs; (Accident Evaluation Branch; Meteorology Section)

Subject: Submittal of RAI 451.14 (a); (Accident Evaluation Branch;
Meteorology Section)

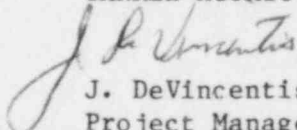
Dear Sir:

We have enclosed a response to the subject RAI which you forwarded in
Reference (b).

It was indicated in Reference (c) that RAI 451.14 (a) would be submitted by
May 17, 1982.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY


J. DeVincentis
Project Manager

Enclosure

451.14
(2.3)
(FSAR)

A comparison of three years of on-site meteorological data (11/71 - 10/72, 4/79 - 3/80 and 6/80 - 5/81 indicates significant variability in the frequency of atmospheric stability conditions, particularly for unstable (Pasquill types "A", "B" and "C") and slightly stable (Pasquill type "E") conditions. For example, for the period November 1971 - October 1972, unstable conditions were observed about 10% of the time, while slightly stable conditions were observed about 32% of the time. However, for the period April 1979 - March 1980, unstable conditions were observed about 21% of the time, while slightly stable conditions were observed only about 24% of the time. For the latest period of record (June 1980 - May 1981), unstable conditions were observed almost 27% of the time, with about 12% classified as extremely unstable (Pasquill type "A"), while slightly stable conditions were observed only about 17% of the time.

- a. Provide a discussion of the year-to-year variability of unstable and slightly stable conditions at the Seabrook site, and discuss the reasonableness of the large fraction (in excess of 20%) of unstable conditions observed at Seabrook since April 1979, considering the atmospheric mechanisms for generating thermal instability, the classification scheme used, the location of the meteorological tower and the surface characteristics around the tower, and the location of the site. Also indicate why the increased frequency of unstable conditions appears to occur at the expense of the frequency of slightly stable conditions while the frequencies of other stability classes remain relatively constant from year-to-year.
- b. Provide information on the persistence of each stability class in a form similar to Table 2B-5 in Appendix B of the FSAR for the periods April 1979 - March 1980 and June 1980 - May 1981.

RESPONSE:

- a. Seabrook RAI Table 451.02-3 indicates that the occurrence of unstable conditions recorded by the lower delta-temperature instrumentation increased from a frequency of 21.1% during 4/79 - 3/80 to a frequency of 26.9% during 6/80 - 5/81. This increase in recorded unstable conditions may be due in part to an intermittent problem with the instrumentation observed during periods of heavy precipitation. Beginning in mid-1980, the lower delta-temperature measurements began to occasionally indicate unstable conditions during rainy periods. By the beginning of 1981, persistent unstable conditions were being recorded during heavy precipitation periods, regardless of the time of day. This intermittent problem did not occur during regularly scheduled calibration and preventative maintenance visits to the site. In an attempt to isolate the problem, the entire lower level delta-temperature system was replaced with spare parts in June 1981. The problem still persisted, however, and in a further attempt to isolate the problem, new cables were run between the tower and instrument shed in February 1982. At the time of this writing (April 1982), it appears the problem may have been resolved with the replacement of the cables.

An attempt was made to edit out the most unreasonable occurrences of unstable conditions by defining such periods as bad data. These periods of unreasonable occurrences of unstable conditions included the persistence of extremely unstable conditions throughout rainy nights, conditions which typically indicate the presence of slightly stable conditions. This editing may explain why there was a decrease of recorded occurrence of slightly stable conditions from the 4/79 - 3/80 period to the 6/80 - 5/81 period. In spite of the editing of the obviously unrealistic, unstable conditions during heavy precipitation periods a slight bias towards unstable conditions may still exist in the 6/80 - 5/81 lower delta-temperature data base.

Differences in measured atmospheric stability conditions between the 11/71 - 10/72 data base and the later periods may have been partially due to changes in ground cover characteristics of the plant site. The 11/71 - 10/72 data base was collected before site construction began, and as such, the plant site was covered with vegetation. A grass surface still remains under the tower, but many surrounding acres once containing fields and disturbed areas interspersed with hardwood and evergreen forest have been replaced with barren dirt parking lots and construction areas. The vegetation present on the plant site during collection of the earlier data base would have produced less surface heating and a more stable atmosphere than the more recent dirt parking lots and construction areas. Direct comparison of atmospheric stability conditions measured during the earlier period with the later periods is difficult due also to a difference in instrumentation, measurement heights and data processing procedures.

- b. Stability persistence summaries for the periods April 1979 - March 1980 and June 1980 - May 1981 are provided in Tables 451.14-1 and 451.14-2, respectively.

TABLE 451.14-1
(Sheet 1 of 2)

STABILITY PERSISTENCE SUMMARY
APRIL 1979-MARCH 1980

a. 43-150 Foot Delta-Temperature

STABILITY PERSISTENCE SUMMARY - NUMBER OF OBSERVATIONS AND PERCENT PROBABILITY

STABILITY PERSISTENCE (HOURS)																											
STABILITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	GT.24	TOTAL	
A	111 47	51 69	31 82	12 87	13 92	3 94	7 97	2 97	3 99	2 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	236	
B	297 62	100 83	47 93	22 98	8 100	2 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	476	
C	319 82	55 96	10 99	4 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	388	
D	333 36	180 55	136 69	70 77	36 81	34 84	32 88	13 89	14 91	15 92	8 93	16 95	9 96	8 96	3 97	5 97	5 98	5 98	2 99	2 99	2 99	1 99	3 99	0 99	5(a) 100	937	
E	322 45	133 64	73 74	46 81	32 85	20 88	17 91	13 93	19 95	9 96	9 98	0 99	8 99	3 99	2 100	0 100	2 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	709	
F	210 62	76 84	24 91	11 94	13 98	1 98	2 99	3 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	341	
G	61 38	33 59	12 66	12 74	6 78	11 84	9 90	4 93	3 94	3 96	4 99	2 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	160	
TOTAL	1653	628	333	177	108	71	67	35	40	29	22	18	17	11	5	5	7	6	2	2	2	1	3	0	5	3247	

(a) Of these 5 occurrences of D stability which persisted over 24 hours:

- o one lasted 28 hours
- o one lasted 32 hours
- o one lasted 33 hours
- o one lasted 40 hours
- o one lasted 44 hours

TABLE 451.14-1
(Sheet 2 of 2)

b. 43-209 Foot Delta-Temperature

STABILITY PERSISTENCE SUMMARY - NUMBER OF OBSERVATIONS AND PERCENT PROBABILITY

STABILITY PERSISTENCE (HOURS)																										
STABILITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	GT.24	TOTAL
A	59	22	2	5	2	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97
	61	84	86	91	93	95	96	98	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B	141	42	15	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203
	69	90	98	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
C	233	90	34	19	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	380
	61	85	94	99	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
D	265	165	123	75	44	38	25	17	17	8	13	14	5	6	7	5	3	2	5	2	3	1	0	1	12 ^(a)	856
	31	50	65	73	79	83	86	88	90	91	92	94	95	95	96	97	97	97	98	98	98	98	98	99	100	
E	276	157	68	58	50	35	15	18	19	18	9	3	5	9	5	1	1	1	0	1	2	1	0	0	0	752
	37	58	67	74	81	86	88	90	93	95	96	97	97	98	99	99	99	99	99	100	100	100	0	0	0	
F	185	88	38	18	10	6	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350
	53	73	89	94	97	99	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
G	44	19	15	9	7	11	10	3	4	0	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	132
	33	48	59	66	71	80	87	89	92	92	93	100	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	1203	583	295	188	118	92	55	40	43	26	29	20	10	15	12	6	4	3	5	3	5	2	0	1	12	2770

(a) Of these 12 occurrences of D stability which persisted over 24 hours:

- | | |
|-----------------------|-----------------------|
| o two lasted 25 hours | o two lasted 32 hours |
| o two lasted 26 hours | o one lasted 36 hours |
| o one lasted 27 hours | o two lasted 44 hours |
| o one lasted 28 hours | o one lasted 46 hours |

TABLE 451.14-2
(Sheet 1 of 2)

STABILITY PERSISTENCE SUMMARY
JUNE 1980-MAY 1981

a. 43-150 Foot Delta-Temperature

STABILITY PERSISTENCE SUMMARY - NUMBER OF OBSERVATIONS AND PERCENT PROBABILITY

STABILITY PERSISTENCE (HOURS)

STABILITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	GT.24	TOTAL
A	99 33	49 49	36 61	23 69	26 78	16 83	19 89	14 94	6 96	5 98	5 99	2 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	300
B	311 66	105 88	32 95	16 98	5 99	1 99	3 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	474
C	251 74	56 91	19 97	6 99	3 99	1 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	337
D	324 39	154 57	79 66	51 72	46 78	27 81	21 83	17 85	15 87	14 89	17 91	9 92	10 93	14 95	7 96	6 96	6 97	2 97	1 98	8 98	2 99	0 99	2 99	1 99	8 100	841 ^(a)
E	313 50	120 70	63 80	41 86	32 92	24 95	10 97	3 98	4 98	4 99	5 100	0 100	1 100	0 100	0 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	621
F	210 61	75 83	31 92	17 97	5 99	2 99	2 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	343
G	69 41	27 57	14 65	14 74	10 80	12 87	6 90	3 92	8 97	2 98	2 99	0 99	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	168
TOTAL	1577	586	274	168	127	83	62	39	33	25	29	11	12	14	7	7	6	2	1	8	2	0	2	1	8	3084

^(a)Of these 8 occurrences of D stability which persisted over 24 hours:

- o one lasted 25 hours
- o one lasted 27 hours
- o one lasted 28 hours
- o one lasted 30 hours
- o one lasted 35 hours
- o one lasted 36 hours
- o one lasted 41 hours
- o one lasted 50 hours

TABLE 451.14-2
(Sheet 2 of 2)

b. 43-209 Foot Delta-Temperature

STABILITY PERSISTENCE SUMMARY - NUMBER OF OBSERVATIONS AND PERCENT PROBABILITY

STABILITY PERSISTENCE (HOURS)																											
STABILITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	GT. 24	TOTAL	
A	70 45	33 66	14 75	9 81	11 88	5 91	5 94	7 99	2 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	156	
B	195 65	67 87	26 95	11 99	2 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	302	
C	281 12	78 92	23 98	4 99	3 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	389	
D	259 33	140 51	101 63	57 71	35 75	22 78	21 81	23 84	21 86	12 88	12 89	10 90	12 92	6 93	8 94	10 95	4 96	6 96	4 97	4 97	1 97	1 98	3 98	1 98	15 ^(a) 100	788	
E	302 43	142 63	79 74	55 81	39 87	24 90	18 93	8 94	12 96	10 97	5 98	1 98	8 99	5 100	0 100	1 100	0 100	0 100	0 100	0 100	1 100	0 0	0 0	0 0	0 0	710	
F	205 55	82 77	42 88	23 94	11 97	3 98	5 99	1 99	0 99	1 100	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	374	
G	49 33	21 47	25 63	10 70	9 76	11 83	5 87	2 88	10 95	5 98	1 99	1 99	1 100	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	150	
TOTAL	1361	563	310	169	110	66	54	41	45	28	19	12	21	11	8	11	4	6	4	4	2	1	3	1	15	2869	

(a) Of these 15 occurrences of D stability which persisted over 24 hours:

- o three lasted 25 hours
- o three lasted 27 hours
- o one lasted 28 hours
- o one lasted 29 hours
- o one lasted 31 hours
- o one lasted 33 hours
- o one lasted 36 hours
- o one lasted 42 hours
- o one lasted 45 hours
- o one lasted 46 hours
- o one lasted 50 hours