Nebraska Public Power District

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August 11, 1992

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Followup Response to Recommendations on Station Blackout, 10CFR50.63
Cooper Nuclear Station
NRC Docket 50-298, DPR-46
TAC No. M68534

Reference: 1) Letter from R. B. Bevan, USNRC, to G. R. Horn, NPPD, dated June 30, 1992, "Supplemental Safety Evaluation - Station Blackout Rule Cooper Nuclear Station (TAC No. M68534)"

2) Letter from G. R. Horn to USNRC, dated February 27, 1992, "Followup Response to Recommendations on Station Blackout"

3) Simiu, Emil and Robert H. Scanlan, "Wind Effects on Structures", Second edition, Chapter 3, Section 3.2.3, John Wiley & Sons, New York, 1986.

Gentlemen:

The District submitted in Reference 2 a plant specific weather data calculation (NEDC 92-023) for review by the staff. In this calculation the CNS wind speed database was used to determine the Station Blackout ESW and SW classifications for CNS. The calculation utilized the available published data for 1975 to 1990 from the CNS meteorological towers. The data consisted of 192 samples (16 years) of monthly extreme, hourly average wind speed values. Application of extreme value statistical techniques to this database placed CNS in the weather classifications ESW1 and SW2 with substantial margin, which in turn resulted in a calculated minimum target EDG reliability of 0.95. There was assumed to be considerable conservatism in this determination.

By letter dated June 30, 1992, (Reference 1), the Nuclear Regulatory Commission forwarded its Supplemental Safety Evaluation (SSE) on Station Blackout (SBO) for the Cooper Nuclear Station (CNS) based on previous District submittals. The Supplemental Safety Evaluation chronicled staff acceptance of all District responses concerning SBO with the exception of site-specific weather analysis that determine the extreme severe weather (ESW) and severe weather (SW) classifications, which are used in establishing the emergency diesel generator (EDG) target reliability for CNS.

The Staff concluded in Reference 1 that it was improper for the District to use average hourly wind speeds (in lieu of fastest mile, or fastest minute wind speeds) in determining the probability of extreme wind speeds at CNS, and questioned whether the use of monthly maximum wind speeds (rather than yearly maximums) resulted in a conservative analysis. This submittal provides a followup response that will resolve both NRC concerns dealing with the CNS site-specific weather analysis as identified in Reference 1.

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As discussed earlier the staff took exception to the submitted CNS site-specific weather data (Reference 1), in particular, the staff raised two concerns. The District wishes to address each concern separately;

1) Regarding the monthly extreme values of wind, the NRC stated in the SSE that: *"The staff questions whether the use of monthly maximum wind speeds (rather than yearly maximums) results in a conservative analysis...a sensitivity analysis should be made to determine whether the monthly extremes or the annual extremes results in the most conservative analysis."*

   To address the above concern, the District has recalculated the CNS weather classifications using the yearly extremes of hourly data. The results, which are summarized in Table 1 (Attachment), show that use of CNS monthly maxima, as was used in Calculation 92-023 (submitted in Reference 2), yields more conservative results compared to using the CNS yearly maxima. This addresses the above NRC concern and indicates that the procedure in NEDC 92-023 is appropriate.

2) Regarding the use of hourly average wind speed data, the NRC provided the following guidance in the SSE: *"The staff believes that the fastest mile, or the fastest minute, annual wind speeds should normally be used for the ESW and SW calculations."*

   In response to the staff s direction in the SSE, the District has reviewed the CNS wind speed database and the fastest-minute values were extracted from the hour that had the highest average value. In general, these fastest-minute samples proved to be roughly 35% greater than the corresponding previously reported hourly average values. Accordingly, the ESW and SW calculations have been re-evaluated (NPPD calculation NEDC 92-105 "CNS site-specific wind speed correlation).

   Using the approach similar to that presented in calculation NEDC 92-023, submitted in Reference 1, and following the procedure recommended by Simiu in Reference 3, the latest data at CNS (a set of 36 monthly extremes from 1989 through 1991) have been used for the determination of the ESW and SW classifications. Use of monthly extremes, which are listed in Table 2 (Attachment), is considered both appropriate and conservative based on the findings discussed in section 1 above.

   The results of the new calculation (NEDC 92-105) are listed in Table 3, (Attachment). Cooper Nuclear Station falls into weather classifications ESW1 and SW2 when using the fastest-minute data, again with margin. This coincides with previously determined weather classifications.

In summary, the District previously submitted calculation NEDC 92-023 in Reference 2. This calculation utilized extreme value statistical analysis techniques to determine the expected frequency of occurrence of 75-mph and 125-mph winds at Cooper Nuclear Station. The plant specific hourly average wind speed data indicated that CNS is in SBO weather classifications ESW1 and SW2 with considerable margin. For an SBO coping duration of 4-hours, and a P1 weather plant, it follows that the target EDG reliability is 0.95.

In response to stated concerns in the NRC's Supplemental Safety Evaluation (Reference 1), the District has determined that it is more conservative for CNS to use the monthly extremes of data, as was in fact done in calculation NEDC 92-023, as opposed to yearly extremes. Therefore, the previously submitted analysis was conservative in this respect. The District has further determined that the use of the CNS fastest-minute data discussed above increases the calculated frequency of occurrence of the 75-mph and 125-mph extreme winds but that this data does not alter the SBO weather classification determinations. CNS still remains in weather classifications ESW1 and SW2 with margin when using this wind speed data.

With the resolution of these concerns, and in conjunction with previous District submittals and commitments, the District satisfies the SBO rule, and concludes that 0.95 is the appropriate target EDG reliability for CNS under 10CFR50.63.

If there are any additional questions, or concerns, please call.

Sincerely,

G. R. Horn
Nuclear Power Group Manager

GRH/tja:sbo
Attachment

cc: NRC Regional Administrator
Region IV
Arlington, TX

NRC Resident Inspector Office
Cooper Nuclear Station

TABLE 1

CNS STATION BLACKOUT WEATHER GROUP FREQUENCY COMPARISON USING MONTHLY AND YEARLY HOURLY AVERAGE WIND EXTREMES

CALCULATED FREQUENCIES

	ESW	SW
Monthly Maxima[b]	e=3.26E-8[a] yr^{-1}	f=0.0069[a]
Yearly Maxima	e=3.76E-12 yr^{-1}	f=0.0068

CALCULATED RETURN PERIODS

	ESW[c]	SW[d]
Monthly Maxima[b]	N=3.06E7 years[a]	$1/h_3$=1,409 years[a]
Yearly Maxima	N=2.66E11 years	$1/h_3$=93,268 years

(a) From NPPD Calculation NEDC 92-023 and Chapter 3 of NUMARC 87-00, Rev. 1.

(b) Since the monthly maxima yield higher calculated frequencies (i.e. shorter return periods) it is more conservative to use the monthly maxima to determine the CNS weather classifications for 10CFR50.63. However, both the monthly and the yearly datasets yield the same station blackout weather classifications.

(c) Return period for 125 mph wind at 30-meter elevation.

(d) Return period for 75 mph wind at 30-meter elevation.

TABLE 2

COOPER NUCLEAR STATION WIND SPEED DATA

MONTH	10-METER HOURLY AVERAGE	10-METER FASTEST MINUTE
JAN 89	23.9	29.2
FEB 89	24.5	31.3
MAR 89	33.6	42.2
APR 89	24.8	33.9
MAY 89	28.3	35.3
JUN 89	19.2	35.5
JUL 89	15.6	23.6
AUG 89	15.1	42.6
SEP 89	23.8	30.2
OCT 89	21.1	28.5
NOV 89	26.2	32.8
DEC 89	24.9	31.4
JAN 90	27.2	33.3
FEB 90	23.4	30.3
MAR 90	21.6	28.0
APR 90	24.7	29.0
MAY 90	22.8	29.5
JUN 90	27.9	38.4
JUL 90	18.1	22.8
AUG 90	16.2	21.4
SEP 90	19.5	25.9
OCT 90	30.0	41.0
NOV 90	24.6	31.2
DEC 90	23.1	26.9
JAN 91	14.5	18.2
FEB 91	27.8	34.2
MAR 91	33.6	40.9
APR 91	30.2	40.7
MAY 91	23.9	31.5
JUN 91	18.3	32.0
JUL 91	17.2	29.3
AUG 91	13.1	17.6
SEP 91	20.3	27.6
OCT 91	21.2	22.8
NOV 91	24.2	29.7
DEC 91	23.3	30.7

TABLE 3

WEATHER CATEGORY RESULTS FOR COOPER NUCLEAR STATION USING HOURLY AVERAGE AND FASTEST-MINUTE DATA

CALCULATED FREQUENCIES

	Hourly Average	Fastest-Minute	RESULTANT CATEGORY
ESW Group	$e=3.26E\text{-}8$[(a)] yr^{-1}	$e=1.98E\text{-}6$ yr^{-1}	ESW1
SW Group	$f=0.0069$[(a)] yr^{-1}	$f=0.0070$ yr^{-1}	SW2

(a) See Calculation NEDC 92-023 (Reference 2)

TABLE 3-1*

EXTREMELY SEVERE WEATHER GROUPS (ESW)

ESW Group	Annual Wind Speed Expectation ≥ 125 mph
1	$e < 3.3 \times 10^{-4}$
2	$3.3 \times 10^{-4} \leq e < 1 \times 10^{-3}$
3	$1 \times 10^{-3} \leq e < 3.3 \times 10^{-3}$
4	$3.3 \times 10^{-3} \leq e < 1 \times 10^{-2}$
5	$1 \times 10^{-2} \leq e$

TABLE 3-4*

SEVERE WEATHER GROUPS (SW)

SW Group	Estimated Frequency of Loss of Offsite Power
1	$f < 0.0033$
2	$0.0033 \leq f < 0.0100$
3	$0.0100 \leq f < 0.0330$
4	$0.0330 \leq f < 0.100$
5	$0.100 \leq f$

* Extracted from NUMARC 87-00, Rev. 1