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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD 17 P2:24

Before Administrative Judges:

James L. Kelley, Chairman
Dr. James H. Carpenter
Glenn O. Bright

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In, the Matter of

CAROLINA POWER & LIGHT COMPANY
and
NORTH CAROLINA EASTERN MUNICIPAL
POWER AGENCY

(Shearon Harris Nuclear Plant)

Docket No. 50-400-OL

(ASLBP No. 82-472-03 OL)

January 16, 1986

MEMORANDUM AND ORDER
(Limited Reopening of the Record
on Eddleman Contention 57-C-3)

In our deliberations on Eddleman Contention 57-C-3, the Board has discovered gaps and ambiguities in the record such that we are unable to definitively resolve certain of the issues presented. Accordingly, the Board has decided to reopen the record for a further evidentiary hearing in the limited areas described in this order. Generally, our concerns focus on the number of people who would be alerted by the sirens in different parts of the EPZ, depending upon which set of arousal data (Horonjeff or the German study) is used. The record is not being reopened on actual sound levels in the EPZ. Furthermore, the record is not being reopened on "informal notification" or on mobile alerting.

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Our specific concerns and some of the reasons underlying them are outlined next. Scheduling will be discussed in a telephone conference on January 17, 1986. In view of time pressures, we do not expect to set dates for prefiling of testimony. However, the parties are asked to make their best efforts to prefile their comments and information in advance of the hearing, if possible.

We stress the tentative nature of the views and concerns that follow. The Board has made no final decision on any issue, legal or factual. The parties are free to take issue with any part of what follows.

TENTATIVE BOARD VIEWS,
SUBJECT TO PARTY COMMENTS

Introduction

The Board believes that it should make separate findings on the arousal capabilities of the Harris siren system within (1) a 5-mile radius of the plant and (2) the area between 5 and 10 miles of the plant. Our primary reason for focusing separately on the first 5 miles is the Commission's endorsement of that distinction in a 1980 ruling rejecting a petition for reconsideration of the 15-minute notification requirement. See Final Rule on Emergency Planning, 12 NRC 636 (1980). Among other matters, the petitioners had relied on certain August 1980 testimony of a FEMA official that full compliance with the 15-minute requirement throughout the entire 10-mile EPZ was impossible. In

rejecting that argument as a basis for relaxing the rule, the Commission noted with apparent approval that --

subsequent to the August 18 testimony, FEMA agreed with the NRC that there ought to be a design objective for the 15-minute rule out to 10 miles and agreed to the design objectives described in NUREG-0654, Revision 1. In the January, 1980 version of NUREG-0654, FEMA and NRC described the design objective for the notification system as assuring that 100 percent of the population within 5 miles of the plant and 90 percent of the population within 5 and 10 miles of the plant could receive notice in 15 minutes. In the November revision, FEMA and NRC modified that guidance to be essentially 100 percent of the population within 5 miles of the plant and no specified percentage out to 10 miles. The NRC and FEMA still insist, however, that a system be designed to provide both an alert signal and an instructional or informational message to the population within the 10-mile EPZ within 15 minutes. The lack of a specified percentage from 5 to 10 miles is to allow planners the flexibility to design the most cost-effective system to meet this general objective. Id. at 638.

As we read it, the quoted Commission statement constitutes an endorsement of a distance distinction within the 10-mile EPZ -- that the rigorous "essentially 100 percent" standard should apply only in the first 5 miles. Furthermore, by its apparently approving recognition that the FEMA/NRC Staffs in NUREG-0654, Rev. 1 had abandoned a 90 percent alerting requirement for the 5 to 10 mile area, the Commission, at least by inference, has indicated that an arousal rate of less than 90 percent in that area might be acceptable.

The legal effect of these Commission statements is unclear. It can be argued that they are mere dicta because no changes were made in the basic notification rule (50.47(b)(5)) or in the more detailed implementing provisions of Appendix E. Moreover, the Commission stated

that the relief requested by the petitioners was being denied. The fact that Appendix 3 of NUREG-0654, Rev. 1 differentiates between notification levels in the 0-5 mile area and the 5-10 mile area has no binding legal significance (apart from the effect of the Commission's endorsement). That guidance document does not have the force of law. Metropolitan Edison Co. (Three Mile Island Nuclear Station), 18 NRC 1290, 1298-1299 (1982). Finally, no party has argued to us¹ and the case was not heard on the theory that different standards might apply in different parts of the EPZ.

On the other hand, as a matter of legal analysis the quoted Commission statement can be regarded as an interpretation of this rule. As such, it would be binding on Licensing Boards. Apart from legal analysis, we think it makes good practical sense to distinguish between the 5 and 10 mile areas. The people in the first 5 miles are closer to the hazard and would be likely to need more rapid notification in order to take effective protective actions. Moreover, it appears to us that if we are to give credit for the phenomenon of "informal notification", in the circumstances presented here it is likely to be more effective in the more heavily populated areas outside 5 miles, e.g., the Town of Apex, than in the sparsely populated areas in the first 5 miles. Furthermore, the quoted Commission Statement contemplates consideration

¹ The quoted Commission ruling did not even come to our attention until after the evidentiary hearing. Tr. 10223.

of cost-effectiveness in choosing among alerting systems. It seems probable that the cost of augmenting the Applicants' proposed system only within the 5-mile area (about 400 houses) would be a small fraction of the cost of augmenting that system for the entire EPZ (about 7000 houses).

For the foregoing reasons, we propose to make separate findings for the first 5 mile and the 5 to 10 mile areas, as well as for the EPZ as a whole.

Initial Steps in Board Technical Analysis

The Board has reviewed the Applicants and NRC/FEMA testimony on the siren sound levels to be expected in the Harris EPZ in the early morning hours of a summer night. The Board accepts Applicants' Exhibit 46 as reliable and probative. We find that less weight should be given to the FEMA testimony on siren sound levels since it ignores the fact that sleeping residents at locations equidistant from 2 or 3 sirens would receive acoustic stimulation (sounds) from each of the sirens and not only one, as FEMA assumes. Tr. 9918.

The Board has obtained a legible copy of Applicants' Exhibit 48 and finds that the data base for this report does not include sounds with frequency spectra that even approximately resemble the frequency spectrum of the Federal Signal Thunderbolt Model 1000 sirens proposed for use at Harris. We, therefore, tentatively rely on the NRC/FEMA testimony that rests on the Horonjeff, et al., data.

The Board has reviewed the research report authored by Professor Dieter Krallmann (now at the University of Essen) on the work that he carried out at the University of Bonn under the direction of Professor Meyer-Eppler and W. Lenders. The Board finds the research report to be probative of the issues before us, recognizing that it has not been the subject of cross-examination.

The Board has carried out some computations in which the above referenced data were used, with a primary focus on a comparison of the quantitative impact of using either the Horonjeff, et al., or the Krallmann data. As previously noted, these computations are not final and may be subject to revision upon further examination of the record presently before us and/or any supplementation of this record.

Computational Scheme

1. The Board has counted the houses as a function of sound levels that are shown in Applicants' Exhibit 46 as being located within 5 miles of the Harris plant. This exhibit is marginally legible and the Board expects that a few (perhaps tens) of houses may have been missed in our count. This modest possible inaccuracy does not appear to be significant. The structure of the resulting table is identical to Attachment 5 of the Keast, et al., testimony.
2. Assume Figure 1 describes Horonjeff, et al., and Krallmann data sets

3. Assume four 3-minute periods of siren soundings (Keast, et al., at 24) and:

$$\text{SEL} = \text{dBA} + 20 - \text{Attenuation}$$

and

$$\text{dBA} = \text{dBC} - 3$$

$$\text{SEL} = \text{dBC} + 17 - \text{Attenuation}$$

4. Assume House Population Density Approximation

22% One resident "alertable"
59% Two residents "alertable"
19% Three residents "alertable"
(Nehnevajsa at 31)

5. Assume 36% houses with no air conditioning

Attenuation = 12 dB
Background = 40 dB in bedroom

Assume 64% houses with air conditioning

Attenuation = 29 dB
(75% at 30; 25% at 26)
Background less than 40 dB except 16% at 49 dB
(Keast at Attachment 6)

6. Round off conservatively

1.5 houses with 1 "alertee" = 2 houses
3.5 houses "alerted" = 3 houses alerted

7. Results of Computations

0 - 5 miles - Harris EPZ

Outdoor Sound Level* - dBC	Number houses	Alerted "Horonjeff"	"Krallman"
112	11	10	11
107	14	12	14
97	23	18	21
92	22	16	20
87	69	46	60
82	129	78	105
78	95	48	65
Totals	363	228	296
		62.8	81.5
Unalerted		135 houses	67 houses

* Combined siren sounds

The State of the Record

In addition to the foregoing Board computations, we are asking certain parties (and any other party who chooses to do so) to address the issues and concerns listed below.

1. The probable alerting of the residents in a 5-10 mile area around Harris has not been estimated by the Board. We ask the Applicant to carry out technical analyses of the probable siren arousal frequencies in the 5-10 mile area of the EPZ, using both the Horonjeff, et al., data and the Krallmann data as the Board has done. However, we recognize the Applicants' preference for the EPN dB scale rather than the SEL scale and will accept either scale as long as details of the basis for the procedure of converting siren levels on the dBC scale to the other scale are presented in sufficient detail that technical review can be carried out.

2. We ask NRC/FEMA staff to have the Krallman research report reviewed by a suitable professional expert in psychoacoustics. The staff witness, Dr. Kryter, appears to be well qualified, but any other appropriate witness would be acceptable. The Board will need to explore the psychoacoustic reasons for the differences in arousal probabilities as forecast in the staff testimony (Dr. Kryter) as compared with the observed arousals reported by Dr. Krallmann. Differences in the frequency spectra of 1) transmission line corona discharge noise, 2) the siren sound used by Krallmann and 3) the FST Model 1000 siren proposed for use by the Applicants should be established and, to the extent present knowledge will permit, the effects of the spectral differences should be translated into differences in arousals.

3. The Board, in making the approximate calculations supra, used the Kryter approximation for converting siren dBA Levels to SELs (Kryter at 26). Review of the FST Model 1000 directionality characteristics, recently filed by Applicants, suggests, as per figure 2, that this approximation may significantly understate the actual acoustic stimulus produced by the sirens functioning. We would like to explore this issue on the record.

4. In a January 2, 1986 filing, the Applicants propose a change to page 9650 of the November 5, 1985 transcript "to correct material errors", based on an attached "Affidavit of David N. Keast Correcting Oral Testimony on Eddleman 57-C-3." The Board will consider the revised calculation on the record, but the basis for the calculation is not explained in sufficient detail or clarity in Mr. Keast's affidavit.

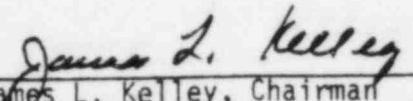
According to the affidavit, the calculational procedure is illustrated or explained at Tr. 9563-64. The Board has some questions on this issue. In the last sentence on page 9563 reference is made to "in Kryter", but we guess that reference is not to Kryter's testimony in this record but rather to some unidentified portion of a book by Dr. Kryter that is not in evidence in this proceeding. The proposed revised calculation has a term "Integration" that is not even mentioned in the cited transcript pages.

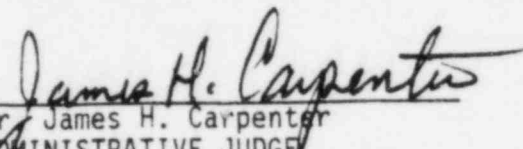
5. In the Applicants' and Intervenor's proposed findings, there are divergent statements concerning Dr. Kryter's cross-examination testimony at Tr. 9702-9707 and 9783-9784. The Board will have clarifying questions on this part of the record.

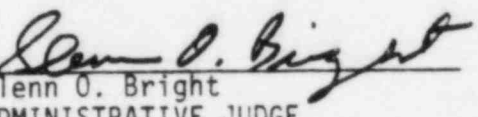
6. If it is assumed that (1) the Board's computation for alerting in the 5-mile EPZ based on Horonjeff, 62.8%, is the best estimate and (2) a high-side estimate of informal alerting, 15-20%, is added to that, this produces a 15-minute alerting estimate of 78-83%. There is a serious question whether that range can be deemed equivalent to "essentially 100%." Therefore, it may be necessary to augment the proposed alerting system with other mechanisms, such as the telephone alerting system called for by Eddleman Contention 57-C-3. The Applicants are asked to provide information concerning both the feasibility and approximate cost of such a system in the 5-mile EPZ. In addition, we invite the Applicants to submit feasibility and cost data on any other alerting systems described in FEMA-43 or of their own

devising which they believe might supplement their presently proposed system.

THE ATOMIC SAFETY AND LICENSING
BOARD


James L. Kelley, Chairman
ADMINISTRATIVE JUDGE


Dr. James H. Carpenter
ADMINISTRATIVE JUDGE


Glenn O. Bright
ADMINISTRATIVE JUDGE

Bethesda, Maryland

1/14/86

Figure 1

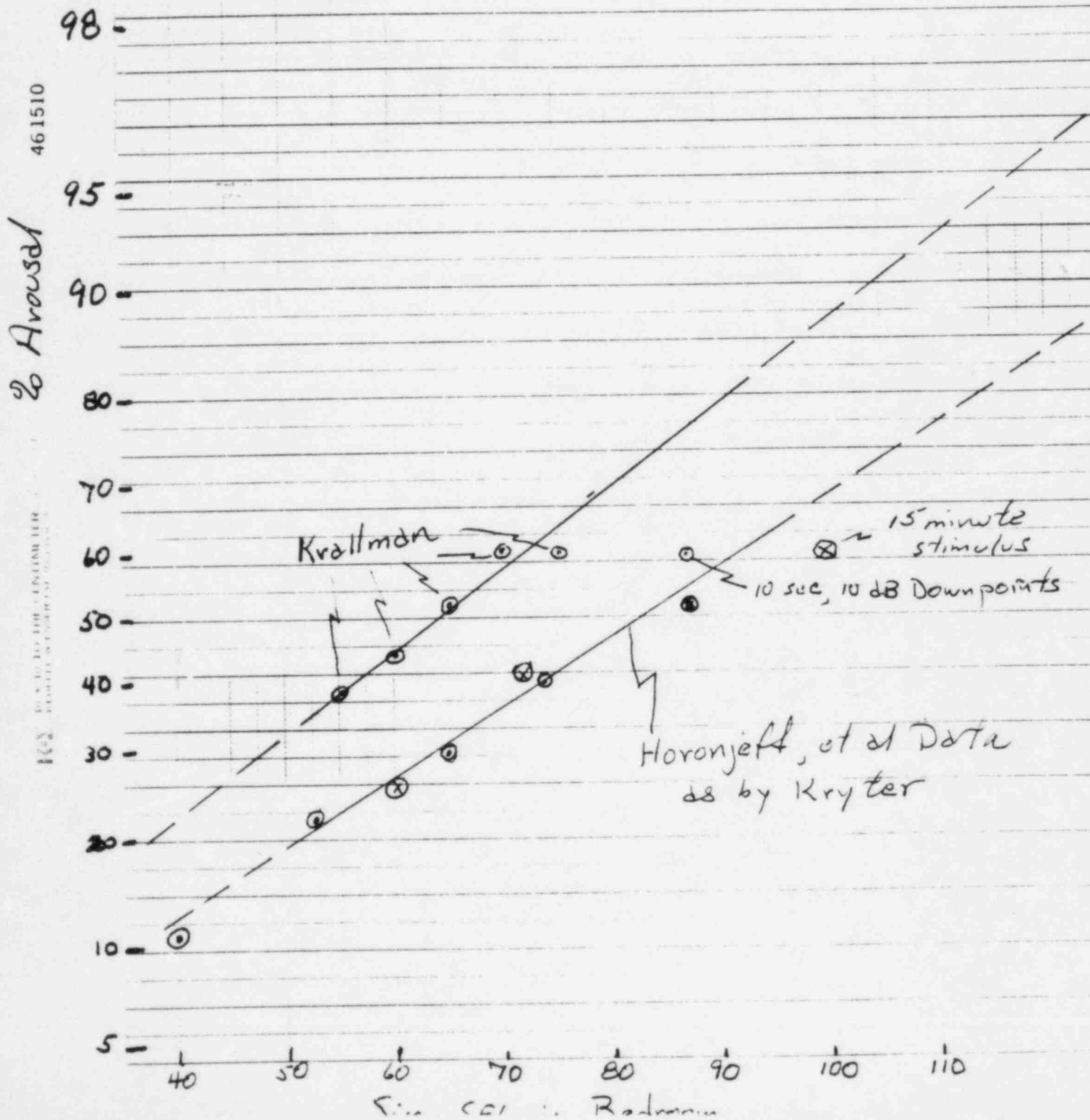


Figure 2

