



ATTACHMENT 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MEMORANDUM FOR: George Lear, Chief
Structural and Geotechnical Engineering Branch
Division of Engineering

THRU: *WAJ* Lyman Heller, Leader
Geotechnical Engineering Section
Structural and Geotechnical Engineering Branch
Division of Engineering

FROM: Joseph Kane, Senior Geotechnical Engineer
Geotechnical Engineering Section
Structural and Geotechnical Engineering Branch
Division of Engineering

SUBJECT: REVIEW OF REGION III REACTOR INSPECTOR'S CONCERNS REGARDING
THE DIESEL GENERATOR BUILDING AT MIDLAND

In response to your verbal request of July 27, 1983 I am providing my comments on the July 19, 1983 memorandum prepared by R. B. Landsman on his concerns for the Diesel Generator Building. Since many of the concerns covered in the July 19, 1983 memorandum had previously been expressed in the ASLB hearing sessions of December 6-10, 1983, I have attempted to identify the specific transcript pages where these issues were discussed. Hopefully this listing of transcript pages will permit the interested reviewer in recognizing and evaluating the similarities and differences with both my previously expressed views and those of GES Consultant, the U.S. Army Corps of Engineers, and those views now provided by Dr. Landsman.

Joseph D. Kane, Senior Geotechnical Engineer
Geotechnical Engineering Section
Structural and Geotechnical
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Enclosure:
As stated

cc: See page 2

George Lear

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cc: w/enclosure
R. Vollmer
J. Knight
G. Lear
P. Kuo
L. Heller
E. Adensam
T. Sullivan
D. Hood
F. Rinaldi
H. Singh, COE
R. Landsman, Region III
J. Harrison, Region III
W. Paton, OELD
J. Kane

Review Comments of
Joseph Kane
Diesel Generator Building Concerns
at Midland

Reference - July 19, 1983 Memorandum, From R. B. Landsman thru J. J. Harrison to R. F. Warnick, Subject: Diesel Generator Building Concerns at Midland.

1. First Concern - The problems and limitations inherent in the finite element analysis completed by CPC because of the effects of cracks and CPC interpretation of settlement data.

Comment: To the best of my understanding and recollection the statements expressed in this first concern are accurate. I am in agreement with these statements except for the sentence "It is this time dependent effect that was also not used in their model." It is not clear to me what is intended by "time dependent effect". If it means the effect of cracking that resulted because of settlements, then I would agree with the statement. If it implies that time dependent settlements were not considered, then I believe the statement is in error.

Pertinent Transcript Pages - December 10, 1982, Pages 11173 to 11203.

2. Second Concern - Problems with analysis performed by NRC Consultant, the U.S. Naval Surface Weapons Center, and statement that this analysis gave unacceptable results.

Comment: In my opinion it was very unfortunate that the study by NSWC was not provided to the NRC Staff who are affected by the study results in sufficient time to permit a full internal NRC review with opportunity for calm and deliberate discussions on its contents before this document was introduced by the Applicant into evidence before the ASLB. I personally have serious problems and questions with the NSWC report. I have not pursued my concerns with the NSWC report for two reasons. First, I was under the impression that all review issues related to the DGB had been fully addressed at the December 6 through 10, 1982 ASLB Hearing session and secondly, my understanding of the procedure used by NRC Structural Engineering Section to arrive at its conclusion as to the magnitude of the stresses induced by settlement (the crack analysis approach) does not rely on the results or conclusions of the NSWC study.

With respect to Dr. Landsman's stated second concern, I essentially am in agreement with his statements except I do not understand what is meant by the words "and this portion of the SSER should be stricken" which appears in the second sentence.

3. Third Concern - Crack analysis approach used by the Staff is not normal engineering practice.

Comment: In response to examination questions from both OELD and ASLB, both Mr. Singh and I gave our views on the crack analysis approach. An important conclusion reached by Dr. Landsman, which is different from my position, is that the Staff's crack analysis to determine rebar stresses is unacceptable. I believe a review of the transcript records will clearly show that I did not make this conclusion on unacceptability because I feel it is outside my area of responsibility and expertise.

Pertinent Transcript Pages - December 10, 1982, Pages 11187 to 11201.

4. Fourth Concern - Problems with relying on the crack monitoring program to evaluate stresses during the service life of the DGB.

Comment: The hearing transcripts will show that neither H. Singh or myself was questioned on the acceptability of the crack monitoring program for the Diesel Generator Building. The discussions that did occur in the hearings were provided by CPC consultants and NRC Structural Engineering Section. It is my impression that technical specification details still need to be resolved with the Applicant on the crack monitoring program for the DGB. Some of the details to be resolved would include the actual method to be used in measuring the cracks and the requirements for jointly coordinating and evaluating both settlement and crack readings. I share

the same concern as Mr. Landsman on the "lack of formulated corrective action to be taken when the allowed crack sizes are exceeded." In addition to Mr. Landsman's concern I have problems with the following aspects of the crack monitoring program which were worked out by NRC Structural Engineering Section and the Applicant.

- a. The criteria on crack widths permitted under both the alert and action limits (December 10, 1982 transcript, page 11069) are not sufficiently restrictive to prevent potential sections of the DGB from experiencing cracks where tensile stresses in the reinforcing steel would be well above the allowable stress.
- b. It is not clear what is intended by the wording "summation of the increase in all the crack widths...." as it pertains to both the alert and action limits. Are the crack widths identified in transcript page 11069 to be the increases that are permitted? Increase over what existing width and date?
- c. A crack monitoring program may elect to select certain wall sections for more careful measurement of cracks but it should not fail to require reasonable surveillance on other portions of the structure. My understanding of the agreed upon monitoring program for the DGB is that it is limited to localized areas on the faces of three selected walls.

- d. The decision to require crack monitoring at a frequency of once in five years after yearly monitoring for the first five years should not be made at this time. The decision to significantly increase the required monitoring interval should be withheld until the initial data and trends are known and evaluated.

Comments on J. Matra's Study - Structural Reanalysis of DGB

The time frames for the phases of construction (e.g. pre-surcharge, during surcharge, etc.) have been selected for the convenience of major construction phases or events and to more accurately estimate the DGB's stresses at these specific times when the effects of settlement are evaluated.

It is not clear why total settlements (Figs. 29, 34, 36, 38, 40 and 42) are being used to compute max. stresses and moments. It is my understanding that computed stresses and moments are only appropriate for the various time frames where the specific settlement increment for that time frame has been used. The comments provided in Tables 2, 3, 4, and 5 should not be comparing stresses and moments based on total settlements when checking for areas of cracking. Need to clarify this with NSWCC and reexamine computed stresses and moments with available crack mapping. In several of the walls (see table notes) there does appear to be correlation of cracks with high stress areas. Discuss with NSWCC.

Tables 3 and 4 provide results of NSWCC on various floor and roof elevations. Since crack maps for floors and roof are not provided in the NSWCC, is it intended to check study results of stresses and moments against existing cracks by a site inspection or request for additional mapping?

Tables 5 and 6 when addressing the settlements on Figs 4 and 43 in causing high stresses and moments should recognize the settlements are predicted to the year 2025. The major portion of these settlements have yet to occur, therefore, a check for cracking due to these settlements can not be made at this time.

The elements in the F.E. analysis appear to be approx. 20' in length. What effect does this 20' length have on the results of the analysis (location of high stresses and strains) recognizing that it is assumed the strain is constant over this length. Could check by using smaller elements, e.g. 5' lengths.

Explanation for "out of plane" moment?

Explanation on how allowable axial load and ^{allowable} out of plane moment were established (e.g. Table 2) for the 30" wide wall that has reinforcing of #8 bars, 12" O.C. in both H & V directions

Following discussions with NSWC, is there a need to set up site inspection to check areas of high stress and moment with visually observed areas of cracking