



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

NOV 18 1983

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

THRU: *[Handwritten initials]* Lyman W. Heller, Leader
Geotechnical Engineering Section
Structural and Geotechnical Engineering Branch
Division of Engineering

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

SUBJECT: COMMENTS ON OCTOBER 21, 1983 REPORT BY INDEPENDENT
TASK GROUP REVIEW OF THE DGB AT THE MIDLAND PLANT

In response to your verbal request, I have enclosed my review comments on the October 21, 1983 report by the Independent Task Group which was formed to evaluate the concerns expressed by R. B. Landsman of Region III for the Diesel Generator Building.

It is my understanding that my review comments will ultimately be considered in OELD deliberations as to whether it is necessary for NRC to request reopening of the ASLB hearings on the DGB. The general guidelines provided by OELD relative to their decision which I have used in identifying the potential hearing considerations are the following:

1. Does the issue which I have identified in the Independent Task Group report provide new evidence that affects or modifies the hearing record evidence?
2. Are the facts or expert opinions which are expressed in the Independent Task Group Report significant and different from the facts or expert opinions that are now in evidence before the Licensing Board which could affect a conclusion with respect to the structural adequacy of the DGB?
3. Although the information from the Independent Task Group report does not change the Staff conclusion with respect to the DGB - in "fairness to the Board" should the Board have the benefit of reviewing the evidence in the report in order to reach its conclusion?

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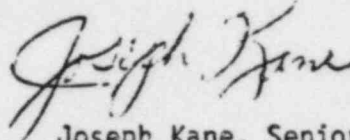
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George Lear

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On the basis of my review of the Independent Task Group report and my comparison with the guideline provided by OELD, I have provided my comments in Enclosure 1.



Joseph Kane, Senior Geotechnical Engineer
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Enclosure:
As stated

cc: w/enclosure
R. Vollmer
J. Knight
T. Novak
L. Heller
P. Kuo
T. Sullivan
E. Adensam
D. Hood
W. Paton, OELD
M. Wilcove, OELD
F. Rinaldi
H. Singh, COE
J. Kane

Subject: Review Comments on October 21, 1983 Report by Independent Task Group on the DGB
Plant: Midland Plant Units 1 and 2, 50-329/330
Prepared by: Joseph Kane, NRR, DE, SGEB

1. A. Potential Hearing Consideration - There are statements in the Independent Task Group report on the completeness and accuracy of available settlement data and history that are in conflict with the previous testimony of reviewers from the NRC geotechnical engineering staff and the Corps of Engineers. The specific areas of the report are:
 - a. Group Report, Pg. 6. "a complete and accurate settlement history does not exist."
 - b. Group Report, Pg. 12. "there are no such detailed settlement measurements available, especially for the early stages of construction."
 - c. Group Report, Pg. 15. "Given the unavailability of the data necessary to complete the input to the analysis by the staff's consultant, the previously stated staff position is reasonable."
 - d. Group Report, Pg. 20. "However, such settlement history for the DGB does not exist."
 - e. Group Report, Pg. 21. "Inconsistencies in the documentation of the settlement history needs to be resolved."
 - f. Appendix III, Pg. 5. "However, it should be mentioned that the exact settlement history at the various settlement markers at the DGB is open to question." (Reasons for this statement are subsequently given).
 - g. Appendix III, Pg. 7. "These analyses, though different in detail, lead to the similar conclusion that the settlement measurements were (and continue to be) in significant error."
 - h. Appendix III, Pg. 8. "The first period (where measured settlements are being used to compute stresses) spans from the beginning of construction through August 1978 at which time construction was halted."
 - i. Appendix III, Pg. 17. "However, it is recommended that the anomalies in the documentation of the settlement history be resolved" (Last paragraph of App. III, Section 2.2).

These nine statements are in conflict with SSER No. 2, pg. 2-33 and the testimony of J. Kane and H. Singh during the week of December 6 - 10, 1982.

- B. Applicable OELD Guidelines - Guidelines Nos. 1, 2 and 3
- C. Basis for Identifying Issue As Potential Hearing Consideration - Because the nine identified statements in the Independent Task Group report raise questions with respect to the completeness and accuracy of the DGB settlement history and because this is in conflict with previous Staff testimony, the hearing record has become unclear and confusing. Also item i. in the above identified statements appropriately recommends that these anomalies be resolved. In my opinion all three of the guidelines identified by OELD would apply when considering the need to reopen the hearings in order to straighten out the hearing record on this issue.
2. A. Potential Hearing Consideration. At this particular time there are questions and significant doubts as to the defensibility of NRC position in concluding there is reasonable assurance that the structural integrity of the DGB will be maintained and its functional requirement fulfilled (See October 21, 1983 memo from P. T. Kuo to J. P. Knight, pg. 1; Group Report, pg. 21, Conclusion no. 5; App. III, pg. 17, Conclusion no. 6). The questions and doubts result from the following items in the Independent Task Group report:
- a. The report in several locations identifies the need for the Applicant and the NRC staff to properly document the information and calculations for crack width approach for all DGB walls in order for the stresses that are induced by settlements to be known and evaluated. (See October 21, 1983 memo, pg. 2, item 3; Group Report, pgs. 16 and 21, item 2; App. III, pgs. 11, 16, 17 item 2).
 - b. Closely related to this issue is the report's acknowledgement that the crack method approach is questionable where relatively few cracks occurred (App. III, pg. 11) and the absence of written justification in the FSAR for using this approach for structures like the DGB (App. III, pg. 16).
 - c. In addition the report in several locations points out the inadequacies of the present crack monitoring program and the need for improvement (Group Report, pgs. 17 and 21 item 4; App. III, pgs. 13, 16 and 17) and the need to establish action levels (Oct. 21, 1983 memo, pg. 2 item 5; App III, pgs. 16 and 17 item 4).
 - d. The NRC Staff position on DGB acceptability uses the crack width approach to estimate settlement induced stresses and this position is heavily dependent on the accuracy of available crack maps. In several locations in the Task Group report, the reliability and accuracy of presently available crack maps are questioned and the Group report cites concern that cracking in the DGB has not

stabilized and the cracks are growing (See Oct. 21, 1983 memo, pg. 2 item 4; App. III pgs. 6, 7, 13 and 17 item 3). In my opinion it will be necessary to obtain and use more recent and accurate crack maps of the DGB before the recommendation of the Task Group can be followed for establishing crack width levels that will reflect a sufficient stress margin available to resist critical load combinations (October 21, 1983 memo, pg. 2 item 5).

B. Applicable OELD Guidelines. Guideline Nos. 1, 2 and 3.

C. Basis for Identifying Issue As Potential Hearing Consideration. For the NRC staff to have a reasonable and defensible position in judging the adequacy of the DGB there is a need to have a good data basis. The Task Group report, as indicated by the above comments, correctly points out that at this time we do not have that basis. The report provides some specific recommendations that should be followed in order to reach the needed sound engineering basis. Both the Board and the public have already asked what is the NRC Staff response to the report's recommendations and will want to know what significant information is developed in carrying out these recommendations. For these reasons I believe all three of the guidelines provided by OELD apply and would be the basis for reopening the hearing on the DGB.

3. A. Potential Hearing Consideration. The Task Group report in many locations discusses the controversial finite element analysis completed by the Applicant where the measured/predicted displacements were "straight lined" which essentially disregards any effect of differential settlement. (See Group Report, pgs. 7, 20 item 1; App. III, pgs. 9 and 14). In the Dec. 6 through 10, 1982 hearing sessions this issue was extensively discussed and reflected significant differences in professional opinions that has left the hearing record unclear and unresolved. The statements in the Task Group report on this controversial subject are very specific and clear "that this model (the Applicant's) will yield unconservative estimates of stresses." (App. III, pg. 9, 2nd par.) and "We therefore conclude that this approach to compute settlement stresses is inappropriate." (App III, pg. 9) and "The straight line representation of the settlements along the north and south wall for the analysis reported in 2.4.1 is said to be in error. As indicated in that section of this report, it is our opinion that this analysis will result in unconservative predictions of stresses due to settlements. As such, it is considered to be an inappropriate analysis." (App. III, pg. 14, 2nd par.).

- B. Applicable OELD Guidelines. Guideline Nos. 1, 2 and 3.
- C. Basis for Identifying Issue As Potential Hearing Consideration. in my opinion the presently conflicting evidence before the Board on this issue is significantly impacted by the Task Group's findings. I believe the clear engineering explanation provided in the report's statements on why this analytical approach is not appropriate would be helpful to the Board in assisting them to reach a decision on this issue.
4. A. Potential Hearing Consideration. A previously identified concern expressed by J. Kane (Oct. 24, 1983 memo, G. Lear to W. Paton on the Applicant's Proposed Findings, pg. 12, item 61) with the results of the Naval Surface Weapon Center (NSWC) study is also impacted by the Task Group's report. Although the Task Group in App. III, pg. 10 questions the value of the NSWC conclusions because of the apparent linear assumption of settlement data points made in the study, the report by the Group reflects an influence of the NSWC results by referencing the important conclusion by the NSWC study - that very high stresses are calculated in areas of the DGB where no cracks now exist. (See Group Report, pgs. 8 and 20 item 1; App. III pgs. 14 and 15). This NSWC conclusion is seriously questioned when a comparison is made of the computed areas of high stress with areas of recorded cracking (See enclosure tables to Oct. 24, 1983 memo). When the internal walls of the DGB are evaluated for computed areas of high stress with areas of recorded cracking, it can be shown that cracks appear in 94 percent of the locations where the NSWC study has computed high stresses.
- B. Applicable OELD Guidelines - Guidelines Nos. 1, 2 and 3.
- C. Basis for Identifying Issue As Potential Hearing Consideration. Both the Task Group report and the present hearing record offer the conclusion by the NSWC study that cracks do not appear in areas of computed high stress, thereby indicating that the settlement values more than likely were not seen by the structure. This NSWC conclusion is incorrect and this issue has not yet been brought to the Board's attention. It is quite likely that the Board would place significant reliance on the NSWC conclusion, if left uncorrected, in reaching its decision with respect to the safety of the DGB. For these reasons I feel it should be brought to the Board's attention.

5. There are less important considerations affected by the information within the Independent Task Group report, that would not require reopening of the DGB hearing, but which would be helpful to the Board if addressed, since they are related to previous testimony. These items are:
 - a. Group Report, pgs. 3 and 4. The implication that surcharging the completed DGB structure relieved it of stress.
 - b. App. III, pg. 5. The questionable significance of the piezometer data during surcharging.
 - c. App. III, pg. 12. The statement that serious structural distress was caused by the very large settlements at the DGB.
 - d. App. III pgs. 12 and 13. The need to improve the accuracy of future settlement monitoring at the DGB and to require better methods for monitoring crack growth with reliable strain gages.