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SUBJECT: Summary of 881213 meeting w/util in Rockville, MD re use of time history analysis in seismic design program.

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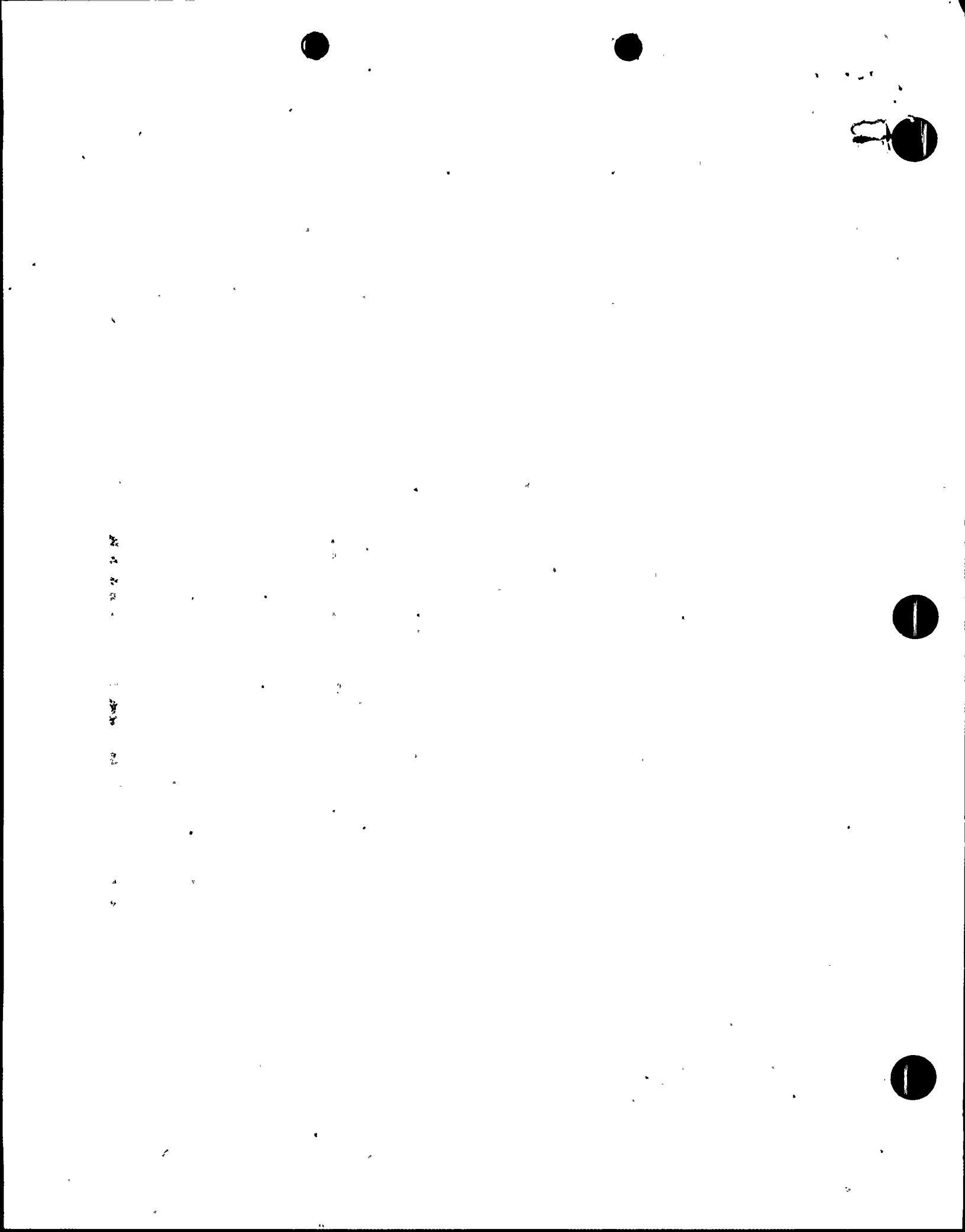
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 1, 1989

Docket No. 50-260

LICENSEE: Tennessee Valley Authority

FACILITY: Browns Ferry Nuclear Plant, Unit 2

SUBJECT: SUMMARY OF DECEMBER 13, 1988 MEETING ON THE USE OF TIME HISTORY ANALYSIS FOR PIPING (TAC 00016)

On December 13, 1988, a meeting was held at the NRC headquarters in Rockville, Maryland with the Tennessee Valley Authority (TVA), the licensee for the Browns Ferry Nuclear Plant (BFN). The purpose of the meeting was to discuss TVA's use of time history analysis in its seismic design program for piping and supports which was established to address IE Bulletins 79-02 and 79-14 (IE Bulletin 79-02/79-14) program). A list of attendees is attached as Enclosure 1.

The NRC staff and TVA have had several meetings during the past year to discuss programmatic and technical issues associated with TVA's IE Bulletin 79-02/79-14 program for the Browns Ferry Nuclear Plant (BFN), Unit 2. The staff's position on the TVA program is provided in a March 25, 1988 meeting summary. In addition, the resolution of technical issues related to the piping analysis methodology used in the seismic design program is contained in a September 19, 1988 meeting summary.

In preparation for a staff audit of TVA's IE Bulletin 79-02/79-14 program, the staff met with TVA and its contractor Stone and Webster Engineering Corporation on November 17, 1988 (Enclosure 2 - Trip Report dated December 8, 1988) to discuss the methods used to implement the program. During the meeting, the staff was informed that the rigorous piping analyses were being performed using time history analysis method. The staff expressed its concern to TVA that the time history analysis method had not been accepted by the staff for use in the BFN seismic design program. The staff requested that TVA present its justification for the use of the time history analysis method for the evaluation of piping systems.

Subsequently, during the December 13, 1988 meeting, TVA presented its basis for using the time history method for piping analysis. The details of TVA's presentation are contained in Enclosure 3. TVA's justification involved (1) a comparison of the Housner-based response spectra with spectra derived using the current Regulatory Guide (RG) 1.60 and 1.61 guidelines and (2) ALARA considerations. The staff also performed its own independent assessment comparing the Housner-based response spectra with the response spectra generated from RG 1.60 response spectra in developing its positions on the acceptability of the seismic design criteria to be used in TVA's IE Bulletin 79-02/79-14 program (meeting summary dated September 19, 1988). The staff recognized that the newly developed artificial time history was not as conservative as the El Centro time history that had been previously used by TVA as the design basis ground motion to develop building amplified floor response spectra. However,

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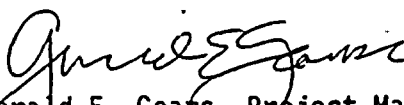
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the staff also recognized that the total combination of the nine criteria used with piping response spectra analysis methods was relatively conservative for a plant of Browns Ferry's vintage.* The staff would have considered an increase in damping to 1% for the SSE load case and the El Centro earthquake appropriate for use in conjunction with TVA addressing the staff's concerns relating to the remaining combination of the nine criteria for piping. That staff assessment was based on a comparison of the Browns Ferry criteria with the criteria specified in the FSARs of other nuclear power plants licensed in the same year as the first Browns Ferry unit. The staff assessment also took into consideration the fact that current licensing criteria also allows higher damping values. However, since the Browns Ferry seismic design criteria did not meet all current criteria, the staff would not accept damping values as high as the current criteria allows. Instead of accepting the 1% damping, TVA requested that the staff accept its use of the new artificial time history to generate floor response spectra for piping analysis. The staff evaluated this TVA proposal to generate floor response spectra and concluded it would produce results reasonably comparable with the results which would have been produced using the 1% damping and the remaining criteria that would have been accepted by the staff with the El Centro time history. Therefore, the staff's evaluation had considered both a comparison of the criteria used by other plants licensed at the time of Browns Ferry and a comparison of the Browns Ferry criteria with criteria used in current licensing reviews. It was on these bases that the staff found the use of the new artificial time history to develop floor response spectra acceptable. The staff had clearly stated in the September 19, 1988 meeting summary that the use of artificial time history piping analysis would require further review on a case-by-case basis prior to the staff accepting its use. The staff further stated that response spectra analysis was the rigorous piping analysis method described in the BFN Final Safety Analysis Report. In addition, the NRC staff is currently developing a target power spectral density (PSD) function to be used in generating an acceleration time history which satisfies RG 1.60 guidelines; however, at this time, little effort has been expended in developing a target PSD function applicable to the Housner ground response spectrum. Based on these considerations, the staff stated that piping analysis for BFN Unit 2 should be performed using response spectra analysis consistent with BFN licensing commitments.

*For many of the plants licensed at the time of Browns Ferry, the licensing documentation does not contain a detailed description of all nine technical issues that were discussed with TVA. However, the staff positions on these technical issues are consistent with the criteria cited in these licensing documents in those cases where the criteria was defined. Therefore, although the staff considered its position on each individual item to be consistent with the criteria used by plants licensed at the same time period as Browns Ferry, the staff also considered the total combination of all criteria might be conservative.



At the conclusion of the meeting, the staff restated its position that it would review the appropriateness of using time history analysis for piping systems on a case-by-case basis for only those limited number of cases where TVA conclusively demonstrates that high radiation or inaccessibility problems exist in performing hardware modifications. The staff stated that it would review the differences between time history analysis results and response spectra analysis results for these limited number of cases. In addition, the staff stated that for those cases for which TVA proposes to use time history analysis methods because of high radiation (ALARA) concerns, all required modifications shall conform to the long-term criteria and rather than the interim criteria established for piping and supports.


Gerald E. Gears, Project Manager
TVA Projects Division
Office of Nuclear Reactor Regulation

Enclosures:

1. Attendance List
2. Trip Report on
November 17, 1988 Meeting
3. Meeting Summary on
December 13, 1988 Meeting

cc w/enclosures:
See next page



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DISTRIBUTION FOR MEETING SUMMARY DATED: February 1, 1989

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