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PDR

June 1, 1979

Mr. James G. Keppler, Director
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: LaSalle County Station Units 1 and 2
Additional Response to IE Bulletin
79-07, "Seismic Stress Analysis of
Safety-Related Piping"
NRC Docket Nos. 50-373 and 50-374

Reference (a): C. Reed letter to J. G. Keppler dated
April 24, 1979

Dear Mr. Keppler:

Reference (a) transmitted our initial response to IE Bulletin 79-07 for LaSalle County Station, indicating that a response to Item 3 of that bulletin would be provided when it became available. The following information is submitted in response to Item 3 of Bulletin 79-07.

The SAP/PISYS computer programs were used for seismic piping analysis at LaSalle County Units 1 and 2. A description of these programs and the verification procedure is presented below.

SAP4G VERIFICATION

Program Description

SAP4G, a version of SAP, was originally developed for General Electric by F. A. Peterson and K. J. Bathe of the Engineering Analysis Corporation at Berkeley. The SAP program is a general purpose structure program used to perform static and dynamic analysis of mechanical and piping components by the finite element method.

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Verification

All GE production versions of SAP are verified using a special benchmark problem that exercises all the important features of the program. The benchmark problem has been analyzed for the effects of constraint of free end, distributed forces and is dynamically analyzed to determine mode shapes and natural frequencies using Swanson System's ANSYS program. ANSYS was also used to predict dynamic response of the benchmark problem, using the response spectra and time history integration methods. The predicted frequencies, mode shapes and loads were compared to the corresponding SAP predictions. The SAP program prediction had to be consistent with those of ANSYS before SAP was qualified for production use. In order to test unique features of SAP that cannot be compared to the results of another program, a special problem is devised which has an equivalent computer or manually calculated solution. Before any new version of SAP is verified for production application, the benchmark problem is reanalyzed to verify that the program changes have not changed predictions or reduced their accuracy.

PISYS VERIFICATIONProgram Description

PISYS is a computer program specialized to analyze piping systems. The PISYS program provides a highly flexible user oriented input format for piping system modeling. The analysis modules of PISYS are taken directly from the SAP4G program.

Verification

Since PISYS analysis modules are identical to SAP4G, a SAP analysis of a typical BWR steam piping system is used as a benchmark problem for the PISYS verification. The steam line is analyzed for thermal expansion, dead weight, and a variety of dynamic loads in order to exercise all the features of PISYS. PISYS was not verified as a production program until the prediction of SAP and PISYS were shown to be identical for practical purposes.

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Before any new version of PISYS is verified for production application, the benchmark problem is reanalyzed to verify that the program changes have not changed the predictions or reduced their accuracy.

Five NRC benchmark problems will also be analyzed as a further verification of the PISYS code. This analysis is expected to be completed and submitted by General Electric to the NRC for review by July, 1979.

Please direct any questions you may have concerning this matter to this office.

Very truly yours,

Cordell Reed
Assistant Vice-President

cc: Director, Division of
Reactor Operations Inspection

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