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ILLINOIS POWER COMPANY



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L08-79(05-29)-9

500 SOUTH 27TH STREET, DECATUR, ILLINOIS 62525

May 29, 1979

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

Dear Mr. Keppler:

Clinton Power Station Units 1 & 2
Docket Nos. 50-461 and 50-462
Construction Permits No. CPPR-137 & CPPR-138

IE Bulletin No. 79-07 reports deficiencies that have been discovered in certain seismic analysis computer codes. It requests information from construction permit holders concerning the computer codes used and their verification.

Action item 1 (of IE Bulletin No. 79-07) asks about any application of algebraic summation of forces used in seismic analysis of piping. None of the methods in question were (or are intended to be) used on any of the Clinton Power Station piping. Therefore items 2 and 4 are not applicable to the Clinton Power Station.

Action item 3 asks about verification of the piping computer programs used. Piping analyzed by the NSSS supplier (General Electric Co.) was (or is to be) analyzed by the PISYS code which is a version of the SAP code. This code has been verified by General Electric benchmark problems as reported for Brunswick and Pilgrim stations. General Electric is in the process of performing the NRC supplied benchmark problems and should have them complete by August 1, 1979.

The remainder of the piping is analyzed by Sargent and Lundy by the PIPSYS code. This code has been validated several times during its history of use. For the seismic portions of the program, this has been done by checking computer results by hand calculations, checking results against public domain programs, and by checking results from PIPSYS against DYNAPIPE which is the program Sargent & Lundy used for piping seismic analysis prior to 1972. Each new version of the program is extensively checked against the older version through a series of test problems. The following validation procedure was followed in the initial validation:

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A. PIPSYS Check Against DYNAL⁽¹⁾ and NASTRAN⁽³⁾ (1972)

In 1972 the modal periods and time history of response to pipe transients using the modal time history method on PIPSYS were checked against those obtained from DYNAL and NASTRAN. Responses from the four codes were in agreement.

B. Check Against MEC-21⁽²⁾ (1969)

In 1969, no public-domain seismic analysis code had the capability of curved elements to model pipe elbows. To validate this feature of the Sargent & Lundy programs, the piping system given in example problem No. 2 of the MEC-21 computer code was analyzed by the Sargent & Lundy program. Seismic analysis was performed using the response spectrum method. Member forces, joint displacements, and joint inertia forces were printed for each mode. The same system then was analyzed using the MEC-21 code with a static load equal to the modal inertia-free forces, and joint displacements obtained from the two codes were compared and found to be in good agreement.

C. PIPSYS & DYNAPIPE Comparison (1972)

In 1972, when the PIPSYS program was developed, it was extensively benchmarked against the DYNAPIPE program. Typical piping systems were run on the two programs and found to yield the same responses.

D. Check Against DYNAL⁽¹⁾ (1969)

A typical hot reheat piping system was analyzed on DYNAPIPE and DYNAL (1). The element forces for a specified response spectra were compared and were found to be comparable. The frequencies of modes 1 through 6 were also in close agreement.

References

1. ICES DYNAL User's Manual, McDonnell-Douglas Automation Co.
2. MEC-21, 7094, "A Piping Flexibility Analysis Program for the IBM7090 and 7094", Los Alamos Scientific Laboratory, University of California, 1964.
3. NASTRAN User's Manual, NASA SP-221.

Sargent & Lundy would welcome a generic review of their piping program by the NRC Licensing Staff.

Mr. James G. Keppler

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Since General Electric Co. has not completed the analysis of the benchmark problems provided by the NRC, Item 3 cannot be completely answered for GE analyzed piping. However since GE is working directly with NRC (Dr. M. Hartzman, MEB, DSS) on this matter and will report results of their verification program directly, this letter should satisfy the requirements of IE Bulletin 79-07.

Sincerely,



G. E. Wuller
Supervisor - Licensing
Generation Engineering Department

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cc: Director, Division of Reactor Operations Inspection
Office of Inspection and Enforcement, USNRC

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