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May 28, 1982

NUCLEAR PRODUCTION DEPARTMENT

U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
File: 0260/6140
Hydrodynamic Loads on Control Rod Drive
Systems
Reference: AECM-82/147, MAEC-82/72
AECM-82/241

The attached information is being provided by MP&L in response to your letter of request dated March 29, 1982 concerning "Fast Scram Hydrodynamic Loads on Control Rod Drive Systems." The five concerns addressed in your letter are responded to in Attachment 1. A detailed analysis was conducted to determine the hydrodynamic loading on the CRD system from the water hammer effects on the system piping and supports.

As discussed in our letter dated April 9, 1982 (AECM-82/147), these hydrodynamic loads have already been included in the design of the CRD system piping and supports and modifications have been completed for the Grand Gulf Nuclear Station.

Please advise this office if you have any additional questions.

Yours truly,


L. F. Dale

Manager of Nuclear Services

SAB/JGC/JDR:lg
Attachments

cc: (See Next Page)

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cc: Mr. N. L. Stampley (w/o)
Mr. R. B. McGehee (w/o)
Mr. T. B. Conner (w/o)
Mr. G. B. Taylor (w/o)

Mr. Richard C. DeYoung, Director (w/o)
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. J. P. O'Reilly, Regional Administrator (w/a)
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Mr. A. Schwencer, Chief (w/a)
Licensing Branch No. 2
Division of Licensing
Nuclear Regulatory Commission
Washington, D. C. 20555

Provide:

1. The design basis opening time for the inlet line scram valve.

Response:

A previously assumed opening time of 20 milliseconds was increased to 45 milliseconds based on special valve stroke traces which were taken during startup tests conducted at Grand Gulf Unit 1. Additional comparisons of test pressure histories with analyses were also conducted. The design basis opening time is therefore 45 milliseconds.

2. An evaluation of the hydrodynamic loads in your CRD system resulting from actuation of the inlet line scram valve using the design basis opening time specified in Item 1.

Response:

An evaluation of the hydrodynamic loads in the CRD system resulting from actuation of the scram valves was conducted. This evaluation was based on computer simulations that were benchmarked against test data. The hydrodynamic loads resulting from this evaluation are used as the design basis.

3. A description of the conditions and configurations of the plant which result in maximum hydrodynamic loads in the CRD system.

Response:

A number of different normal and abnormal operating configurations that can exist in the CRD system were reviewed and the short stroke (3 ft. rod withdraw) scram for normal and startup reactor conditions were chosen as limiting conditions. The case of failure of the buffer system seals was also examined for design impact. To assure conservative results, accumulator over pressure at charging system shut-off head with a plant heat-up transient was assumed. The other configurations are bounded by this analysis.

4. A statement regarding the appropriateness of the mathematical model used to calculate the hydrodynamic loads in the CRD system resulting in a scram.

Response:

The computer code and mathematical model used for the analysis has been benchmarked against the Grand Gulf Pre-Operational test data. The IMPULSE computer code used for the analysis is also benchmarked against the BWR-6 Standard Short Stroke for normal scram, start-up (cold) scram and the 'failed buffer' scram. The benchmarking also includes comparisons of response frequency with analytical predictions. The conclusion of our studies is that the mathematical model used to calculate the hydrodynamic loads is accurate and appropriate in predicting all CRD scram hydraulic loads.

5. A comparison of the hydrodynamic loads evaluated in Item 2 with the present design basis loads for the CRD system.

Response:

The hydrodynamic loads evaluated in Item 2 are currently part of the design basis for the Grand Gulf CRD system piping supports. Modifications to these supports in accordance with the design basis are complete.