May 1, 1997

Mr. Joseph J. Hagan
Vice President, Operations
Entergy Operations, Inc
P. O. Box 756
Port Gibson, MS 39150

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - GENERIC LETTER 95-07, "PRESSURE LOCKING AND THERMAL BINDING OF SAFETY-RELATED POWER-OPERATED GATE VALVES," GRAND GULF NUCLEAR STATION, UNIT 1 (TAC NO. M93467)

Dear Mr. Hagan:

On August 17, 1995, the Nuclear Regulatory Commission issued Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," to request that licensees take actions to ensure that safety-related power-operated gate valves that are susceptible to pressure locking or thermal binding are capable of performing their safety functions. We are reviewing and evaluating your responses, dated October 15, 1995, and February 13 and June 28, 1996, to GL 95-07. Additional information, as discussed in the enclosure, is requested in order to complete our review. We request that you respond within 60 days of the receipt of the letter.

Sincerely,
5/1/97
Jack N. Donohew, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosure: Request for Additional Information

cc w/encl: See next page

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Document Name: GG93467.RAI 050114

OFC	PM:PD4-1	LA:PD4-1	SRXB/NRR	SC:SRXB/NRR	BC:SRXB/NRR
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DATE	4/30/97	4/30/97	4/30/97	4/30/97	4/30/97
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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REQUEST FOR ADDITIONAL INFORMATION

RELATED TO GENERIC LETTER 95-07

PRESSURE LOCKING AND THERMAL BINDING OF SAFETY-RELATED MOVs

ENTERGY OPERATIONS, INC.

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

The following request for additional information is based on the staff's review of (1) Entergy Operations, Inc.'s (EOI's) submittals dated October 15, 1995, and February 13 and June 28, 1996, related to Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Valves," and (2) the meetings held on March 25 and April 9, 1997, on the generic letter. The meeting summaries were issued on April 10 and 25, 1997, respectively.

1. During a meeting on March 25, 1997, EOI provided the Nuclear Regulatory Commission (NRC) staff with a copy of Test Report, "Flow Loop Differential Pressure and Pressure Lock Tests on a 14-inch William Powell Gate Valve," dated March 1, 1993. The NRC staff reviewed the test report but the information necessary to independently verify the pressure locking test results was not in the report. Discuss the schedule when the test data can be provided to the staff.

2. During a meeting on April 9, 1997, EOI discussed the development and use of its pressure locking thrust prediction methodology and the test data used to evaluate acceptability of the methodology. During the meeting, EOI presented test results from a 14-inch (900-pound) William Powell valve; a 4-inch (1500-pound) Westinghouse valve; a 10-inch (900-pound) Crane valve; a 10-inch (300-pound) Borg-Warner valve; and Idaho National Engineering and Environmental Laboratory (INEEL) pressure locking test results from a 6-inch (600-pound) Walworth valve to help support its methodology. EOI stated that it intended to perform more testing to validate the model but a test schedule has not been developed to accomplish this testing. Discuss these additional tests and the schedule to complete the tests.

3. The following requests for additional information are based on the EOI presentation at the April 9, 1997 meeting:

   a. When validating its pressure locking prediction methodology, EOI used a 0.4 friction factor to calculate the required thrust except when test results indicated that the friction factor was greater than 0.4 and then the actual friction factor value was used. Discuss how the use of a 0.4 friction factor in the EOI pressure locking prediction equation accurately validates the EOI pressure locking prediction methodology in cases when the actual friction factor was significantly less than 0.4?

ENCLOSURE

b. When using actual friction factors, the EOI pressure locking prediction methodology often underestimated the amount of thrust required to open the Westinghouse, Crane and Walworth valves during pressure locking conditions. The methodology consistently underestimated the amount of thrust required to open the Borg-Warner valve during pressure locking conditions. Explain the basis for the applicability of the EOI pressure locking prediction methodology to all flexible wedge gate valves or for the use of the methodology to specific types of flexible wedge gate valves.

c. Pressure locking test results from the Walworth valve indicated that as the differential pressure between the bonnet and the downstream (or upstream) side of the valve increases, the stem thrust required to open the pressure locked valve increases. The EOI pressure locking methodology predicted that the opposite would occur in that as the differential pressure between the bonnet and downstream (or upstream) side of the valve increased the stem thrust predicted to open the pressure locked valve decreased. Many of the INEEL tests involved upstream or downstream pressure of 0 psig or very close to 0 psig; however, the upstream and downstream pressures were significantly greater than 0 psig in several tests. EOI stated that it does not apply the pressure locking prediction methodology to scenarios where upstream or downstream pressure is 0 psig. However, this does not explain why the methodology is not consistent with the test data nor does it resolve the issue when upstream or downstream pressures are present. Why does the EOI pressure locking thrust methodology prediction results conflict with the Walworth valve test results? Discuss if there are any differential pressure restrictions or other conditions associated with the use of the EOI pressure locking prediction methodology.

d. EOI used results of differential pressure flow tests conducted in response to GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," to demonstrate that its pressure locking prediction methodology provided conservative approximations. Discuss how differential flow test results can be used to validate EOI's pressure locking prediction methodology.

e. The EOI pressure locking prediction model did not account for disk shear forces, vertical downward force on the disk, compression of the disk hub and flexibility of the body and disk. Discuss why it is not necessary to address these parameters in the EOI pressure locking prediction methodology.

f. Unwedging force is one of the parameters of the EOI pressure locking prediction methodology. INEEL testing identified that the force required to unwedge a valve can significantly deviate as the valve is repeatedly stroked closed and then reopened. Discuss how this variance in unwedging force is accounted for in the EOI pressure locking prediction methodology.

4. In the EOI GL 95-07 180-day submittal dated February 13, 1996, EOI stated that it was determined by calculation that the following nine valves would operate during a pressure locking scenario:

   E12F028A and E12F028B-Containment Spray Valves
   E12F064C-RHR C Minimum Flow Valve
   P41F064A-SSW Inlet to Control Room A/C A
   P41F064B-SSW Supply to CR A/C and ESF Room Coolers B
   P41F081A-SSW Outlet from Control Room A/C A
   P41F081B-SSW Return from CR A/C B & ESF RM Coolers B
   P41F237-SSW Inlet to ESF Room Coolers A
   P41F238-SSW Outlet from ESF Room Coolers A

   Provide the pressure locking thrust prediction and actuator capability calculations for the above valves.

5. In the GL 95-07 180-day submittal, EOI stated that shutdown cooling line suction valves E12F006A, E12F008 and E12F009 were classified as non-priority valves, and therefore, not evaluated for pressure locking or thermal binding. These valves are shut during power operation and are required to open to cooldown the unit. Discuss the basis for deciding not to evaluate these valves for pressure locking and thermal binding.

6. In the GL 95-07 submittal dated June 28, 1996, EOI stated that sixteen normally open valves are shut during surveillances. EOI modified five of these valves, and evaluated the remaining eleven valves for pressure locking/thermal binding and determined that these valves were acceptable. Are these eleven valves in systems that would be declared inoperable per the Technical Specifications when surveillances are performed on the systems? If not, explain why these valves are not susceptible to pressure locking/thermal binding.