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August 12, 1999  
1920-99-20449

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

Ladies and Gentlemen:

Subject: Three Mile Island Nuclear Station, Unit-1 (TMI-1)  
Operating License No. DPR-50  
Docket No. 50-289  
Pressurizer Supports

TMI-1 Licensee Event Report (LER) No. 99-006-00, dated June 23, 1999, long-term corrective actions include submittal of a license change request to revise the design basis for the TMI-1 pressurizer supports as described in the TMI-1 Updated Final Safety Analysis Report (UFSAR) to allow use of Regulatory Guide (R.G.) 1.61 damping values together with the existing design basis amplified response spectra. The detailed analyses supporting this license change request are ongoing and are expected to be submitted for NRC review and approval by September 10, 1999. The purpose of this letter is to request NRC concurrence with the ongoing analytical approach, as described in detail herein (Attachment), which is being utilized by GPU Nuclear to support the detailed license change request. This design basis change is being applied only to the analysis of the TMI-1 pressurizer supports and it is not GPU Nuclear's intent to extend use of this methodology to other plant components at this time.

The proposed change to the TMI-1 pressurizer support design basis requires NRC approval because the use of the higher damping values specified by R.G. 1.61 utilizes a methodology that has not previously been reviewed by the NRC for use at TMI-1. As described in LER 99-006-00 referenced above, the existing pressurizer support lug bolts remain operable and capable of performing their design function during a design earthquake event. Thus, GPU Nuclear does not consider resolution of this LER corrective action to be required for the upcoming outage. This initial NRC concurrence is being requested in order to facilitate GPU Nuclear's decision to pursue the analytical design basis change to the pressurizer support which is technically justifiable and maintains adequate design margin, and to obtain concurrence that review of the associated license change request does not need to be resolved for the upcoming outage based on the present operable condition of the supports.

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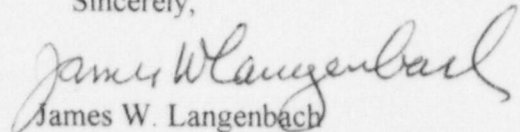
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GPU Nuclear believes that this change to the seismic design basis for the TMI-1 pressurizer supports maintains adequate design margin when compared to current NRC approved seismic design basis criteria, and potential modification of the supports to restore the original design basis is unnecessary and provides no added safety benefit. Modification of the pressurizer support bolts involves significant radiological and financial considerations. Implementation will result in approximately 6-10 man-rem radiation exposure. Design and installation cost for the pressurizer support modification will exceed \$200K. The modification requires the plant to be shutdown and would most efficiently be implemented during a planned outage.

GPU Nuclear is available to meet with NRC staff as necessary to support this request. We expect to have the detailed results of the specific application of this methodology to the pressurizer supports available to discuss with NRC staff at a meeting the week of September 6, 1999. If any additional information is needed, please contact Mr. David J. Distel, Nuclear Licensing and Regulatory Affairs at (973) 316-7955.

Sincerely,



James W. Langenbach  
Vice President and Director, TMI

Attachment

cc: Administrator, Region I  
TMI-1 Senior Project Manager  
TMI-1 Senior Resident Inspector  
File No. 99097

ATTACHMENT

The TMI-1 UFSAR specifies damping values to be used in the design of structures, systems and components in nuclear safety related applications. These damping values are generally lower and thus more conservative than the damping values specified in current regulatory guides and the Standard Review Plan. GPU Nuclear plans to change the TMI-1 UFSAR to permit use of the damping values specified in the current revision of Regulatory Guide (R.G.) 1.61 for analysis of the TMI-1 pressurizer supports. These damping values are based on current knowledge with respect to behavior of structures, systems and components subjected to vibratory motion and have been approved by the USNRC for use at nuclear power plants.

GPU Nuclear has determined based on preliminary results that it is acceptable to use R.G. 1.61 damping values for the pressurizer support analysis because the loads on the pressurizer supports calculated using R.G. 1.61 damping values combined with the existing TMI-1 design basis response spectra remain greater than the pressurizer support loads calculated using R.G. 1.61 damping values and response spectra generated using criteria currently accepted by the NRC. Therefore, although this proposed change reduces some of the margin available in the existing TMI-1 design basis criteria for the pressurizer supports, the proposed analysis methodology and criteria described below remains conservative when compared to current NRC approved seismic analysis methods and criteria.

Dr. Robert P. Kennedy of Structural Mechanics Consulting, Inc. was contracted to assist in developing the technical justification for using the Regulatory Guide damping values in conjunction with the TMI-1 design basis amplified response spectra. Specifically, the damping values to be used in the analysis as specified by R.G. 1.61 and as recommended by Dr. Kennedy are as follows:

Reinforced Concrete:	4% for the OBE case and 7% for the SSE case
Pressurizer Support Steel: (Including Lugs and Lug Bolts)	4% for the OBE case and 7% for the SSE case
Pressurizer:	2% for the OBE case and 4% for the SSE case

The pressurizer supports have been analyzed using the existing TMI-1 design basis amplified floor response spectra at the damping values listed above. The preliminary results of this analysis demonstrate that the pressurizer supports are fully compliant with requirements of the TMI-1 UFSAR except for the use of higher damping values. However, the existing TMI-1 design basis amplified floor response spectra were not generated in accordance with the current requirements of the Standard Review Plan and pertinent regulatory guides. Based on input from Dr. Kennedy, the following steps are being followed to provide a technical basis for using the higher damping values:

1. Using the Uniform Hazard Spectra developed by Lawrence Livermore National Labs and presented in LLNL93 and NUREG 1488 as input, develop amplified in-structure response spectra that fully comply with the requirements of the latest revision of the Standard Review Plan using the best estimate soil properties. Based on recommendations of Dr. Kennedy, the LLNL93 median  $1 \times 10^{-5}$  Uniform Hazard Response Spectrum (UHS), specified as a rock outcrop motion at elevation 277 ft is being used as input to this analysis.
2. Using the existing TMI-1 SSE design basis ground response spectra as input, develop a second set of amplified in-structure response spectra that fully comply with the requirements of the latest revision of the Standard Review Plan using the best estimate soil properties.
3. Plot the two sets of spectra generated in Steps 1 and 2 at 4% and 7% damping. If the existing design basis amplified response spectra plotted at 4% and 7% damping envelop the spectra generated in Steps 1 and 2 at all frequencies, then use of the design basis spectra at the higher damping values is justified. That is, the design basis response spectra would be more conservative than spectra calculated in accordance with current criteria.
4. If the two sets of spectra generated in Steps 1 and 2 are not enveloped by the existing design basis amplified response spectra at 4% and 7% damping at every frequency, an analysis of the pressurizer supports will be conducted using the spectra generated in steps 1 and 2 as input. Prior to this analysis however, two additional sets of amplified response spectra are generated using the UHS as input, but with the lower bound and upper bound soil properties respectively. These three sets of response spectra are then broadened and enveloped in accordance with the requirements of the latest revision of the Standard Review Plan.
5. The pressurizer supports are then analyzed using an envelope of the spectra generated in step 4 and the spectra generated in Step 2. The spectra generated in Step 2 is broadened but is generated only for the best estimate soil case. This is due to the fact that the spectra generated from the UHS greatly exceed the spectra generated from the design basis ground response spectra at all frequencies of interest.
6. If the forces generated from the analysis of the pressurizer described in Step 5 are less than the forces obtained from the analysis using the 4% and 7% damped existing design basis amplified response spectra, then use of the design basis response spectra at the higher damping values is justified. That is, the use of the design basis response spectra at damping values specified in Regulatory Guide 1.61 produce loads that are more conservative than the loads that result from an analysis performed in full compliance with the current Standard Review Plan.

To ensure that the amplified response spectra are generated in accordance with the latest requirements of the Standard Review Plan, GPU Nuclear has contracted with Dr. Kennedy to direct and oversee all aspects of this effort. EQE International, Inc. has been contracted to generate the amplified response spectra using latest analytical methodologies and using the uniform hazard spectra as input. EQE has also been contracted to perform all spectra comparisons and to develop enveloping spectra for use in analyzing the pressurizer supports. The response spectra developed from the design basis ground response were generated previously by EQE for use in resolution of USI A-46. These spectra were developed in accordance with the Standard Review Plan and have been determined by the NRC to be classified as "conservative design in-structure response spectra" (Reference NRC letter to GPU Nuclear C311-94-3247, dated September 26, 1994) per the definition provided in the SQUG Generic Implementation Procedure.

In the first phase of the current work, EQE International has generated the 4% damped amplified response spectra at the location of the pressurizer supports using the uniform hazard spectra and the best estimate soil profile as input. These spectra are enveloped by the 4% damped design basis amplified response spectra at the fundamental natural frequencies of the pressurizer. However, they are not enveloped by the design basis amplified response spectra at all frequencies. Therefore, as described above per the direction of Dr. Kennedy, EQE is presently in the process of developing additional amplified response spectra for the upper bound and lower bound soil profile estimates. These spectra are being broadened and enveloped and plotted at 4% and 7% damping. The enveloped spectra are then combined with the spectra generated in accordance with the Standard Review Plan using the design basis ground response spectra as input. Since the response spectra generated from the UHS exceed the response spectra generated from the design basis response spectra at all frequencies above 6 Hz. and since the first frequency of the pressurizer is 13 Hz, only the best estimate soil profile case is being used for the spectra generated from the design basis spectra. The resulting enveloped response spectra is then used to determine loads on the pressurizer supports. As stated previously, if these loads are less than the loads generated from the 4% and 7% SSE damped design basis amplified response spectra, then use of the design basis amplified response spectra in conjunction with the Regulatory Guide 1.61 damping values is justified.

GPU Nuclear expects to complete development of the 4% and 7% damped amplified response spectra generated from the uniform hazard spectra by the end of August 1999. The spectra will then be enveloped and used as input to calculate loads on the pressurizer supports. This work is expected to be complete by the first week in September. If the loads are less than those obtained from the 4% and 7% SSE damped design basis amplified response spectra, then GPU Nuclear plans to submit a formal license change request to revise the TMI-1 UFSAR to permit use of the damping values from Regulatory Guide 1.61 with the existing design basis amplified response spectra for analysis of the pressurizer. This analysis will demonstrate that the existing pressurizer supports fully comply with all other requirements of the TMI-1 UFSAR if the regulatory guide damping values are used in the analysis.