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OG-07-402

Mr. John Grobe
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: PWR Owners Group
NRC Letter of July 18, 2007 from Mr. John A. Grobe to Mr. Gordon Bischoff, "Potential Adverse Flow Effects in Nuclear Power Plants"

Reference: NRC letter dated July 18, 2007; Subject: POTENTIAL ADVERSE FLOW EFFECTS IN NUCLEAR POWER PLANTS

Dear Mr. Grobe:

Thank you for communicating with the PWROG prior to issuing a Regulatory Issue Summary (RIS) on potential adverse flow effects. This letter only addresses operating PWRs.

While we acknowledge the potential significance of the issue, we note that the PWROG has not had significant interactions with the NRC on this topic, nor have we addressed adverse flow effects generically. As stated in the NRC letter, "The acoustic resonance phenomenon that causes adverse flow effects in nuclear power plants is highly complex…" This complexity requires a deliberate and focused effort to understand it sufficiently.

We note that a similar letter was sent to the BWROG. It is our understanding that the NRC and the BWROG have had significant communications for several years and this is to be commended. However, there has been little communication with the PWROG regarding this issue and consequently, we do not have a good understanding of the regulatory concerns and objectives. This is not to suggest the issue is unimportant for pressurized water reactors, but it is essential for the PWROG and NRC to communicate on generic issues.

A general comment is that because of differences between PWR and BWR designs, we question whether adverse flow effects can or should be addressed generically for all light water reactors. In the NRC letter, we note that many of the seven topics listed for consideration are assumed to be applicable to both PWR and BWR designs. However, we need to consider the differences in the NSSS designs when defining and resolving these topical areas. For example, steam flow effects are different in pressurized and boiling water reactor designs. Likewise, changes due to power rating cannot be deemed comparable. Our point is that PWR and BWR issues related to adverse flow effects should be separated rather than combined in NRC guidance documents. Acknowledging the design differences will allow the industry to apply resources effectively and resolve the NRC issues.

As an example of the need to separate BWR and PWR topics, we note that Regulatory Guide 1.20, Revision 3, is cited in your July 18 letter as one of the documents recently updated with respect to adverse flow effects. This revision significantly expanded the document's scope beyond reactor internals vibration assessment. The Regulatory Guide wording now includes references to BWR steam dryers and PWR steam generators. While vibration from adverse flow effects is a generic fluid systems engineering topic, the issues are different for the various NSSS types. As a result, the guidance from Regulatory Guide 1.20, Revision 3, is confusing and will hinder resolving the NRC's concerns.

The following section contains the seven (7) topics in your July 18 letter, with our comments:

1. Pressure Fluctuations and Vibration in Plant Systems (including the construction and validation of a small SMT facility, and method and approach for the measurement of plant-specific data to determine pressure fluctuations and vibration that can impact structures, systems, and components)

   PWROG Comment
   In most PWRs, pressure fluctuations during normal operation are minor and have not caused adverse effects. Likewise, few PWRs have experienced adverse effects from acoustic resonance conditions. The NRC has expressed concern for uprated conditions, but note that upratings for PWRs generally produce only small changes in primary system flow characteristics; so there is little change to pressure and vibration. Therefore, we believe there is no need to require measuring plant-specific data from all PWRs when a generic issue is not apparent.

2. Design Load Definition for Steam Dryers (including the development of an analytical methodology to calculate fluctuating pressure loads on the steam dryer that is validated against SMT data and plant-specific instrumented steam dryers)

   PWROG Comment
   PWRs steam dryers are in the secondary side of the steam generators and therefore cannot adversely affect the reactor internals. These components cannot be directly compared to the BWR steam dryers. The NRC needs to define the issues pertaining to adverse flow effects for the PWR steam dryers.

3. BWR Steam Dryer Stress and Limit Curves (including the performance of a finite element analysis using appropriate damping values, justification of bias error and uncertainty for each category of the stress calculation on a frequency-specific basis, and development of limit curves based on plant data accounting for bias errors and uncertainties as well as concentration and weld size factors)

   PWROG Comment
   This topic is not applicable to PWRs.

4. PWR Steam Generator Stress and Design Margin (including the evaluation of the dynamic response, stress, and design margin of the internal components in steam generators)

PWROG Comment
This needs to be evaluated.

5. Evaluation of Other Plant Components (including the evaluation of potential adverse effects from pressure fluctuations and vibration on piping and components in reactor coolant, steam, feedwater, and condensate systems, such as safety relief valves, power-operated valves, and sampling probes)

PWROG Comment
The subject pressure fluctuations and vibrations have rarely occurred in these piping systems. There are no established vibratory loads for use in design and analysis. Developing the loads and then evaluating for these loads would be an extensive effort. Based on the limited occurrences of these vibrations, it is not prudent or necessary to design and analyze all the valves in the candidate piping systems for the pressure fluctuations and vibratory loads. If we change a valve and support spacing, the changes are addressed in the design control process.

6. Power Ascension Data (including the development of power ascension procedures with limit curves and frequent data collection, walkdowns, and hold points for data evaluation and NRC staff interaction)

PWROG Comment
Data collection during power ascension for PWRs has not previously required hold points and NRC staff interaction. Also, preoperational and startup testing does not typically include NRC hold points. We believe that forcing the plants to suspend power ascension for a hold point is unnecessary for plant safety.

7. Monitoring of Potential Adverse Flow Effects (including the development of proactive methods for identifying acoustic resonance or severe hydrodynamic loading prior to component failure)

PWROG Comment
Because configuration and conditions leading to pressure fluctuations and pipe vibrations are not well defined, monitoring for potential adverse flow effects would require widespread instrumentation to catch the rare event of vibrations. Observation during preoperational startup and power accession testing should be sufficient to detect any significant vibrations that are a result of pipe configuration and design.

If you have any questions regarding these comments, please contact Reginald Dulaney (412) 374-6549 or any of the undersigned.

Regards,

Frederick P. "Ted" Schiffley, II, Chairman
Pressurized Water Reactors Owners Group

FPS:RRD:mjl

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