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DUKE POWER

January 30, 1992

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

Subject: McGuire Nuclear Station, Units 1 and 2  
Docket Nos. 50-369 and 50-370  
NRC Bulletin 88-11  
Pressurizer Surge Line Thermal Stratification

Dear Sir;

By a letter dated August 1, 1991, the NRC issued a Safety Evaluation Report (SER) on the Westinghouse Owners Group (WOG) Pressurizer Surge line Thermal Stratification Generic Detailed Analysis (WCAP-12639). The SER advised us that the WOG program results could be used to satisfy items 1.c and 1.d of the bulletin for McGuire and Catawba Nuclear Stations, provided that plant specific applicability is demonstrated and additional evaluation requirements as specified within the SER are performed. Your August 1, 1991 letter also requested that we submit the results within 30 days of completing the analysis.

The analysis was completed on December 31, 1991, accordingly please find attached a summary of the results of our analyses for McGuire Nuclear Station (attachment 1). Briefly, the results of the analyses confirm the adequacy of the existing designs for McGuire. In addition, Pipe support drawings affected by the stratification analysis have been revised and issued for McGuire.

Further, please be advised that all actions requested by Bulletin 88-11 of licensees of operating PWRs (Items 1.a through 1.d) have been completed for the McGuire Nuclear Stations. Details of the inspections, analysis and evaluations performed in support of responding to this bulletin are available for inspections.

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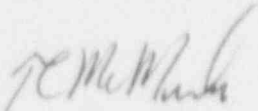
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If you have any questions regarding the information provided in response to Bulletin 88-11, please contact Paul Guill at (704) 875-4002.

I declare under penalty of perjury that the statements set forth herein are true and correct to the best of my knowledge.

Very truly yours,



Ted C. McMeekin, Vice President

xc: S. D. Ebnetter  
Regional Administrator, Region II

P. K. VanDooran  
Senior Resident Inspector, McGuire

T. A. Reed, Project Manager  
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H. A. Froebe {group file 815.02 (bulletin 88-11)}  
Master File 1.1.3  
MNS File 815.02 (bulletin 88-11)  
Corporate Records

## ATTACHMENT 1

### DUKE POWER COMPANY MCGUIRE NUCLEAR STATION RESPONSE TO BULLETIN 88-11 PRESSURIZER SURGE LINE THERMAL STRATIFICATION

All analyses and evaluations required for NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification, are complete. Results of the analyses confirm the adequacy of the existing designs. Pipe support drawings affected by the stratification analysis have been revised and issued. A summary of the actions taken for final closure of NRC Bulletin 88-11 for McGuire Nuclear Station follow. The summary is presented in four parts: Background, SER Applicability Requirements, SER Plant Specific Evaluations, and Additional Evaluations.

#### Background

NRC Bulletin 88-11 required utilities to take action to confirm the structural adequacy of the pressurizer surge line considering the effects of thermal stratification and thermal striping. Generic tasks required by NRC Bulletin 88-11 were performed under the auspices of the Westinghouse Owners Group. The results of the Westinghouse Owners Group program were summarized in WCAP 12639, "WOG Pressurizer Surge Line Thermal Stratification Generic Detailed Analysis." The NRC transmitted the staff's SER on the WCAP 12639 with a letter to M.S. Tuckman dated August 1, 1991. The SER stated that for McGuire Units 1 & 2, "the WOG generic detailed analysis results can be used to satisfy the requirements of NRC Bulletin 88-11, Actions 1.c and 1.d, provided that plant specific applicability is demonstrated and additional evaluations which were not included as part of the WOG program are performed.

Applicability requirements include:

Review of operating records to ensure that system delta-T limits assumed in the analysis were not exceeded

Verification of operational methods to ensure that they are consistent with the methods assumed in the analysis. Limits on system delta-T for future operation are recommended.

Verification of applicability of seismic OBE bending moments used in the fatigue analysis and combined deadweight and OBE moments at the hot leg nozzle.

Additional plant specific evaluations to be performed include:

Evaluation of adequacy of pipe support[s for] loads and displacements.

Evaluation of effects of stratification on stress and fatigue at integral welded attachments (lugs, plates, etc.)

Evaluation of effects of stratification on stress and fatigue of the pressurizer nozzle."

## Applicability Requirements

**Requirement 1. Review operating records to ensure that system delta-T limits assumed in the analysis were not exceeded.**

The McGuire operating records were reviewed. No occurrences were found of system delta-T exceeding 320°F; or, of fill and vent delta-T greater than 150°F. The system delta-T limits assumed in the WOG generic analysis are applicable for past McGuire operation.

**Requirement 2. Verify operational methods to ensure that they are consistent with the methods assumed in the analysis. Limits on system delta-T for future operation are recommended.**

The maximum administratively controlled pressurizer to RCS delta-T at McGuire is 370°F. This exceeds the 320°F assumed in the analysis. However, as noted in requirement (1), the 320°F degree has never been exceeded. The 370°F can only potentially occur when the pressurizer is at its maximum temperature allowed during heatup without an RCP running (440°F), with the RCS temperature at the minimum allowed (70°F) {  $440 - 70 = 370$  }. In practice the 370°F does not occur. Normal operating practice is to turn on a reactor coolant pump while the pressurizer is in the range of 425°F to 430°F and RCS temperature is in the range of 110°F to 130°F. Maximum system delta-T given this normal operating practice is 320°F {  $430 - 110 = 320$  }. The fatigue life of the surge line will be determined by normal operating practice. The WCAP 12639, 320°F limit on pressurizer to RCS temperature difference is a fatigue limit, not a primary stress type (ductile rupture) safety limit or a brittle fracture type safety limit. Adequate conservatism exists in the analysis to more than compensate for a brief excursion above the 320°F limit should such an excursion ever occur. Thus, the McGuire operating methods are consistent with the methods assumed in the WCAP 12639 analysis.

**Requirement 3. - Verify the applicability of seismic OBE bending moments used in the fatigue analysis and combined deadweight and OBE moments at the hot leg nozzle.**

A unit specific analysis has been completed for the McGuire Unit 1 and Unit 2 surge lines. The analyses confirm that the seismic OBE bending moments for the McGuire Unit 1 and Unit 2 surge lines are less than the 1731 in-kips used in the WCAP 12639 analysis (reference pg 9-14 of WCAP 12639.) The combined deadweight and OBE inertia moments are less than 1847 in-kips (reference pg 9-21 of WCAP 12639).

### **Plant Specific Evaluations**

**Evaluation 1. Evaluate adequacy of pipe support[s for] new loads and displacements.**

Results of the unit specific analyses confirm that all pipe support loads and displacements remain within applicable design limits. Loads and displacements for all loading conditions were evaluated. The pipe support structural attachments were also evaluated for the increased pipe support loads. Each McGuire unit surge line is supported by one spring, one snubber and one rigid (three supports per unit; six total for the station). The six pipe support drawings have been revised to reflect the new loads and movements resulting from the thermal stratification analysis.

**Evaluation 2. Evaluate the effects of stratification on stress and fatigue at integral welded attachments (lugs, plates, etc.)**

Integral welded attachments are not used on the McGuire surge lines. This SER evaluation is not applicable to McGuire Nuclear Station.

**Evaluation 3. Evaluate the effects of stratification on stress and fatigue of the pressurizer nozzle.**

As noted in our July 15, 1991, letter to the NRC staff, Westinghouse has completed an analysis of the pressurizer surge nozzle accounting for the effects of stratification. The analysis confirms that the pressurizer nozzle satisfies all applicable stress and fatigue limits considering the effects of stratification.



## Additional Evaluations

In addition to the applicability and plant specific evaluations included in the SER, the following was also evaluated:

1. the new maximum pipe movements against available rupture restraint gaps,
2. the effect of stratified movements on rupture restraint blowdown loads; and,
3. effect of stratification on postulated break locations.

### **Additional Evaluation 1.**

The new maximum pipe movements resulting from the combination of uniform expansion, stratification, SSE and LOCA were evaluated against the available rupture restraint gaps. Contact was predicted at one rupture restraint. The effects of the contact were evaluated with respect to the pipe, the rupture restraint device, and the pipe supports. The components evaluated are structurally adequate considering the effects of the predicted contact. All other devices were found to have adequate clearance for all loading conditions.

### **Additional Evaluation 2.**

The effect of stratified movements on rupture restraint blowdown loadings was evaluated. (Rupture restraint loadings are a function of the hot gap.) Existing blowdown loads remain adequate when considering the new thermal expansion movements associated with thermal stratification.

### **Additional Evaluation 3.**

The effects of stratification on postulated break locations was evaluated. Final stress and fatigue results, including the effects of stratification, were reviewed and resulted in no new postulated break locations.