



PIPE SUPPORT GUIDELINES

CRITERIA FOR DETERMINING JUSTIFICATION
FOR CONTINUED OPERATION WHEN ENCOUNTERING
MAJOR DISCREPANCIES IN "AS-BUILT" SAFETY RELATED PIPING

WISCONSIN ELECTRIC POWER COMPANY
Point Beach Nuclear Plant



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1.0 INTRODUCTION & SCOPE

These criteria are intended to assure the operability requirements of safety related piping and associated supports if it is determined that stresses exceed allowables presented in the Point Beach Nuclear Plant FSAR. These criteria permit operation for an interim period only. Modifications will be made which return the system to within FSAR allowables by the next refueling outage or sooner if operation permits.

These criteria are intended to expeditiously perform necessary evaluations to determine interim operability and not to delay appropriate actions.

For cases involving components classified as ASME Code Class I where FSAR allowables are exceeded, WE shall be notified upon discovery and WE shall evaluate reportability requirements per 10CFR50.

2.0 CRITERIA

2.1 Piping Operability Criteria

The piping analysis shall be in accordance with ASME, Section III NC-3600 service level D limits (Ref. 1). The design loading conditions to be applied in the analysis shall include the DBE earthquake.

Following is the pipe stress criteria for justifying continued operation of the plant:

$$[S_{LP} + S_{WT} + S_{DBE} < 2.0 S_Y] \quad (\text{Ref. 1 equation 9})$$

Where:

- S_{LP} = Longitudinal Pressure Stress
- S_{WT} = Dead Weight Stress
- S_{DBE} = Stresses Resulting From Design Basis Earthquake
- S_Y = Material Yield Stress (Reference 1 Appendices)

Code Case N-411 allows for increased damping values, independent of pipe diameter, for seismic analysis. Therefore, increased damping values, in accordance with reference 2, will be acceptable when performing these analyses to meet operability. Should the piping stress analysis exceed the value of $2.0 S_Y$, or pipe supports do not meet their operable limits (see Section 2.2), then additional iterative analysis of the piping may be required. The iterative analysis may use the knowledge that a support is not capable of withstanding the loads, and can be removed from the analysis. Where feasible, the actual support stiffness may be included in the iterative analysis, along with other refinements.



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For cases where piping secondary stresses are determined to exceed FSAR allowables, a specific case by case approach will be used to determine interim operability.

2.2 Pipe Support & Hanger Operability Criteria

As a first step in evaluating the support, a linear elastic analysis method will be used to determine the stress in the support members. In addition to the loading in Section 2.1, the support loads must include pipe thermal loads and results from free end displacement and anchor motion. Supports will be analyzed using the allowables listed below to meet operability requirements.

Structural Steel

Tension $F_t = 1.20 S_y$ but
 $\leq 0.70 S_u$

Bending $F_b = 1.20 S_y$ but
 $\leq 0.70 S_u$

Shear $F_v = 0.72 S_y$ but
 $\leq 0.42 S_u$

Compression $F_a < F_c$ but not to exceed
 $\frac{2}{3} P_{cr}$

Combined Stress For axial compression and bending
or axial tension and bending, use
AISC 1.6., (Ref. 6)

Web Crippling $= 1.0 S_y$

Weld Stress $F_w = 0.42 S_u$ (of weld material)

Anchor Bolts Use Factor of Safety of 2 against
ultimate tension and shear values

Snubbers

Hydraulic: Load $<$ manufacturers one time load
capacity.
Movement $<$ total travel

Springs Load within catalog range without
bottoming out

Struts $FS = 2$ and $< \frac{2}{3} P_{cr}$



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All remaining
Catalog Items

Use manufacturers published faulted load rating. Where level D allowables are not given, and the factor of safety is specified in the catalog, use design allowables but with $FS = 2$. (Typical catalog $FS = 5$, therefore use $2.5 \times$ catalog capacity.

Where:

- F_t = Allowable Tensile Stress
- F_b = Allowable Bending Stress
- F_v = Allowable Shear Stress
- F_a = Allowable Axial Compressive Stress
- F_w = Allowable Weld Stress
- P_{cr} = Maximum Strength of Axially Loaded Compression Member
- S_y = Specified Minimum Yield Strength at Temperature (See Note 1)
- S_u = Specified Minimum Tensile Strength Temperature
- FS = Factor of Safety

Note 1: Actual yield strength may be used where CMTR's are available for the material.

If a support fails using the linear elastic method, then a more refined analysis may be performed using plastic analysis techniques. The plastic analysis will follow the design rules of ASME Section III, Appendix F, (Ref. 1)

3.0 CONCLUSION

If the above criteria cannot be met, reportability per 10CFR50 must be evaluated and system operability requirements per Plant Technical Specifications must be evaluated and appropriate actions taken.

4.0 REFERENCES

1. American Society of Mechanical Engineers, Boiler and Pressure Vessel Codes, Section III, 1983 Edition, through Winter 1985 Addenda.
2. American Society of Mechanical Engineers, Boiler and Pressure Vessel Codes, Case N-411, Dated 9/17/84.



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3. NRC-IE Bulletin 79-02, "Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts," Revision 7.0. 1 (Supplement No. 1), Dated 8/20/79.
4. USAS B31.1.0-1967, Power Piping Code.
5. "Manual of Steel Construction," American Institute of Steel Construction, Inc., Eighth Edition, 1980.