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U.S. Nuclear Regulatory Commission
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**DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT**
SUBMITTAL OF SUPPLEMENTARY INFORMATION IN SUPPORT OF RELIEF REQUEST NO. RR-13

In a letter dated December 20, 1998, Consumers Energy Company submitted for NRC approval a request for relief from certain requirements of Section XI of the ASME Boiler and Pressure Vessel Code. In response to questions raised during a series of telephone conference calls on December 21, 1998, additional supplementary information was transmitted by fax to facilitate staff review. The purpose of this letter is to docket that supplementary information.

Attachment 1 provides a brief discussion of reasons why seismic loading cases are not controlling in the analysis of Primary Coolant Pump casing bolt stresses. Attachment 2 discusses the additional casing bolt stress and fatigue considerations which would result from eccentricity due to bolt wastage. Consumers Energy will incorporate this information into a revision of Engineering Analysis EA-C-PAL-98-1939-01 and submit the revised analysis under separate cover.

In addition to the technical information, Consumers Energy Company provided an additional commitment relating to methods of monitoring for Primary Coolant System leakage. That commitment is restated below.

A047

SUMMARY OF COMMITMENTS

This letter contains two new commitments and no revisions to existing commitments. The new commitments are:

1. The information provided in Attachments 1 and 2 will be incorporated into a revision of Engineering Analysis EA-C-PAL-98-1939-01. The revised analysis will be submitted to the NRC.

2. With the plant at steady state power, if a Primary Coolant System leak rate calculation indicates an unidentified leak rate in excess of 0.3 gpm, or the containment sump level trend indicated by the Plant Process Computer indicates a change in unidentified sump inleakage rate in excess of 0.2 gpm, a confirmatory Primary Coolant System leak rate calculation will be performed as soon as possible. If the confirmatory calculation verifies that the unidentified Primary Coolant System leak rate is greater than 0.3 gpm, and the reason for this leak rate is not understood, action will be initiated within 24 hours to place the plant in Hot Standby. Before the plant is returned to power operation, it will be verified that indication of leakage was not a result of significant additional degradation of Primary Coolant Pump P-50A.

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CC Administrator, Region III, USNRC
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NRC Resident Inspector - Palisades

Attachment

ATTACHMENT 1

CONSUMERS ENERGY COMPANY
PALISADES PLANT
DOCKET 50-255

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# DISCUSSION OF SEISMIC LOADING CASES IN ANALYSIS OF PRIMARY COOLANT PUMP CASING BOLT STRESSES

EA-C-PAL-98-1939-01 Seismic Design Considerations

The initial seismic design of Palisades NSSS components was conducted in a very simplistic, static manner. In the 1986 time frame, Palisades elected to use the ASME Section III, Code Case N 411-1 damping in conducting seismic response spectrum analysis. This entailed using the response spectrum curves provided Palisades by the NRC via NUREG/CR 1833.

The implementation of these curves required the determination of seismic anchor movements for piping attached to the primary coolant system. At about the same time, it was necessary for Palisades to determine time history input to the reactor vessel in order to conduct nonlinear seismic analysis on the new fuel bundles. Each of these analysis demands required that the primary coolant system vessels and piping be decoupled from the stick building model for the development of an interaction model. The vessels themselves ( reactor vessel, steam generator, pressurizer and primary coolant pumps ) were characterized by stick model members. This enabled the analysts to calculate seismic loads directly at critical cross sections.

This experience demonstrated that the interaction of the primary coolant system components with the concrete internal structure was such that the combined system/structure (original lumped mass) model was adequate for overall structural response and the seismic loading as previously calculated by the static ZPA methods was acceptable. The seismic loading was very modest and noncontroling with respect to the other load cases and the siesmic anchor movements of the primary coolant components could be ignored. This is the basis for the conclusion that seismic loadings cases and combinations are not limiting in the analysis of primary system components.

ATTACHMENT 2

CONSUMERS ENERGY COMPANY
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# CASING BOLT STRESS AND FATIGUE CONSIDERATIONS DUE TO ECCENTRICITY OF DEGRADED PRIMARY COOLANT PUMP CASING BOLTS

Reference/Comment

## Bolt Eccentricity

Preload and bending load load stresses are deflection limited secondry loads. Therefore, ASME code Stress Intensity limit is 2 Sy or 122 KSi

Preload + bending load stress intensity range = 37.32 + 38.5 = 76 KSi < 122 KSi

See Sheet 3 for 38.5 KSi

Therefore, bolt eccentricity due to corrosion is acceptable.

Peak Alternating stresses are determined to be 115 KSi, well within the fatigue resistance See attached.

Reference/Comment

Operating Pressure = 2060 psi

Pressure Load on joint = $2060 \times 48^2 \times \pi/4$

= 3727.7 Kips

Load of the equipment 112.3 Kips

Net Pressure load = 3605.4 Kips

Pressure Load/bolt = 225.3 Kips

Stress in the corroded bolt

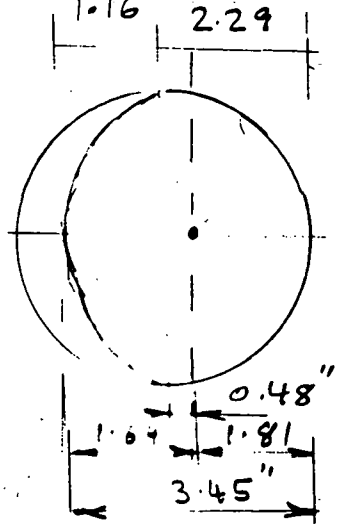
$= \frac{225.3}{12.21} = 18.5$ ksi

Stress Combination

Preload Stress + Op. Pressure Stress x $\phi$

= 32.71 + 18.5 x 0.25 = 37.32 ksi

C.G. of the combined section (1/2 circle + 1/2 ellipse) is 0.48" into the half circle as shown.



Moment of Inertia about CG axis
= 9.32 $in^4$

Tension will be on reduced area side

Bending stress due to moment (local)

$$= \frac{37.32 \times 12.21 \times 0.48}{9.32} \times 1.64 = 38.5 \text{ ksi}$$

Using a stress concentration factor of 5 — NB-3228.5 1998 ASME Code

Peak Bending Stress = $38.5 \times 5 = 192.5$ ksi

Total Peak stress = $37.32 + 192.5$
= 230 ksi

Peak Alternating Stress = $\frac{230}{2} = 115$ ksi

For 10 cycles, from ASME section III - 1998 Code, Fig. I-9.4, the maximum peak stress = 1000 ksi

Peak stresses are less than allowable maximum stresses. Therefore, the degraded stud is acceptable.

Reference/Comment