Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, MI 49201 • (517) 788-0550

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Dennis M Crutchfield, Chief
Operating Reactor Branch No 5
Nuclear Reactor Regulation
US Nuclear Regulatory Commisssion
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - NUREG-0737, ITEM II.D.1, RELIEF AND SAFETY VALVE TEST REQUIREMENTS

NRC letter dated September 29, 1981, requested a submittal addressing the functionability of the pressurizer safety and power operated relief valves in reference to NUREG-0737 Item II.D.1 that are installed in the Palisades Plant. NUREG-0737 Item II.D.1 requires that utilities operating a Pressurized Water Reactor (PWR) power plant submit: (1) evidence supported by test, of the functionability of the pressurizer safety and power operated relief valves and their associated piping; (2) qualification of PWR block valves to ensure that a stuck-open power operated relief valve can be isolated. Attached is Consumers Power Company Company's final report in response to the referenced NRC letter and NUREG-0737 Item II.D.1.

Brian D Johnson
Staff Licensing Engineer

A046

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

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NUREG-0737 ITEM II.D.1

RELIEF AND SAFETY VALVE TEST REQUIREMENTS
FINAL REPORT

NUREG-0737, Item II.D.1, requires that utilities operating a PWR power plant submit: (1) evidence supported by test, of the functionability of the pressurizer safety and power operated relief valves and their associated piping; (2) qualification of PWR block valves to ensure that a stuck-open power operated relief valve can be isolated. In response to these requests the following discussion is provided:

Reference 1 explains Consumers Power Company's participation in the EPRI valve testing program and the C-E Owners Group effort to evaluate the EPRI data and apply the results to the existing valves and valve operating conditions.

I. POWER OPERATED RELIEF VALVES (PORV's)

Reference 1 provides the information required for the power operated relief valves at Palisades by referring to C-E Report CEN-213 (Reference 4).

II. BLOCK VALVES

Palisades operates in the high pressure mode with the block valves closed; therefore, it is not necessary to evaluate their ability to close at high pressures and high rates of flow. For Low Temperature Overpressurization Protection (LTOP), the Palisades block valves are required to be opened when the temperature of one or more of the PCS cold legs is equal to or less than 250°F, and closed when the plant is reheated. This procedure is documented in the Technical Specifications (3.18) and the Operating Procedures (GOP-9, SOP-1). The valves have performed satisfactorily.

III. SAFETY VALVES

Combustion Engineering Report CEN-227 (Reference 3) provides the required information on the functionability of the safety valves at Palisades when the Palisades pressurizer high pressure reactor trip pressure is 2422 psia and the ring settings on the safety valves are one of the combinations listed in that report as applicable for Palisades. Valve opening occurs during the postulated "Loss of Load" event described in Chapter 14 of reference 5.

The pressurizer high pressure reactor trip point at Palisades is actually set at 2255 psia as specified in the Tech specs (Table 2.3.1). A "Loss of Load" analysis with the pressurizer high pressure reactor trip set at 2255 psia was performed by Exxon Nuclear Company and the results are printed in Reference 9. The peak PCS pressure with a 2255 psia pressurizer high pressure reactor trip set point is calculated by Exxon to be 2394 psia. This pressure is not sufficient to cause the safety valves to open. They are set at 2485, 2525 and 2565 psig.

"Loss of Load" is the only incident listed in the FSAR which causes the safety valves to open. With the pressurizer high pressure reactor trip point set at 2255 psia, the Loss of Load incident will not cause the

safety valves to open. Therefore, none of the incidents listed in the Palisades FSAR will cause the pressurizer safety valves to open. However, Consumers Power Company has proceeded with the qualification of the safety valves as if the valves would be caused to open due to the postulated "Loss of Load" event in reference 5.

In October 1981, Palisades pressurizer safety valve rings were set by Wyle Laboratories, per Dresser's recommendations, at -45, -30, -2 notches for the top ring, middle ring, and bottom ring, respectively. They are the existing ring settings on all three safety valves.

C-E report CEN-227 (Ref 3) recommends four different sets of ring settings for Palisades - none of which are the same as the existing ring settings. As noted in CEN-227, the recommended settings are not the only settings which allow acceptable valve functionability, but were recommended in that report because they were used in the EPRI testings.

From the EPRI test results Consumers Power Company has correlated the effect of ring setting on valve lift and blowdown and has determined the existing ring settings at Palisades will cause approximately 8% blowdown and a steam flow of approximately 238,000 lb/hr/valve. Therefore, blowdown is sufficient to permit the stable operation of the valve and steam flow is sufficient to limit the primary system pressure to less than 110% percent of design (2750 psia). The Palisades Technical Specifications (Reference 6) state that less than one-half of one valve's rated capacity (230,000 lbs/hr Ref 5) is sufficient to limit the PCS pressure to less than 2750 psia.

Because of the findings of the EPRI valve tests, as evaluated in the CE report CEN-227 and the Consumers Power correlations of EPRI test results to ring setting, Consumers Power Company considers the pressurizer safety valves, as they exist, to be qualified under present operating conditions.

IV. SAFETY AND RELIEF VALVE PIPING

Consumers Power Company contracted with EDS Nuclear to analyze the safety and relief valve piping (Reference 10). The analysis was performed using the Relaps/MOD1 and the Superpipe computer codes. Results of analysis indicate the piping upstream of the safety and power operated relief valves meets code of record allowable stresses. At the safety valve outlet flanges and at certain points of the non-pressure retaining, non-seismic class discharge piping, code allowable stresses for valve activation loadings are exceeded. However, for the bounding system transient (The FSAR listed "Loss of Load") with the plant in its current configuration (no use of the PORVs), at no point do the combined, valve activation and sustained pipe stresses exceed the faulted allowables.

The computed pipe support loads were compared to the loadings derived from the recent IE Bulletin 79-14 re-evaluation. In most cases the valve activation and sustained loadings exceeded the 79-14 loadings. However, the actual capacity of the supports exceeds the 79-14 loads. Even though the Exxon Report's (Reference 9) analysis shows that the Loss of Load

transient will not challange the safety valves, in the first quarter of 1983, Consumers Power Company will proceed to analyze the pipe supports to determine those supports which may be overloaded by valve activation forces during the 1985 shutdown, it is intended to modify those supports in which the postulated stresses exceed code allowables.

SUMMARY

1. Consumers Power Company considers the safety valves at Palisades to be qualified in their present condition as a result of evaluation of the EPRI test results.
2. The power operated relief valves are not used in the high pressure mode and do not need to be qualified. In the LTOP mode the valves are qualified (Ref 1).
3. The block valves are not opened in the high pressure mode and do not need to be qualified. Continued trouble free operation of these valves when going to and from the LTOP mode during each cold shutdown and reheat qualifies them for that function.
4. The valve piping stresses do not exceed faulted allowables.
5. Some pipe supports may exceed code allowables. Qualification by analysis of the pipe supports will begin in the first quarter of 1983. Modifications to supports in which stresses are postulated to exceed code allowables are planned for the 1985 outage.

CONCLUSION:

Palisades has complied with the intent of NUREG-0737 Item II.D.1.

REFERENCES

1. Letter dated June 30, 1982 from BDJohnson, Consumer Power Company to DMCrutchfield, NRC - Response to Reference 2.
2. NRC letter dated September 29, 1981 - Refering to the Functionability of Safety and Relief Valves.
3. Combustion Engineering Company Report CEN-227 "Summary Report on the Operability of Pressurizer Safety Valves in CE Designed Plants", transmitted on 12/20/82 to Harold Bernard of the NRC by RWWells, Chairman of the C-E Owners Group.
4. Combustion Engineering Company Report CEN-213 "Summary Report on the Operability of Power Operated Relief Valves in C-E Designed Plants" submitted to the NRC by KPBaskin.
5. Palisades FSAR.
6. Palisades Technical Specifications (3.18).
7. Palisades Operating Procedures.
8. EPRI "Safety and Relief Valve Test Report" dated September 1982.
9. "Plant Transient Analysis of the Palisades Reactor for Operation at 2530 Mwt." July 1977, No. XN-NF-77-18, by the Exxon Nuclear Company, Inc.
10. "Evaluation of Palisades Safety and Relief Valve Discharge Piping," November 1982. Revision 0, EDS Nuclear Inc (one copy attached).