UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION REQUESTS FOR RELIEF

FOR

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

The Technical Specifications for Palisades Plant state that the inservice inspection (ISI) and testing of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The 1983 Edition, Summer 1983 Addenda, of Section XI is the applicable edition of the ASME Code for the Palisades Plant, second 10-year ISI interval. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to

10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law; will not endanger life, property, or the common defense and security; and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

In a letter dated January 24, 1995, the licensee, Consumers Power Company (CPC), proposed an alternative examination to the requirements of the ASME Boiler and Pressure Code, Section XI. CPC requested approval for the implementation of the alternative rules of ASME Section XI Code Case N-498-1, dated May 11, 1994, "Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems" pursuant to 10 CFR 50.55a(a)(3) for 10-year hydrostatic testing on Class 1, 2, and 3 systems.

2.0 EVALUATION

2.1 Licensee's Request

The licensee's January 24, 1995, letter stated the following request:

> The AMSE Code Case N-498 allows Class 1 and 2 systems to be hydrostatically tested at a reduced pressure equal to the system nominal operating pressure. Code Case N-498 has been endorsed by the NRC in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI Division I." The ASME has recently expanded the scope of the Code Case when it approved Code Case N-498-1.
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> Code Case N-498-1 repeats the requirements for hydrostatically testing Class 1 and 2 systems and extends the allowed nominal operating pressure testing to Class 3 systems. Code Case N-498-1 also allows the use of installed plant instrumentation in place of the requirements for special test gauging of IWA-5260 when performing these nominal operating pressure tests.
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> Due to its recent approval, Code Case N-498-1 has not yet been approved for use in Regulatory Guide 1.147. However, in accordance with footnote 6 to 10 CFR 50.55a, we request approval for use of Code Case N-498-1 for inservice testing during the 1995 refueling outage which is presently scheduled to begin in May of this year.

2.1.1 Licensee's Component Identification

Components identified for this relief include Class 1, 2, and 3 systems subject to hydrostatic testing.

2.1.2 ASME Code, Section XI, Requirements

Section XI, Table IWB-2500-1, Category B-P (for Class 1), Table IWC-2500-1, Category C-H (for Class 2), and Table IWD-2500-1, Categories D-A, D-B, and D-C (for Class 3) contain the requirements for system hydrostatic and leakage testing. The Code requires system hydrostatic testing once per 10-year interval at or near the end of the interval.

2.1.3 Licensee's Proposed Alternative Testing

The licensee proposed to use the alternative contained in Code Case N-498-1, a system leakage test, in lieu of hydrostatic testing for Class 1, 2, and 3 Systems.

2.1.4 Licensee's Basis for Relief

The licensee's January 24, 1995, letter provided the following basis for use of Code Case N-498-1:

> Performance of system hydrostatic pressure tests imposes an undue hardship without a compensating increase in nuclear safety. The amount of effort expended in repairing system boundary valves, which are not designed for leak tight shutoff, in order to successfully complete testing is not compensated for by an increase in safety. Additionally, removing systems from service to complete hydrostatic testing poses a risk to safety by isolating cooling water from important plant loads, such as, spent fuel pool cooling and shutdown cooling.
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> Code Case N-498, currently endorsed by the NRC in Regulatory Guide 1.147, allows Class 1 and 2 System Hydrostatic testing at a reduced pressure equal to system nominal operating pressure. The recent ASME approved Code Case N-498-1, while repeating these requirements for Class 1 and 2, also clarifies the intent of using installed plant instrumentation without the need for test gauging or their imposed requirements of IWA-5260 when performing these nominal operating pressure tests.
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> It is Palisades' position that performing system pressure tests on Class 1 and 2 systems consistent with the requirements of N-498-1, together with the applicable volumetric examinations in accordance with the ISI Program, provides a level of quality and safety equivalent to, or greater than, that provided by the Code hydrostatic test pressure and instrumentation requirements.
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> Code Case N-498-1 also permits the reduced pressure testing in lieu of Hydrostatic Tests for Class 3 systems. Palisades Class 3 systems include portions of Chemical and Volume Control, Component Cooling, Service Water, Auxiliary Feedwater and Spent Fuel Pool Cooling Systems. Each of these systems is designed, fabricated, constructed and tested in a manner which assures pressure boundary integrity. Additionally, each system receives chemical treatment and/or monitoring to assure continued pressure boundary integrity.
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> The Auxiliary Feedwater System receives water from the Condensate Storage Tank T-2. The water contained in T-2 is filtered and demineralized to reduced corrosion of system components.
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> In the Component Cooling System, nitrite concentration is maintained to provide corrosion protection. The nitrate inhibitor acts to create

and maintain a passive oxide layer on the internals of the Component Cooling System. Sampling and analysis of system chemistry is performed at a frequency adequate to maintain proper corrosion inhibiting conditions.

For the Service Water System, Palisades employs a program designed to ensure corrosion, erosion, silting, biofouling and protective coating degradation are controlled so that safety-related components are not at risk. This program includes chlorination, zebra mussel chlorination treatment, inspections and coupon analysis. This program is also designed to control Microbiologically Influenced Corrosion (MIC).

The portion of Chemical and Volume Control between the Class 1 portion of letdown and the containment penetration has been designated as Class 3 in accordance with Regulatory Guide 1.26. The CVCS is designed to maintain Primary Coolant System chemistry, therefore, appropriate conditions are maintained through the use of filtration and addition of Boron, Hydrogen, Nitrogen and other chemicals.

Spent Fuel Pool chemistry is maintained through the use of Primary Make-up water and Boron. System design makes extensive use of stainless steel to reduce corrosion concerns. Chemistry containment limits are consistent with that of the Primary Coolant System, because Spent Fuel Pool water may enter the PCS when refueling is in process.

System chemistry for all Palisades safety systems is maintained by approved plant procedures. The purpose of chemistry control is to assure operational readiness by inhibiting degradation mechanisms which may compromise pressure boundary integrity.

Palisades maintains Visual Examination VT-2 certifications for all Auxiliary Operators and other selected individuals, who meet the educational, experience and physical requirements of ANSI N45.2.6. The VT-2 program provides training to assist operators in determining the pressure boundary integrity of all plant systems during daily rounds. Operators are trained to recognize evidence of leakage, as well as, actual system leakage. Operator use of VT-2 Examination training provides additional assurance of pressure boundary integrity for all class systems.

It is Palisades' position that performing system pressure tests on Class 3 systems consistent with the requirements of N-498-1, together with the implementation of chemical control and VT-2 examination programs, provides a level of quality and safety equivalent to, or greater than, that provided by the Code hydrostatic test pressure and instrumentation requirements.

2.1.5 Evaluation

Information prepared in conjunction with ASME Code Case N-498-1 notes that the system hydrostatic test is not a test of the structural integrity of the

system but rather an enhanced leakage test. That this was the original intent is indicated in a paper by S.H. Bush and R.R. Maccary, *"Development of In-Service Inspection Safety Philosophy for U.S.A. Nuclear Power Plants,"* ASME, 1971. Piping components are designed for a number of loadings that would be postulated to occur under the various modes of plant operation. Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure and therefore does not present a significant challenge to pressure boundary integrity since piping dead weight, thermal expansion, and seismic loads, which may present far greater challenge to the structural integrity of a system than fluid pressure, are not part of the loading imposed during a hydrostatic test. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leakage detection during the examination of components under pressure, rather than as a measure to determine the structural integrity of the components.

CPC requested approval for the implementation of the alternative rules of ASME Section XI Code Case N-498-1, dated May 11, 1994, "Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems" in lieu of 10-year hydrostatic testing of Class 1, 2, and 3 systems. The licensee may already use N-498, "Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, and 2 Systems" since use of Code Case N-498 for Class 1 and 2 systems was previously approved by the NRC in Regulatory Guide 1.147, Rev. 11. The rules for Code Class 1 and 2 in N-498-1 are unchanged from N-498. The staff found N-498 acceptable because the alternative provided adequate assurance and because compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Revision N-498-1 encompasses Class 3 components and specifies requirements for Class 3 that are identical to those for Class 2 components. In lieu of 10-year hydrostatic pressure testing at or near the end of the 10-year interval, Code Case N-498-1 requires a visual examination (VT-2) be performed in conjunction with a system leakage test in accordance with paragraph IWA-5000.

Currently, licensees incur considerable time and radiation dose in carrying out hydrostatic test requirements. A significant amount of effort may be necessary (depending on system, plant configuration, Code class, etc.) to temporarily remove or disable code safety and/or relief valves to meet test pressure requirements. The safety assurance provided by the enhanced leakage gained from a slight increase in system pressure during a hydrostatic test are offset or negated by the following factors: having to gag or remove code safety and/or relief valves, placing the system in an off-normal state, erecting temporary supports in steam lines, possible extension of refueling outages, and resource requirements to set up testing with special equipment and gages.

Class 3 systems do not normally receive the amount and/or type of Non-Destructive Examinations that Class 1 and 2 systems receive. While Class 1 and 2 system failures are relatively uncommon, Class 3 system leaks occur more frequently and the failure mode typically differs. Based on a review of Class 3 system failures requiring repair for the last 5 years in Licensee

Event Reports and the Nuclear Plant Reliability Data System databases, the most common causes of failures are erosion-corrosion (EC), microbiologically induced corrosion (MIC), and general corrosion. Licensees generally have programs in place for prevention, detection, and evaluation of EC and MIC. Leakage from general corrosion is readily apparent to inspectors when performing a VT-2 examination during system pressure tests. The industry indicates that experience has demonstrated that leaks are not being discovered as a result of hydrostatic test pressures propagating a preexisting flaw through wall. They indicate that leaks in most cases are being found when the system is at normal operating pressure.

Giving consideration to the minimal amount of increased assurance provided by the increased pressure associated with a hydrostatic test versus the pressure for the system leakage test and the hardship associated with performing the ASME Code required hydrostatic test, the staff finds that compliance with the Section XI hydrostatic testing requirements results in hardship and/or unusual difficulty for the licensees without a compensating increase in the level of quality and safety. Accordingly, the licensee's proposed alternative, use of Code Case N-498-1 for Code Class 1, 2, and 3 systems, is authorized for Palisades, pursuant to 10 CFR 50.55a(a)(3)(ii). CPC's alternative is authorized until such time as the Code Case is published in a future revision of Regulatory Guide 1.147. At that time, if the licensee intends to continue to implement this code case, the licensee is to follow all provisions in Code Case N-498-1, with limitations issued in Regulatory Guide 1.147, if any.

3.0 CONCLUSIONS

The staff evaluated the information provided by the CPC in support of its request for relief. Based on the information submitted, the alternative for hydrostatic testing contained in the licensee's proposal is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for Class 1, 2, and 3 systems as compliance with the specified hydrostatic testing requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The alternative is authorized until such time as the Code can be published in a future revision of Regulatory Guide 1.147, under the terms outlined above.

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