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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION REQUEST FOR RELIEF

FOR

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT, UNITS 1 AND 2

DOCKET NOS. 50-335 AND 50-389

1.0 INTRODUCTION

The Technical Specifications for St. Lucie Plant, Unit Nos. 1 and 2, state that the inservice inspection 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 Title 10 of the Code of Federal Regulations (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). Section 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commisson, 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 difficulty 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 that become effective subsequent to editions specified in 10 CFR 50.55a(g)(2) and (g)(3), 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, with Summer 1983 Addenda, of Section XI is the applicable edition of the ASME Code for St. Lucie Unit 1, and the 1989 Edition, with no Addenda, is the applicable edition of the ASME Code for St. Lucie Unit 2. This is the Second 10-year Inservice Inspection (ISI) Interval for both units.

ENCLOSURE

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 requirements. 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 September 18, 1996, the licensee, Florida Power and Light Company (FPL) proposed an alternative examination to the requirements of the ASME Boiler and Pressure Code, Section XI. FPL 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

This submittal is requesting approval pursuant to 10 CFR 50.55a(a)(3) for use of Code Case N-498-1, "Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems".

2.1.1 Licensee's Component Identification

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 or a system pressure test, in lieu of hydrostatic testing.

2.1.4 Licensee's Basis for Relief

The licensee stated the following basis for relief:

> This Code Case is an alternative to the 10-year system hydrostatic tests presently required by ASME Section XI for Class 1, 2, and 3 systems. Use of this alternative reduces the need for special system alignments

and temporary system alterations to conduct hydrostatic tests. Temporary system alterations include removal of check valve internals, installation of temporary jumpers, and in some instances, the blanking off of pressure relief devices. The preparation for and performance of the 10-year system hydrostatic tests involve excessive cost, man-hours, and man-REM with little or no compensating increase in the level of quality or safety.

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 a far greater challenge to the structural integrity of a system than fluid pressure, are not part of the loading imposed during a hydrostatic test. Water is used as a test medium in the hydrostatic test. Since water is highly incompressible, any small leak from a high pressurized, water-solid system can be readily detected by a sharp decline in system pressure, or by continual pumping required to maintain the system pressure. As such, hydrostatic pressure testing is primarily regarded as a means to enhance leakage detection during the examination of components under pressure, since such a test provides good indication of any system leakages, especially those that might originate from small through-wall cracks of the pressure boundary. Consequently, this in-service hydrostatic pressure test required by the Code enhances the possibility of timely discovery of small through-wall flaws which, because of a tiny leak size, might not be readily detected by any other means such as system walkdowns or installed leak-detection systems.

FPL 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 have already used Code Case N-498, "Alternative Rules for 10-Year System Hydrostatic Testing for Class 1 and 2 Systems" since use of N-498 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 of performing a test at a slightly reduced pressure 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.

Code Case N-498-1 was revised to encompass 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 IWA-5000.

Currently, licensees incur considerable time and radiation dose, 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 is 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 leaks occur more frequently and the failure mode typically differs. Based on the staff's 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.

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 licensee 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, is authorized for St. Lucie, Unit Nos. 1 and 2, pursuant to 10 CFR 50.55a(a)(3)(ii).

3.0 CONCLUSIONS

The staff evaluated the information provided by the FPL 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) 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. Florida Power and Light Company'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.

Principal Contributors: L. Wiens

Date: November 12, 1996