



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

SUPPLEMENTAL SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATING TO CERTAIN REQUIREMENTS OF SECTION XI OF THE ASME CODE  
FLORIDA POWER AND LIGHT COMPANY, ET AL.  
ST. LUCIE UNIT 2  
DOCKET NO. 50-389

1.0 INTRODUCTION

This report provides a supplemental safety evaluation of the St. Lucie Plant, Unit No. 2, program for inservice testing of certain pumps and, in particular, of the licensee's requests for relief from the regulatory requirements applicable to these safety-related components. The Code of Federal Regulations (10 CFR 50.55a(g)) requires that inservice testing (IST) of ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code. Specifically, St. Lucie 2 is required to comply with ASME Section XI, 1980 Edition with Addenda through Winter 1980 (the Code), which is the applicable code required by 10 CFR 50.55a(g).

By letter dated January 13, 1986, the staff denied certain relief requests from the requirements of IWP-4600 of the Code regarding flow measurement. Subsequently, the staff granted schedular relief from these requirements since plant modifications requiring significant lead time were involved. It was determined by the staff that flow measurement would not be required until the end of the scheduled fall 1987 outage at which time the installation of flow measurement instrumentation would be complete.

By letter dated October 13, 1986, the licensee submitted revised requests for relief and exceptions from the pump flow measurement required by the Code. The following is an evaluation of these requests for relief and exceptions.

1. Boric Acid Makeup, Auxiliary Feedwater, Low Pressure Injection, and High Pressure Injection Pumps

1.1 Testing Request for Relief

The licensee has requested relief from the Code frequency of testing required by IWP-3400 (quarterly) for the following pumps:

Boric Acid Makeup Pump No. 2A  
Boric Acid Makeup Pump No. 2B  
Auxiliary Feedwater Pump No. 2A  
Auxiliary Feedwater Pump No. 2B  
Auxiliary Feedwater Pump No. 2C

Low Pressure Safety Injection Pump No. 2A  
Low Pressure Safety Injection Pump No. 2B

High Pressure Safety Injection Pump No. 2A  
High Pressure Safety Injection Pump No. 2B

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### 1.2 Licensee's Basis for Relief

The licensee states that because the pump recirculation flow paths do not contain flow measurement capability, the flow rate of these pumps cannot be determined quarterly. The main system flow paths, which are instrumented to measure flow rate, cannot be used quarterly because this would require injecting into the reactor vessel (or into the steam generator in the case of the Auxiliary Feedwater Pumps). These flow paths are undesirable during normal operation either because of thermal shock considerations, insufficient pump discharge pressure, or excessive boron addition. Further, the High Pressure Safety Injection (HPSI) pumps cannot inject into the reactor coolant system during cold shutdown due to Technical Specification pressure-temperature limit considerations. Therefore, the licensee proposes to test the Boric Acid Makeup (BAM), the Auxiliary Feedwater (AFW), and the Low Pressure Safety Injection (LPSI) pumps only during cold shutdowns (Mode 5) using the main system flow paths and the existing flow rate meters. The licensee proposes to perform similar tests on the HPSI pumps only during refueling outages. In addition, the licensee proposes to test these pumps quarterly using the recirculation flow paths without measuring flow rate.

The licensee proposes to evaluate the quarterly recirculation flow pump tests (without flow measurement) and the main flow path pump tests (with flow measurement) performed during cold shutdowns (or refueling outages for HPSI pumps) to detect significant changes in the pump hydraulic characteristics. The licensee also states that the measurement of pump vibration amplitude (also required by the Code) will provide a means for detecting significant changes in mechanical characteristics of the pumps.

### 1.3 Evaluation

The staff does not agree with the licensee's basis that the proposed alternative testing will adequately demonstrate pump operability. Pump testing at a frequency less than the quarterly Code requirement (including flow measurement) is considered unacceptable by the staff since quarterly testing is considered the minimum acceptable for determining the operability of the pumps. The proposed quarterly measurement of pump differential pressure without the simultaneous measurement of flow rate through the pumps will not establish the hydraulic performance of the pumps. The pump tests the licensee proposes to perform only at cold shutdowns (and/or refueling outages), whereby the flow rate is measured while discharging through the main system flow path, are not sufficient to demonstrate pump

operability. Tests performed at these time intervals do not provide a sufficient amount of data for trending of actual pump performance to demonstrate operability over the relatively long operating periods between cold shutdowns (and/or refueling outages).

The measurement of pump vibration amplitude is a Code requirement separate from the measurement of pump hydraulic characteristics and does not provide a basis for relief from flow rate measurement. The hydraulic characteristics of a pump could degrade independent of vibration amplitude levels.

#### 1.4 Conclusion

The hydraulic characteristics of these pumps cannot be determined without measurement of pump flow rate. Therefore, relief is not granted from the Code requirement (IWP-3400) of quarterly pump testing (including flow rate measurement) for these pumps. Since flow rate instrumentation does not presently exist in the pump recirculation lines, pump flow rate cannot be measured quarterly in accordance with the requirements of the Code for these pumps. Therefore, the licensee is required to make the necessary plant modifications to install flow rate measurement instrumentation for these pumps prior to startup at the end of the next refueling outage. For the balance of the period of the current fuel cycle, interim relief is granted to test the pumps as proposed by the licensee. Requiring the licensee to make these modifications prior to the next refueling outage would impose unnecessary hardship on the licensee without compensating increase in the level of safety. Taking into account the inservice tests that will be performed, it is concluded that this interim relief will not endanger life or property or the common defense and security of the public.

## 2. Containment Spray and Diesel Oil Transfer Pumps

### 2.1 Testing Exceptions

The licensee has stated that the following pumps are excepted from quarterly flow rate measurement required by IWP-3400 and Table IWP-3100-1 of the Code:

Containment Spray Pump No. 2A  
Containment Spray Pump No. 2B

Diesel Oil Transfer Pump 2A  
Diesel Oil Transfer Pump 2B

## 2.2 Licensee's Basis for Exceptions

The licensee states that 10 CFR 50.55a(g)(3)(iv) requires that ASME Class 2 or 3 pumps (such as these pumps) are required to be designed and be provided access to enable testing in accordance with Section XI of the ASME Code, 1974 Edition through Summer 1975 Addenda, which does not require flow measurement if pump differential pressure is measured when pumping through a fixed resistance system. These pumps are equipped with minimum recirculation lines which have fixed orifices.

Further, the licensee states that 10 CFR 50.55a(g)(4) excepts design from having to be changed to meet the requirements of the applicable Editions and Addenda of Section XI (1980 Edition with Addenda through Winter 1980 for St. Lucie 2). The licensee considers the modifications necessary to install flow instrumentation to be beyond practicality and states that the costs of such modifications would exceed \$550,000 and, therefore, would result in extreme hardship.

The licensee states that the testing of these pumps using fixed resistance recirculation lines without measuring flow rate will provide sufficient data to assess the operability of the pumps.

## 2.3 Evaluation

The staff does not agree that these pumps are excepted from flow measurement during quarterly testing. While the Section XI Code which was in effect concerning the design and access provisions of 10 CFR 50.55a(g)(3)(iv) was the 1974 Code through Summer 1975 Addenda, the Section XI Code which the licensee is required to meet for inservice testing of pumps and valves is the 1980 Code through Winter 1980 Addenda which does require flow rate measurement. Further, the staff does not agree that the installation of flow instrumentation is beyond the limitations of design, geometry, and materials of construction of any system components. The staff has determined that commercially available flow instrumentation installed within the piping systems as designed will provide a means to obtain repeatable flow rate measurements, which are suitable for trending purposes in accordance with the Code.

The staff does not agree that the testing proposed by the licensee will adequately demonstrate pump operability. The measurement of pump differential pressure without the simultaneous measurement of flow rate through the pumps will not establish the hydraulic performance of the pumps.

#### 2.4 Conclusion

The hydraulic characteristics of these pumps cannot be determined without quarterly measurement of pump flow rate in accordance with IWP-3400 and Table 3100-1 of Section XI, 1980 Edition through Winter 1980 Addenda. Further, these pumps are not excepted from the Code requirement of quarterly flow rate measurement for these pumps. Since flow rate instrumentation does not presently exist in the pump recirculation lines, pump flow rate cannot presently be measured quarterly in accordance with the requirements of the Code for these pumps. Therefore, the licensee is required to make the necessary plant modifications to install flow rate measurement instrumentation for these pumps prior to startup at the end of the next refueling outage. For the balance of the period of the current fuel cycle, interim relief is granted to test the pumps as proposed by the licensee.

Requiring the licensee to make these modifications prior to the next refueling outage would impose unnecessary hardship on the licensee without compensating increase in the level of safety. Taking into account the inservice tests that will be performed; it is concluded that this interim relief will not endanger life or property or the common defense and security of the public.

Date: February 10, 1987

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