

November 1, 2005

Mr. Michael Kansler  
President  
Entergy Nuclear Operations, Inc.  
440 Hamilton Avenue  
White Plains, NY 10601

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT - REQUEST FOR RELIEF  
FROM HYDROSTATIC TEST AND TEST REQUIREMENTS FOR SMALL BORE  
PIPE (TAC NO. MC7207)

Dear Mr. Kansler:

By letter dated May 26, 2005, Entergy Nuclear Operations, Inc. (Entergy) submitted a relief request which proposed a system leakage test in lieu of a hydrostatic test for the reactor coolant system and also proposed testing to the normal operating pressure boundary on small bore pipe (less than or equal to 1 inch nominal pipe size) in the reactor coolant system in lieu of the full system pressure boundary. The request was made pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 55a(a)(3)(ii).

As documented in the enclosed safety evaluation, the Nuclear Regulatory Commission staff has reviewed your submittal and concludes that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), your proposal is authorized.

If you have any questions regarding this matter, please contact John Boska, the NRC Project Manager for FitzPatrick, at 301-415-2901.

Sincerely,

*/RA/*

Richard J. Laufer, Chief  
Plant Licensing Branch A  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosure: As stated

cc w/encl: See next page

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Enclosure: Safety Evaluation

cc w/encl: See next page

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FitzPatrick Nuclear Power Plant

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FitzPatrick Nuclear Power Plant

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO REQUEST FOR RELIEF FROM HYDROSTATIC TEST  
AND TEST REQUIREMENTS FOR SMALL BORE PIPE  
ENTERGY NUCLEAR OPERATIONS, INC.  
JAMES A. FITZPATRICK NUCLEAR POWER PLANT  
DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated May 26, 2005, Agencywide Document Access and Management System accession number ML051580203, Entergy Nuclear Operations, Inc. (Entergy or the licensee), submitted a relief request for the James A. FitzPatrick Nuclear Power Plant (JAFNPP) which proposed a system leakage test in lieu of a hydrostatic test and also proposed testing to the normal operating pressure boundary on small bore pipe (less than or equal to 1 inch nominal pipe size) in the reactor coolant system (RCS) in lieu of the full system pressure boundary. The request was made pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(ii) and requested relief from selected requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1989 Edition.

The inservice inspection (ISI) of ASME Code Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and 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 in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if the licensee demonstrates that: (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, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The third 10-year

ISI interval for JAFNPP began in December 1996 and will end in December 2006. The ASME Code of record for JAFNPP's third 10-year ISI interval is the 1989 Edition with no Addenda. 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.

## 2.0 REGULATORY EVALUATION

### 2.1 Components For Which Relief Is Requested

Hydrostatic test of the ASME Code Class 1 RCS Pressure Boundary (RCPB) and small bore (#1-inch), ASME Code Class 1 RCPB vent, drain, and branch (VTDB) lines and connections.

### 2.2 ASME Code Requirements

ASME Section XI, 1989 Edition, Table IWB-2500-1, Examination Category B-P, Items B15.51 and B15.71, require the RCS hydrostatic test to be conducted near the end of each 10-year interval and to include all ASME Code Class 1 components within the system boundary.

### 2.3 Relief Requested

The licensee is requesting relief from the ASME Code requirements for a system hydrostatic test and requests to perform the ASME Code Class 1 System Leakage Test with the VTDB lines and connections in the closed position.

### 2.4 Licensee's Basis

The RCS ASME Code Class 1 system hydrostatic test is no longer required once per 10-year interval by newer versions of the ASME Code. For example, see the ASME Code, 2001 Edition, 2003 Addenda, Subsection IWB-2500, Table 2500-1, for Class 1 system components. Instead a system leakage test is required, which is conducted at a pressure not less than the pressure corresponding to 100% rated reactor power. Also, the VTDB lines and connections at JAFNPP are equipped with manual valves, which provide double isolation of the RCPB. These valves are generally maintained closed during normal operation. The piping outboard of the first isolation valve is not normally pressurized. Under normal operating conditions, the VTDB lines and connections see RCS pressures and temperatures only if leakage through the inboard valve occurs. To perform the Code-required test, it would be necessary to manually open the inboard valves to pressurize the VTDB lines and connections. Pressurization by this method defeats the double isolation and potentially presents safety concerns for the personnel performing the test. Furthermore, performing the test with the inboard isolation valves open requires several man-hours to position the valves for the test and restore the valves after the test is complete. These valves are located in close proximity of the RCPB main loop piping and thus require personnel entry into high radiation areas within the containment. Based on previous outage data, estimated radiation exposure associated with valve alignment and realignment would be approximately 0.5 man-Rem per test. Since this test would be performed near the end of an outage when all RCPB work has been completed, the time required to open and close these VTDB lines and connections would impact the outage schedule. Thus, compliance with the Code requirement to pressurize to the outboard valves results in unnecessary hardship pursuant to 10 CFR 50.55a(a)(3)(ii) without a sufficient compensating increase in the level of quality and safety.

The licensee stated that the proposed relief request provides an acceptable level of safety and quality based on the following:

1. The 1989 Edition, No Addenda of the ASME Section XI Code, Subsection IWA-4700, Pressure Test, provides the requirements for hydrostatic pressure testing of piping and components following repairs by welding to the pressure boundary. IWA-4700(b)(5) excludes component connections, piping, and associated valves that are nominal pipe size (NPS) 1 inch and smaller from the hydrostatic pressure test requirement following welded repairs. Therefore, requiring a leakage pressure test and visual examination of these #1 inch diameter RCPB VTDB lines and connections once each 10-year interval is unwarranted considering that hydrostatic pressure testing a repair weld on the same connections is not required by the ASME Code Section XI.
2. The non-isolable portion of the RCPB VTDB lines and connections will be pressurized and visually examined as required by the Code. Only the isolable portion of those small diameter VTDB lines and connections will not be pressurized, but a VT-2 examination will still be performed in these cases.
3. A typical VTDB line and connection includes two (2) manual valves separated by a short pipe nipple, which is connected to the RCPB via another short pipe nipple and a half coupling. All connections are typically socket-welded and the welds receive a surface examination after installation. The piping and valves are normally heavy wall (Schedule 160 pipe and 600 # valve bodies). The VTDB lines and connections are not subject to high stresses or cyclic loads and design ratings are significantly greater than RCPB operating or design pressure.

## 2.5 Licensee's Proposed Action

The licensee proposes to perform a system leakage test of the Class 1 systems and components prior to plant startup following each refueling outage in accordance with ASME Code, Section XI, 2001 Edition, 2003 Addenda, Table IWB-2500-1 and IWB-5220, with the exception that the RCPB VTDB lines and connections will be visually examined for leakage, and any evidence of past leakage, with the isolation valves in the normally closed position. This examination will be performed at nominal operating pressure associated with 100% reactor power after satisfying the required 4-hour hold time.

## 3.0 TECHNICAL EVALUATION

The 1989 Edition of the ASME Code requires that all Class 1 components within the RCS boundary undergo a system hydrostatic test once per 10-year interval. The licensee has proposed substituting a leakage test for the hydrostatic test by following ASME Code, Section XI, 2001 Edition, 2003 Addenda, Table IWB-2500-1 and IWB-5220, with the exception that the RCPB VTDB lines and connections will be visually examined for leakage, and any evidence of past leakage, with the isolation valves in the normally closed position.

The system hydrostatic test, as stipulated in Section XI, is not a test of the structural integrity of the system but rather an enhanced leakage test. Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure; therefore, piping dead-weight, thermal expansion, and seismic loads present far greater challenges to the structural integrity of a system. Consequently, the Section XI hydrostatic test is primarily regarded as a means to enhance leak detection during the examination of components under pressure, rather than as a method to determine the structural integrity of the components. Industry experience indicates that leaks are not being discovered as a result of hydrostatic test pressures causing a preexisting flaw to propagate through the wall. In most cases, leaks are being found when the system is at normal operating pressure. For these reasons, the NRC allows all power reactors to substitute a leakage test for the 10-year system hydrostatic test, as allowed by NRC Regulatory Guide 1.147. Newer editions of the ASME Code no longer require a 10-year system hydrostatic test. NRC Regulatory Issue Summary 2004-16: "Use of Later Editions and Addenda to ASME Code Section XI for Repair/Replacement Activities," clarifies that 10 CFR 50.55a(g)(4)(iv) also covers repair/replacement activities. The edition of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the third ISI interval is the 1989 Edition with no addenda. The NRC staff finds that the licensee may use the 2001 Edition of ASME Section XI through the 2003 Addenda because it was endorsed by a subsequent amendment to 10 CFR 50.55a published in the Federal Register on October 1, 2004 (69 FR 58804) and became effective on November 1, 2004, subject to the modifications and limitations listed therein.

System hydrostatic testing can entail considerable time and radiation dose. The safety assurance provided by the enhanced leakage gained from a slight increase in system pressure during a hydrostatic test may be offset or negated by the necessity to gag or remove code safety valves and relief valves (placing the system and the plant in an off-normal state), erect temporary supports for steam lines, and expend resources to set up testing with special equipment and gages. Therefore, performance of system hydrostatic testing represents a considerable burden for the licensee. Considering the minimal amount of increased assurance provided by hydrostatic test pressures versus system leakage test pressures, and the time and radiation dose expended preparing for a hydrostatic test, the NRC staff finds that compliance with the Section XI hydrostatic testing requirements results in unnecessary hardship without a compensating increase in the level of quality and safety. Therefore, the licensee's proposal to use a system leakage test of the Class 1 systems and components in accordance with ASME Code, Section XI, 2001 Edition, 2003 Addenda, Table IWB-2500-1 and IWB-5220, in lieu of the 10-year system hydrostatic test required by the 1989 ASME Code, is authorized by the NRC staff pursuant to 10 CFR 50.55a(a)(3)(ii) for JAFNPP's third 10-year ISI interval.

The licensee has also proposed not pressurizing past the inboard isolation valve of the Class 1 VTDB small-bore piping. The VTDB line segments, as stated by the licensee, include two manually operated valves separated by a short pipe nipple that is connected to the RCS via another short pipe nipple and half coupling. The line configuration provides double isolation from the high RCS pressure. Under normal plant operating conditions the subject line segments would see RCS temperatures and pressures only if leakage through the inboard valves occurs. For the licensee to perform the ASME Code-required test, it would be necessary to manually open the inboard valves to pressurize the section downstream of the inboard valve. Pressurization by this method would defeat the RCS double isolation and may cause safety concerns for the personnel performing the examination.



Typical VTDB lines and connections are in close proximity to the RCS main steam piping. Manual operation (opening and closing) of the VTDB valves is estimated to expose plant personnel to 0.5 man-Rem per test. Therefore, the ASME Code requirement to perform the system pressure test on these isolated line segments presents a hardship for the licensee. The licensee proposed to visually examine the isolation valves in the normally closed position for leaks and evidence of past leakage during the system leakage test each refueling outage. Also, the RCS vent and drain connections will be visually examined with the isolation valves in the normally closed position during the 10-year ISI pressure test. Imposition of the Code requirement on JAFNPP would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, the licensee's proposal to leave the VTDB valves in the normally closed position during system leakage tests is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for JAFNPP's third 10-year ISI interval.

#### 4.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal and determined that, in accordance with 10 CFR 50.55a(a)(3)(ii), compliance with the requirements of the ASME Code, Section XI, 1989 Edition, Table IWB-2500-1, Examination Category B-P, Items B15.51 and B15.71, for the system hydrostatic test and for all ASME Code Class 1 RCPB vent, drain and branch lines and connections results in a hardship or difficulty without a compensating increase in the level of quality and safety. The licensee's proposed inspection is to perform a leakage test by following ASME Code, Section XI, 2001 Edition, 2003 Addenda, Table IWB-2500-1 and IWB-5220, with the exception that the RCPB VTDB lines and connections will be visually examined for leakage, and any evidence of past leakage, with the isolation valves in the normally closed position. This test provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the staff authorizes the proposed alternative, described in the licensee's letter dated May 26, 2005, for JAFNPP's third 10-year ISI interval (request for relief RR-36). All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: N. Ray, J. Boska

Date: November 1, 2005