

August 2, 2000

Mr. T. F. Plunkett
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SUBJECT: ST. LUCIE, UNIT 1, RELIEF REQUESTS NOS. 17 AND 18 - ALTERNATIVE
FOR EXAMINING PRESSURE RETAINING BOLTED CONNECTIONS FOR
THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION (ISI) PROGRAM
PLAN (TAC NO. MA8364)

Dear Mr. Plunkett:

The U.S. Nuclear Regulatory Commission staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has reviewed and evaluated the information provided by Florida Power and Light Company (FPL) by letter dated March 1, 2000. FPL is proposing its Third 10-Year Interval Inservice Inspection Program Plan Relief Requests Nos. 17 and 18, for St. Lucie, Unit 1. The staff found your requests for relief acceptable. The staff's evaluation and conclusions are contained in the Enclosure. The Enclosure also lists each relief request and the status of approval, including INEEL's Technical Letter Report.

The staff has determined that the proposed alternatives are authorized in the third 10-year ISI interval pursuant to 10 CFR 50.55a (a)(3)(i) or (a)(3)(ii) in that they provide an acceptable level of quality and safety or that compliance with the code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

A copy of the Safety Evaluation and the Technical Evaluation Report are enclosed.

Sincerely,

/RA/

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure: Safety Evaluation
w/Technical Evaluation Report

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
FOR
THIRD 10-YEAR INTERVAL INSERVICE INSPECTION
RELIEF REQUESTS NOS. 17 AND 18
FOR
ST. LUCIE PLANT, UNIT 1
FLORIDA POWER AND LIGHT COMPANY
DOCKET NUMBER 50-335

1.0 INTRODUCTION

Inservice inspection of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) 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 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, "Rules for Inservice Inspection (ISI) 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) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The Code of record for the St. Lucie, Unit 1 third 10-year ISI interval is the 1989 Edition of the ASME Boiler and Pressure Vessel Code.

2.0 EVALUATION

The staff, with technical assistance from Idaho National Engineering and Environmental Laboratory (INEEL), has reviewed the information concerning the third 10-year interval inservice inspection (ISI) program Requests for Relief 17 and 18 for St. Lucie, Unit 1 in Florida Power and Light Company (the licensee) submitted by letter dated March 1, 2000.

ENCLOSURE

The staff adopts the evaluations and recommendations for authorizing alternatives contained in the Technical Letter Report (TLR), included as Attachment 1, prepared by INEEL. Attachment 2 is a table that lists, among other things, each relief request and the status of disposition of the request.

For St. Lucie, Unit 1, the staff has determined whether the proposed alternatives provide an acceptable level of quality and safety, or whether compliance would result in a hardship or unusual difficulty without a compensating increase in quality or safety.

3.0 CONCLUSION

The staff concludes that the alternative contained in Request for Relief 17 which involves use of Code Case N-623 "Deferral of Inspections of Shell-to-Flange and Head-to-Flange Welds of a Reactor Vessel, Division 1" provides for an acceptable level of quality and safety. The licensee's proposed alternative to use Code Case N-623 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year inservice inspection interval or until such time as the Code Case is referenced in a future revision of 10 CFR 50.55a. At that time, if the licensee intends to continue to implement this Code Case, the licensee is to follow all provisions in the Code Case with limitations or conditions specified in 10 CFR 50.55a, if any.

The staff has determined that compliance with the Code requirements discussed in Request for Relief 18 would result in a hardship or unusual difficulty without a compensating increase in quality or safety. The licensee's proposed alternative contained in Request for Relief 18 provides reasonable assurance of structural integrity of the subject components. The staff has concluded that the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year inservice inspection interval.

Principal Contributor: Thomas K. McLellan

Attachments: 1. INEEL Technical Letter Report
2. Summary of Relief Requests

TECHNICAL LETTER REPORT
ON THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION
RELIEF REQUESTS 17 AND 18
FOR
FLORIDA POWER AND LIGHT COMPANY
ST. LUCIE UNIT 1
DOCKET NUMBER: 50-335

1. INTRODUCTION

By letter dated March 1, 2000, the licensee, Florida Power and Light Company, submitted Relief Requests 17 and 18 for the St. Lucie Unit 1, third 10-year inservice inspection (ISI) interval. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluation of the subject requests for relief is in the following section.

2. EVALUATION

The information provided by Florida Power and Light Company in support of the requests for relief from Code requirements has been evaluated and the bases for disposition are documented below. The Code of record for the St. Lucie Unit 1, third 10-year ISI interval, which began February 11, 1998, is the 1989 Edition of Section XI of the ASME Boiler and Pressure Vessel Code.

2.1 Request for Relief No. 17, Use of Code Case N-623, *Deferral of Inspections of Shell-to-Flange and Head-to-Flange Welds of a Reactor Vessel*

Code Requirement: Examination Category B-A, Item B1.30 requires 100% volumetric examination of the shell-to-flange welds, as defined by Figure IWB-2500-4. In addition, Item B1.30 requires volumetric examination of at least 50% of the welds by the end of the first period.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(i), the licensee proposed to employ the rules in Code Case N-623 as an alternative to the volumetric examination requirements of Examination Category B-A, Item B1.30.

The licensee stated:

- "1) Perform examinations of the shell-to-flange weld in accordance with Code Case N-623
- "2) Periodic system pressure tests per Category B-P, Table IWB-2500-1."

Licensee's Basis for Proposed Alternative (as stated):

"Code Case N-623 provides an alternative to the examination scheduling requirements for the reactor pressure vessel (RPV) shell-to-flange and head-to-flange welds contained in Examination Category B-A 'Pressure Retaining Welds in Reactor Vessel,' of the 1989 Edition of ASME Section XI. These examinations currently may be partially deferred to the end of a 10-year Inservice Inspection Interval, but total deferral is not allowed. Code Case N-623 provides an option to

the Owner for total deferral of these weld examinations provided three basic conditions are met:

- “(1) no welded repair/replacement activities have ever been performed on these welds;
- “(2) the welds do not contain identified flaws or relevant conditions that currently requires successive inspections in accordance with IWB-2420(b); and
- “(3) the RPV is not in the first inspection interval.

“Florida Power & Light Company (FPL) meets these conditions for the St. Lucie Unit 1 RPV. Total deferral of these examinations to the end of the inspection interval would allow the RPV Ultrasonic examinations to be scheduled, in aggregate, at the same time and would result in a significant burden reduction with no change to the examination methods or techniques required under the 1989 Edition of Section XI.

“The present large population of operating reactors supports deferral of these shell-to-flange weld examinations to the end of a specific plant’s 10-year inspection interval. Each reactor is representative of the operating conditions throughout the population of reactors for a particular Nuclear Steam Supply System (NSSS) design. The volume and number of RPV welds inspected within successive 10-year intervals among these various operating reactors are essentially uniformly distributed. This being the case, examining the shell-to-flange welds within the population of operating reactors sequentially for the period of a plant specific 10-year interval, or all at the end of that interval provides the necessary assurance that any industry wide degrading condition will be detected. Additionally, performing Ultrasonic examination of the RPV welds at one time, on a specific RPV, will improve the reliability and the population of welds will be at a uniform level of technology. The use of this Code Case will thus close the 10-year gap in technology between various examinations now being performed on a specific RPV. The experience to date indicates that examinations performed on these shell-to-flange welds have not identified any detrimental flaws or relevant conditions and that changing the schedule for examining these welds in aggregate at the end of successive 10-year intervals should provide an equivalent indication of the RPV integrity for a specific RPV.

“The ASME Boiler and Pressure Vessel Committee approved Code Case N-623 on February 26, 1999.”

Evaluation: Examination Category B-A, Item B1.30 requires 100% volumetric examination of the shell-to-flange welds, as defined by Figure IWB-2500-4. In addition, Item B1.30 requires volumetric examination of at least 50% of the welds by the end of the first period. The licensee has proposed the use of Code Case N-623, *Deferral of Inspections of Shell-to-Flange and Head-to-Flange Welds of a Reactor Vessel*. This

Code Case allows for deferral of volumetric examinations of the reactor pressure vessel shell-to-flange and head-to-flange welds to the end of the interval.

Code Case N-623 requires that the following three conditions be met in order to defer the shell-to-flange and head-to-flange welds to the end of the inspection interval:

- (1) No welded repair/replacement activities have ever been performed on the shell-to-flange or head-to-flange weld.
- (2) Neither the shell-to-flange weld nor head-to-flange weld contains identified flaws or relevant conditions that currently require successive inspections in accordance with IWB-2420(b).
- (3) The Vessel is not in the first inspection interval.

The licensee stated that all of these conditions have been met for St. Lucie Unit 1.

Industry experience to date indicates that examinations performed on reactor pressure vessel shell-to-flange and head-to-flange welds have not identified any detrimental flaws or relevant conditions and that changing the schedule for examining these welds to the end of the licensee's ten-year inservice inspection interval will provide a suitable frequency for verifying the integrity of the subject shell-to-flange weld¹. The shell-to-flange weld will still receive 100% examination of the volume required by the Code, using the same acceptance criteria. The only change will be that the shell-to-flange weld examinations will be deferred to the end of the inspection interval without conducting partial examinations from the flange face earlier in the inspection interval. Considering that such volumetric examinations of similar plants have resulted in no detrimental flaws or relevant conditions, and that the volumetric examinations will continue to be performed on an interval basis, it is determined that the licensee's proposed alternative, to use Code Case N-623, provides an acceptable level of quality and safety. In addition, the licensee will be performing the Code required periodic system pressure tests per Category B-P, Table IWB-2500-1. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i). Use of this Code Case will be authorized until such time as the Code Case is referenced in a future revision of 10 CFR 50.55a. At that time, if the licensee intends to continue to implement this Code Case, the licensee will follow all provisions in the Code Case with limitations or conditions specified in 10 CFR 50.55a, if any.

2.2 Request for Relief No. 18, Examination Category B-G-1, Item B6.40, Pressure-Retaining Bolting Greater Than 2 Inches In Diameter

Code Requirement: Examination Category B-G-1, Item B6.40 requires 100% volumetric examination of the threads in the reactor pressure vessel flange, as defined by Figure IWB-2500-12. IWB-2420 (a) requires that the sequence of component examinations established during the first inspection interval be repeated each successive inspection interval, to the extent practical.

1 Information obtained from NRC Safety Evaluation Report for Millstone Nuclear Power Station Unit 2, dated March 15, 2000.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to the Code scheduling requirements for the reactor pressure vessel shell-to-flange and threads in flange.

The licensee stated:

- "1. Perform all the stud holes threads in flange examinations in the third period, scheduled to coincide with the 10-year reactor vessel examinations
- "2. Periodic system pressure test per Category B-P, Table IWB-2500-1."

Licensee's Basis for Proposed Alternative (as stated):

"Total deferral of this examination to the end of the inspection interval would allow the RPV ultrasonic examinations to be scheduled, in aggregate, at the same time and would result in a significant burden reduction with no change to the examination methods or techniques required under the 1989 Edition of Section XI.

"10 CFR 20.1101(b) mandates FPL to reduce radiation exposure to as low as reasonable achievable. In order to satisfy this requirement and other new regulations, FPL must reevaluate every aspect of every job. Adjusting the sequence of examinations will allow FPL to minimize the amount of work being conducted in radiation areas, meet safety requirements, ALARA requirements, and still meet the intent of Section XI.

"The present large population of operating reactors supports deferral of the reactor vessel threads in the flange examinations to the end of a specific plant's 10-year inspection interval. Each reactor is representative of the operating conditions throughout the population of reactors for a particular Nuclear Steam Supply System (NSSS) design. The volume and number of the reactor vessel threads in the flange inspected within successive 10-year intervals among these various operating reactors are essentially uniformly distributed. This being the case, examining the reactor vessel threads in the flange within the population of operating reactors sequentially for the period of a plant specific 10-year interval, or all at the end of that interval provides the necessary assurance that any industry wide degrading condition will be detected. Additionally, performing ultrasonic examination of the reactor vessel threads in the flange at one time, on a specific RPV, will improve the reliability and reproducibility of the ultrasonic examinations since the procedures and techniques utilized on the population will be at a uniform level of technology. The alternative will thus close the 10-year gap in technology between various examinations now being performed on a specific RPV.

"Adjusting the sequence of examinations will reduce the need for personnel to prepare and examine items in essentially the same areas several times. Changing the sequence of the areas to be examined can significantly reduce the total radiation exposure, time, and manpower required to perform these tasks.

“St. Lucie performed the reactor vessel threads in flange examinations in the first and second periods of the first and second intervals. During the first period of the first interval, 1/3 of the stud holes in the flange were examined. During the second period of the first interval, the remaining 2/3 of the stud holes in the flange were examined. During the first period of the second interval, the same 1/3 of the stud holes in the flange examined in the first period first interval were examined. During the second period of the second interval, all 54 stud hole threads in the flange examinations were performed. The experience-to-date at St. Lucie Units 1 & 2 indicates that examinations performed have not identified any detrimental flaws or relevant conditions, so modifying the ISI schedule would have no effect on the safe operation of the plant.”

Evaluation: Examination Category B-G-1, Item B6.40 requires 100% volumetric examination of the threads in the reactor pressure vessel flange. In addition, IWB-2420 (a) requires that the sequence of component examinations established during the first inspection interval be repeated each successive inspection interval, to the extent practical. The licensee has proposed that third interval examinations of these components be deferred until the third period of the interval to coincide with the reactor pressure vessel shell weld examinations.

The licensee last examined the subject flange threads during the second period of the second ten year interval. Consequently, the licensee’s proposed alternative could result in time span between examinations of up to 15 years. Examinations performed thus far through two intervals of service have resulted in no identified detrimental flaws or relevant conditions requiring evaluation. Deferral of the examinations to the third period of the interval would allow the licensee to perform the examinations in conjunction with the reactor pressure vessel examinations using automated equipment. Performing the examinations prior to the third period in accordance the Code-required schedule would result in excessive radiation exposure and rad-waste, placing a significant and unnecessary hardship on the licensee. Deferral of the examinations would provide a significant reduction in radiation exposure and rad-waste and allow the licensee to comply with the requirements of 10 CFR 20.1101(b), which mandates FPL to reduce radiation exposure to as low as reasonably achievable.

Based on the examinations performed in the second period of the second 10-year interval and the fact that no detrimental flaws or relevant conditions have been identified, it is concluded that deferral of the examinations to the third period will provide reasonable assurance of the structural integrity of the threaded flange areas. In addition, the licensee will be performing the Code required periodic system pressure tests per Category B-P, Table IWB-2500-1. Furthermore, it is concluded that the imposition of the Code requirements would result in an undue hardship without a compensating increase in quality and safety. Therefore, it is recommended that the licensee’s proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

3. CONCLUSION

The INEEL staff evaluated the licensee's submittal and concludes that certain inservice examinations cannot be performed to the extent required by the Code at the St. Lucie Unit 1. For Request for Relief No. 17, the INEEL staff concludes that the licensee's proposed alternative will provide an acceptable level of quality and safety, and should be authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third ISI interval or until such time as the Code Case N-623 is referenced in a future revision of 10 CFR 50.55a. At that time, if the licensee intends to continue to implement Code Case N-623 until such time as the Code Case is published in a future revision of 10 CFR 50.55a. At that time, if the licensee intends to continue to implement this Code Case, the licensee is to follow all provisions in the Code Case with limitations or conditions specified in 10 CFR 50.55a, if any.

For Request for Relief No. 18, the licensee has demonstrated that the Code scheduling requirements would result in a burden without a compensating increase in the level of quality and safety; therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third ISI interval.

SUMMARY OF RELIEF REQUESTS

Relief Request Number	INEEL TLR Sec.	System or Component	Exam Category	Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Disposition
17	2.1	Reactor Pressure Vessel	B-A	B1.30	RPV Shell-to-Flange Weld	Volumetric	Use of Code Case N-623	Authorized 10 CFR 50.55a(a)(3)(i)
18	2.2	Reactor Pressure Vessel	B-G-1	B6.40	RPV Flange Threads	Volumetric	Defer examination to the end of third 10-year interval	Authorized 10 CFR 50.55a(a)(3)(ii)

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