



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

SAFETY EVALUATION  
BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PLAN  
REQUEST FOR RELIEF NO. 14 FOR  
FLORIDA POWER AND LIGHT COMPANY  
ST. LUCIE PLANT, UNIT 2  
DOCKET NUMBER: 50-389

1.0 INTRODUCTION

Inservice inspection 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, Code of Federal Regulations (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the U.S. Nuclear Regulatory Commission (Commission or NRC) 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. 10 CFR 50.55a(g)(6)(i) states that the Commission may grant relief and impose such alternative requirements that it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden on the facility that could result if the requirements were imposed on the facility.

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 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 ten-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. For St. Lucie Plant, Unit 2, the applicable edition of Section XI of the ASME Code for the second ten-year inservice inspection (ISI) interval is the 1989 Edition.

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## 2.0 EVALUATION

In a safety evaluation (SE) dated August 13, 1997, the NRC authorized Request for Relief No. 14 for St. Lucie, Unit 2. By letter dated November 19, 1998, Florida Power and Light Company (FP&L or licensee), submitted a revised version of Request for Relief No. 14, seeking relief from the requirements of the ASME Code, Section XI, for the St. Lucie Plant, Unit 2. The current revision of the request for relief clarifies discrepancies among the original request for relief, NRC requests for additional information (RAIs), and the licensee's responses to the RAIs. In addition, a typographical error that resulted in an inconsistency between the Steam Generator A and the Steam Generator B inspection schedules was corrected. This relief request is for the second 10-year inservice inspection (ISI) interval. The Idaho National Engineering and Environmental Laboratory technical evaluation of the subject revised request for relief is attached. Based on the results of the review, the staff adopts the contractor's conclusions presented in the technical letter report (TLR) attached.

The information provided by the licensee in support of the requests for relief from Code requirements has been evaluated and the basis for disposition is documented below.

### ISI Request for Relief No. 14:

Code Requirement: ASME Code, Section XI, IWB-2412, and IWC-2412 specify the minimum/maximum percent of examinations that may be completed/credited each period. IWB-2420 and IWC-2420 require that the sequence of component examinations established during the first inspection interval be repeated during each successive inspection interval, to the extent practical.

Licensee's Code Relief Request: Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee proposed to adjust the sequence of examinations established within the first inspection interval for the reactor pressure vessel, steam generator, and pressurizer such that all major examinations are performed at one time within a specified inspection period. Where practical, the sequence of examinations has been adjusted within the same examination category (shutdown cooling water heat exchanger, regenerative heat exchanger, etc.) to minimize the variation in the percentage requirements of Inspection Program B.

This request for relief was originally authorized by the NRC in an SE dated August 13, 1997. The purpose of the current revision of the request for relief is to clarify discrepancies among the original request for relief, NRC RAIs, and the licensee's responses to RAIs. In addition, a typographical error that resulted in an inconsistency between the Steam Generator A and the Steam Generator B inspection schedules was corrected. The staff determined that the changes made in the current revision of the request for relief does not change the justification for authorization of the original request for relief.

Staff Evaluation: To reschedule the examination of components while minimizing the duration between examinations, the licensee modified the distribution of examinations among inspection periods for major components. For example, the licensee has scheduled the examination of the RPV, including 12 Examination Category B-D welds, during the second period. Since the duration between examinations does not exceed 10 years, this has been found to be an



acceptable alternative to reduce the burden of staging the automated tool more than once in a given interval. However, distribution of all Examination Category B-D welds within the interval would require delaying SG examinations from the first period into the second period for SG-A, which would mean 14 to 17 years could elapse between examinations. The licensee will continue to examine six Category B-D welds on SG-B during the third period while examining the SG-A welds during the second period. Although this results in a slight variation in the scheduling requirements of Inspection Program B of the Code, the staff determined that the distribution is adequate for detecting patterns of degradation that may occur. Therefore, the licensee's proposed alternative provides reasonable assurance of the structural integrity of the subject components.

### 3.0 STAFF CONCLUSION

The licensee has proposed rescheduling of examination areas for the second inspection interval, which will establish a new sequence of examinations while reducing radiation exposure and enhancing the overall efficiency of the inservice inspection program. The staff concludes that the proposed scheduling changes provide reasonable assurance of structural integrity of the affected systems, and that imposing the scheduling and sequencing requirements of the Code would cause an undue hardship without a compensating increase in the level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

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Date: August 2, 1999



TECHNICAL LETTER REPORT  
ON SECOND 10-YEAR INTERVAL INSERVICE INSPECTION  
REQUEST FOR RELIEF 14  
FOR  
FLORIDA POWER AND LIGHT COMPANY  
ST. LUCIE PLANT, UNIT 2  
DOCKET NUMBER: 50-389

1. INTRODUCTION

In a safety evaluation report (SER) dated August 13, 1997, the NRC authorized Request for Relief No. 14 for St. Lucie Plant, Unit 2. By letter dated November 19, 1998, the Florida Power and Light Company (FP&L), submitted a revised version of Request for Relief No. 14, seeking relief from the requirements of the ASME Code, Section XI, for the St. Lucie Plant, Unit 2. The current revision of the request for relief clarifies discrepancies among the original request for relief, NRC requests for additional information (RAIs), and the licensee's responses to the RAIs. In addition, a typographical error that resulted in an inconsistency between the Steam Generator (SG) A and the SG-B inspection schedules was corrected. This relief request is for the second 10-year inservice inspection (ISI) interval. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluation of the subject revised request for relief is in the following section.

2. EVALUATION

The information provided by FP&L Company in support of the request for relief from Code requirements has been evaluated and the basis for disposition is documented below. The Code of record for the St. Lucie Plant, Unit 2, second 10-year ISI interval, which began August 8, 1993, is the 1989 Edition of Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code.

Request for Relief No. 14, IWB-2412 and IWC-2412, Inspection Program B Percentage Requirements, IWB-2420 and IWC-2420, Sequence of Component Examinations Established During the First Inspection Interval

Code Requirement: IWB-2412 and IWC-2412 specify the minimum/maximum percent of examinations that may be completed/credited each period. IWB-2420 and IWC-2420 require that the sequence of component examinations established during the first inspection interval be repeated during each successive inspection interval, to the extent practical.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(ii), the licensee proposed to adjust the sequence of examinations established within the first inspection interval for the Reactor Pressure Vessel, SG, and Pressurizer such that all major examinations are performed at one time within a specified inspection period.

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Where practical, the sequence of examinations has been adjusted within the same examination category (Shutdown Cooling Water Heat Exchanger, Regenerative Heat Exchanger, etc.) to minimize the variation in the percentage requirements of Inspection Program B. The licensee stated:

"FPL proposes to adjust the sequence of examinations established within the first inspection interval on the reactor pressure vessel, steam generator and pressurizer, such that all major examinations are performed at one time within a specified inspection period. Where practical, FPL has adjusted the sequence of examinations, (additional items) within the same examination category, (shutdown cooling water heat exchanger, etc.) in order to minimize the variation in the percentage requirements of Inspection Program B.

"Reactor Pressure Vessel - All required examinations will be performed in the second inspection period, in conjunction with the automated examination activity, with the exception of the shell to flange weld from the seal side and the threads in base material which will be conducted in the first period.

"Reactor Pressure Vessel Closure Head - All required examinations will be performed in the first inspection period, which will minimize the percentage requirements over the inspection Interval.

"Steam Generator (primary and secondary sides) - All required examinations will be performed in the second inspection period, except the Examination Category B-D nozzle-to-vessel welds for Steam Generator B which will be examined during the third period.

"Pressurizer - All required examinations will be performed in the first inspection period.

"The readjusted schedule proposed and the system pressure test will provide continued assurance of an acceptable level of quality and safety.

"In lieu of the percentage requirements of IWB-2412-1 and IWC-2412-1, FPL proposes the following variations. The minor variations between Inspection Program B and the percentage defined below will not significantly affect the health and safety of the general public.

Examination Category	1 <sup>st</sup> Period 16%-34%	2 <sup>nd</sup> Period 50%-67%	3 <sup>rd</sup> Period 100%-100%
B-A* (26) total	6 = 23%	20 = 100%	0 = 100%
B-B (9) total	4 = 44%	5 = 100%	0 = 100%
B-D (36) total	12 = 33%	18 = 83%	6 = 100%

B-F (31) total	14 = 45%	7 = 68%	10 = 100%
B-J ** (179) total	60 = 34%	62 = 68%	57 = 100%
B-K *** (2) total	1 = 50%	1 = 100%	0 = 100%
B-G-2 (22) total	8 = 36%	5 = 59%	5 = 100%
C-A (9) total	2 = 22%	7 = 100%	0 = 100%
C-B (8) total	4 = 50%	4 = 100%	0 = 100%
C-C (9) total	3 = 33%	3 = 67%	3 = 100%

Note: Shaded blocks identify variations to the percentage requirements of Section XI.

\* Deferral of inspection to the end of interval permissible by IWB-2500-1

\*\* The Number identified above reflect circumferential weld examinations only, see Table 14-5 for additional longitudinal weld numbers and overall B-J Category percentages.

\*\*\* Later editions of Section XI allow less than three items in a category to be examined in any two periods. Implementation of Code Case N-509 changes Category B-H Item Numbers B8.20 & B8.30 to Category B-K Item Numbers 10.10.

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

"Since FPL began performing in-service examinations, the guidance for radiation exposure (ALARA) and personnel safety, as they relate to the selection and scheduling of in-service examinations, have increased significantly. Examinations in the first in-service inspection interval on Class 1 and 2 components and systems were performed in accordance with the 1980 Edition through the Winter 1980 Addenda of Section XI prorated for the interval."

"Vessels, unlike piping systems, are unique in that examination areas include several Examination Categories, Examination Item Numbers, and, in the case of steam generators cover two Code Classes (Class 1 and Class 2, respectively). Equal distribution of examinations over three inspection periods on individual vessels (steam generators, pressurizer, etc.), are complicated due to their unique size, reduction in required examination items, and multiple Examination Categories. Equal distribution imposes an undue hardship in the areas of radiation exposure, personnel access, multiple job interference, and adds additional cost without providing a significant increase in the quality and safety of the plant."

#### Previous Examination Results

"The St. Lucie previous nondestructive (NDE) examination results performed on these same components during the first inspection interval have not identified any flaws that exceeded the acceptance criteria of Section XI or identified results that would warrant consideration of not adjusting the sequence of the examinations, therefore modifying the ISI schedule would have no effect on the safe operation of the plant."

#### Radiation

"10 CFR 20.1101(b) mandates FPL to reduce radiation exposure to as low as reasonably achievable (ALARA). In order to satisfy this requirement and other new regulations, FPL must re-evaluate 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."

"Adjusting the sequence of examinations reduces the need for personnel to prepare and examine components in essentially the same areas several times. The radiation exposure, time, and manpower required to perform these tasks can be significantly reduced by changing the sequence of examinations and the areas to be examined. St. Lucie has gone through one outage with this altered scheduling criteria."

#### Insulation

"Vessel insulation is of a size and shape that the removal process of examination area insulation usually requires a substantial amount of additional insulation to be removed. Adhering to the sequence of examinations established during the first interval would require FPL to remove and reinstall the same insulation and scaffolding on two or more occasions. Removal, storage, and reinstallation of the insulation greatly increases the chances of insulation damage and includes additional man-rem and costs associated with the need for personnel to prepare and examine components in essentially the same area several times. The radiation exposure, time, and manpower required to perform these tasks can be significantly reduced by changing the sequence of examinations and changing the areas to be examined."

"Cost Reduction - The cost associated with preparing vessels for selected examinations on the same component, within each inspection period in order to specifically satisfy the percentage requirements of Section XI, is an economic hardship without a substantial compensating increase in the quality or safety of the unit."

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"Examination Schedules - While it is desirable to have examination schedules move forward in the interval (less than 10 years between successive examinations), the wording of Inspection Program B makes this difficult. A review of Inspection Program B requirements show that it is weighted toward moving examinations to the end of the interval (opposite from USNRC desires). The maximum examinations allowed for credit during the first period is 34%. If the minimum examinations were performed during the first period (16%) and the maximum examined during the second period (67%), then 51% of the interval exams could be performed during the second period. This same thought process can be applied to the third period. When a sample size in a category is small, Inspection Program B requires examinations to be scheduled later in the interval. Since St. Lucie ISI examinations were originally scheduled one-third each period, it is not possible to move examination schedules forward without scheduling others later in the interval."

"Inspection Program B allows up to 50% of the 10 year examinations to be performed during the second or third periods. Allowing this same latitude during the first period would enable FPL to perform examinations with a more efficient schedule, reduce radiation exposure and costs, and meet USNRC desires to have the time frame between successive examinations not exceed 10 year intervals."

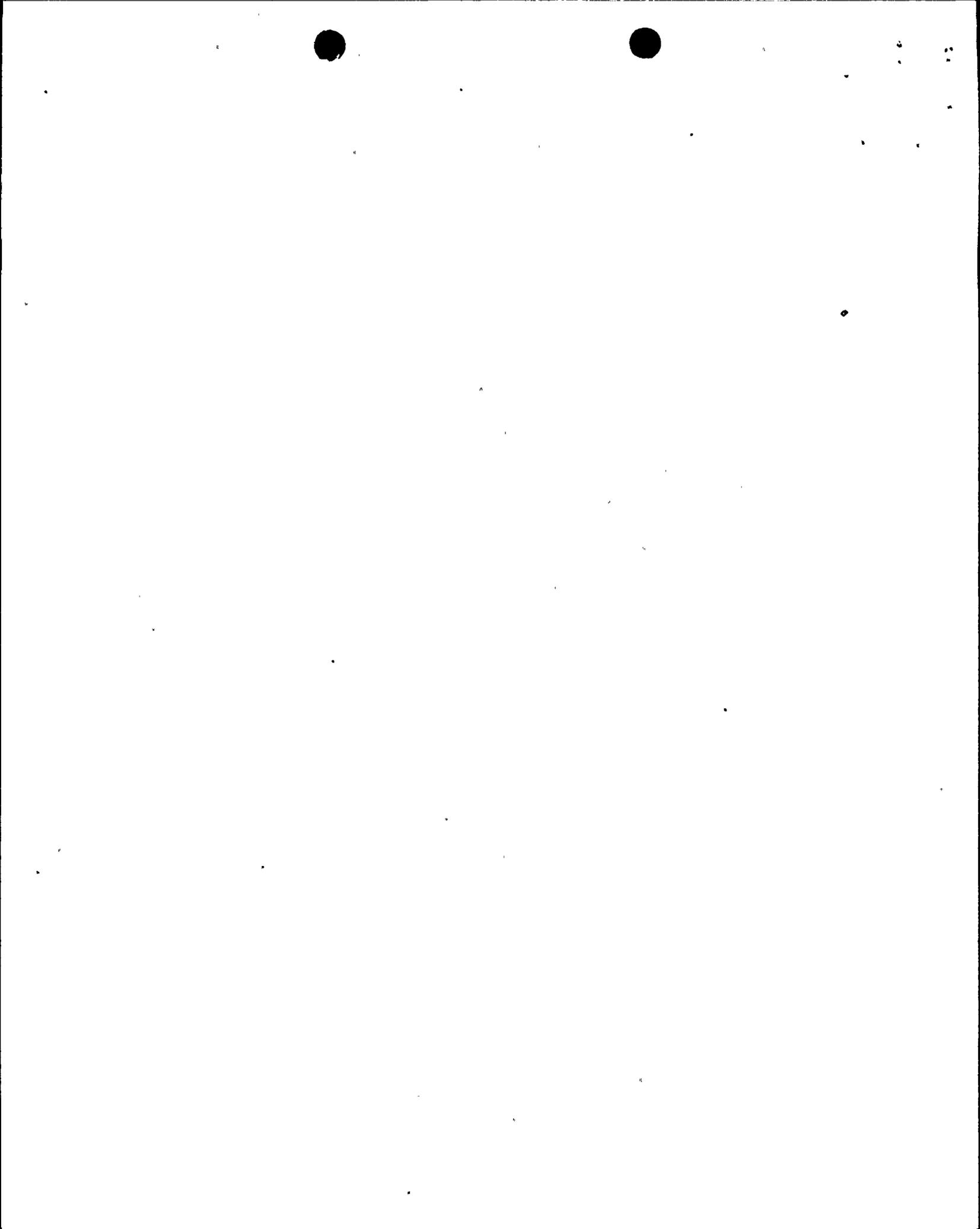
"Substitutions - Examination items scheduled may be substituted for items not previously scheduled in order to reduce the radiation levels. All substitutions will meet the selection criteria of the applicable Examination Category, (i.e. terminal ends, high stress welds, etc.), and shall meet the percentage requirements of Inspection Program B. Such changes will be noted in the summary report submittal."

"Tables 14-1 through 14-10 provide listings of items selected for adjustment by Examination Category and provides specific percentages to be achieved during the inspection interval and within each inspection period."

"Table 14-11 provides a Category summary for all Code Categories."

Evaluation: This request for relief was originally authorized by the NRC in an SER dated August 13, 1997. The purpose of the current revision of the request for relief is to clarify discrepancies among the original request for relief, NRC RAIs, and the licensee's responses to RAIs. In addition, a typographical error that resulted in an inconsistency between the SG-A and the SG-B inspection schedules was corrected. The INEEL staff believes that the changes made in the current revision of the request for relief do not change the justification for authorization of the original request for relief.

The Code requires that the sequence of component examinations established during the first inspection interval be repeated during each successive inspection interval to the extent practical. In addition, the Code requires a distribution of examinations in accordance with IWX-2400, Inspection Schedule. The licensee has proposed rescheduling examination areas for the second inspection interval to reduce the radiation exposure and burden associated with distributing the examinations of major components



by inspection period. This approach is intended to focus on one component or zone at a time to minimize repeated insulation removal during the inspection interval. In addition, the licensee proposed to substitute scheduled welds with similar welds in order to reduce radiation exposure.

The Code scheduling philosophy requires periodic examination of selected areas to assure continued system operability and integrity. Modifying the schedule of examination areas for the second 10-year interval provides the licensee a means to reduce radiation exposure while enhancing the overall efficiency of the inservice inspection program. Considering that the purpose of ALARA is to maintain radiation levels as low as reasonably achievable, ISI program changes that reduce radiation exposure without compromising quality and safety are prudent.

There are two technical considerations associated with this request. The first is the time duration between examinations, which are performed at intervals of approximately 10 years. This aspect is controlled by the successive examination requirement of the Code (IWX-2420). The second consideration is the distribution of examinations within the inspection interval, which is governed by IWX-2412 (Inspection Program B) for the St. Lucie Plant. By adhering to the sequence of examinations established during the first 10-year interval, the same insulation would have to be removed two or more times during each inspection interval. This requires many man-hours from skilled workers and greatly increases the potential for damage to the insulation, while causing additional radiation exposure to plant personnel. As a result, imposition of the Code scheduling and sequencing requirements would create an undue burden on the licensee.

At St. Lucie, the licensee has proposed a compromise with the Code requirements that will allow them to group the examinations of certain components within a single period to reduce radiation exposure. To accomplish this, the licensee altered the sequence of examinations established during the first 10-year interval. The licensee has provided tables summarizing the rescheduling of examinations by examination category for the second 10-year interval. These tables indicate that a majority of the components will be examined during the same period as during the first interval. For those areas where the schedule was adjusted, the number of components examined later in the interval is offset by those examined earlier. Although the time between examinations will exceed 10 years for some components, the delayed examination of these components is being compensated for by the examination of other components for which the duration is less than 10 years. This results in a new sequence of examinations that allows the licensee to achieve its goal of reducing radiation without compromising the level of quality and safety.

To reschedule the examination of components while minimizing the duration between examinations, the licensee modified the distribution of examinations among inspection periods for major components. For example, the licensee has scheduled the examination of the RPV, including 12 Examination Category B-D welds, during the second period. Since the duration between examinations does not exceed 10 years, this has been found to be an acceptable alternative to reduce the burden of staging the automated tool more than once in a given interval. However, distribution of all Examination Category B-D welds within the interval would require delaying SG examinations from the first period into

the second period for SG-A, which would mean 14 to 17 years could elapse between examinations. The licensee will continue to examine six Category B-D welds on SG-B during the third period while examining the SG-A welds during the second period. Although this results in a slight variation in the scheduling requirements of Inspection Program B of the Code, the INEEL staff believes that the distribution is adequate for detecting patterns of degradation that may occur. Therefore, reasonable assurance of the structural integrity of the subject components will be provided.

3. CONCLUSION

The licensee has proposed rescheduling of examination areas for the second inspection interval, which will establish a new sequence of examinations while reducing radiation exposure and enhancing the overall efficiency of the inservice inspection program. The INEEL staff has evaluated the licensee's proposed alternative and concludes that the proposed scheduling changes will provide reasonable assurance of the structural integrity of the affected systems, and that imposing the scheduling and sequencing requirements of the Code would cause an undue hardship 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).

Enclosure