August 1, 2003

Mr. J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: TURKEY POINT NUCLEAR PLANT, UNIT 4 - EVALUATION OF RELIEF REQUEST CONCERNING RISK-INFORMED INSERVICE INSPECTION (TAC NO. MB5551)

Dear Mr. Stall:

By a letter dated July 8, 2002, as supplemented by letters dated January 15, 2003, February 13, 2003, and May 14, 2003, Florida Power and Light Company (FPL) submitted a relief request, “Risk-informed Inservice Inspection Program”, for implementation during the third inspection period of the 10-year inspection interval of Turkey Point Plant, Unit 4. The proposed Risk-Informed Inservice Inspection (RI-ISI) program, developed in accordance with Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A, is an alternative to the current American Society of Mechanical Engineers (ASME) Code, Section XI, Inservice Inspection Program (ISI), and is applicable to Class 1 piping at Turkey Point Unit 4.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the relief request. Based on the information provided by FPL, the NRC staff concludes that the licensee’s proposed RI-ISI program is an acceptable alternative to the requirements of the ASME Code, Section XI for ISI of Code Class 1 piping, Categories B-F and B-J welds. Therefore, FPL’s request for relief is authorized pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety.

Included in the RI-ISI program, the licensee requested the performance of VT-2 visual examination each refueling outage as an alternative to the volumetric examinations specified in WCAP-14572, Revision 1-NP-A, for ASME Class 1 socket welds that are ranked as high safety significant (HSS). The NRC staff finds that the information collected during volumetric examination of socket welds is inconclusive due to the geometric limitations imposed by a socket weld. The NRC staff also finds that it is not productive to perform the Code-required surface examination of the subject socket welds in the absence of an environment that would cause outside surface-initiated flaws. Therefore, the use of a VT-2 visual examination for the HSS Class 1 socket welds is authorized pursuant to 10 CFR 50.55(a)(3)(i) on the basis that it provides an acceptable level of quality and safety.

The enclosed Safety Evaluation authorizes application of the proposed RI-ISI program for the subject Class 1 piping during the third 10-year ISI interval and will be implemented during the third inspection period of the current inspection interval, which began April 15, 1994, and ends April 14, 2004.

Sincerely,

***/RA by K.Jabbour Acting for/***

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-251

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION PROGRAM

RISK-INFORMED INSERVICE INSPECTION (RI-ISI) RELIEF REQUEST

FLORIDA POWER AND LIGHT COMPANY

TURKEY POINT NUCLEAR PLANT UNIT 4

DOCKET NO. 50-251

## 1.0 INTRODUCTION

In a submittal to the U.S. Nuclear Regulatory Commission (NRC or the Commission) dated July 8, 2002 (Reference (Ref.) 1), as supplemented on January 15, 2003 (Ref. 2), February 13, 2003 (Ref. 3), and May 14, 2003 (Ref. 4), the Florida Power and Light Company (FPL, the licensee) proposed an RI-ISI program as an alternative to a portion of its current ISI program for Turkey Point Unit 4. The scope of the RI-ISI program is limited to the American Society of Mechanical Engineers (ASME) Code Class 1 piping. Included in the RI-ISI program, the licensee requested the performance of VT-2 visual examinations each refueling outage as an alternative to the volumetric examinations specified in WCAP-14572, Revision 1-NP-A, for ASME Class 1 socket welds that are ranked as high safety significant (HSS).

The licensee's RI-ISI program was developed in accordance with the methodology contained in the Westinghouse Owners Group Topical Report, WCAP-14572, Revision 1-NP-A (Ref. 5), which was previously reviewed and approved by the NRC staff. The RI-ISI program proposed by the licensee was reviewed pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i).

## 2.0 REGULATORY REQUIREMENTS

Section 50.55a(g) of 10 CFR requires that inservice inspection (ISI) of the ASME Code Class 1 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1 components (including supports) shall meet the requirements set forth in the ASME Code, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda 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.

Enclosure

Section 50.55a(a)(3) of 10 CFR states, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC if the applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The staff reviewed the licensee's submittal with respect to the methodology and criteria contained in the NRC-approved WCAP. Further guidance in defining acceptable methods for implementing an RI-ISI program is also provided in Regulatory Guide (RG) 1.174, RG 1.178, and NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, LWR Edition, (SRP) Chapter 3.9.8.

RG 1.174 defines the following safety principles that should be met in an acceptable RI-ISI program: (1) the proposed change meets current regulations unless it is explicitly related to a requested exemption, (2) the proposed change is consistent with the defense-in-depth philosophy, (3) the proposed change maintains sufficient safety margins, (4) when proposed changes result in an increase in risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement, and (5) the impact of the proposed changes should be monitored using performance measurement strategies.

In accordance with the guidance provided in RGs 1.174 and 1.178, an engineering analysis of the proposed changes is required using a combination of traditional engineering analysis and supporting insights from the probabilistic risk assessment (PRA). The WCAP provides a discussion on how the results of the engineering analysis demonstrate that the proposed changes are consistent with the principles of defense-in-depth. This is accomplished by performing an evaluation to determine susceptibility of components (i.e., a weld on a pipe) to a particular degradation mechanism that may be a precursor to a leak or rupture, and then performing an independent assessment of the consequence of a failure at that location.

For Turkey Point Unit 4, the applicable edition of the ASME Code for the third 10-year ISI interval is the 1989 Edition. The subject relief request is for the remainder of the third 10-year ISI interval at Turkey Point Unit 4, which began April 15, 1994, and ends April 14, 2004.

## 3.0 <u>RELIEF REQUEST</u>

### 3.1 <u>Component Function/Description</u>

Turkey Point Unit 4, ASME Code, Section XI, Code Class 1 piping components

### 3.2 <u>ASME Code Requirements for Which Relief is Requested</u>

The current ISI requirements, for Class 1 piping, are contained in the 1989 Edition of Section XI, Division 1 of the ASME Code.

### 3.3 <u>Licensee's Proposed Alternative</u>

In the licensee's proposed RI-ISI program, piping failure potential estimates were determined using a software program contained in Supplement 1 to Reference 5, entitled "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection," which utilizes probabilistic fracture mechanics technology, industry piping failure history, plant-specific piping failure history, and other relevant information. Using the failure

potential and supporting insights on piping failure consequences from the licensee's PRA, safety significance ranking of piping segments was established to determine inspection locations. The program maintains the fundamental requirements of the ASME Code, such as the examination technique, frequency, and acceptance criteria. The RI-ISI program is intended to reduce the number of required examination locations significantly while maintaining an acceptable level of quality and safety.

The licensee plans to implement the RI-ISI program during the third inspection period of the third 10-year ISI interval. In Reference 2, the licensee states that, as a minimum, 18 examinations will be performed during the third period of the third interval of the B-F and B-J risk informed population. This is approximately 78 percent of the RI-ISI required examinations. Turkey Point Unit 4 has completed the examinations scheduled for the first and second periods using the current ASME Code ISI program. Other non-related portions of the ASME Code requirements, as well as the ongoing augmented inspection programs will remain unchanged. The RI-ISI program follows a previously approved methodology delineated in Reference 5.

3.4 Evaluation

In accordance with the guidance provided in RGs 1.174 and 1.178 (Refs. 6 and 7), the licensee provided the results of an engineering analysis of the proposed changes, using a combination of traditional engineering analysis and PRA. Defense-in-depth in RI-ISI programs is accomplished by evaluating a location's susceptibility to each potential degradation mechanism that may be a precursor to leak or rupture and then performing an independent assessment of the consequence of a failure at that location. The RI-ISI program for Turkey Point Unit 4 includes surface and volumetric examinations on the main reactor coolant piping and main safety injection lines (downstream of the first check valve). The licensee stated that inspections at these locations, which include reactor vessel, steam generator, and pressurizer dissimilar metal welds, assure that defense-in-depth is maintained. No changes to the evaluation of design basis accidents in the Final Safety Analysis Report are being made by the RI-ISI process. Therefore, defense-in-depth and sufficient safety margins will be maintained.

Pursuant to 10 CFR 50.55a(a)(3), the NRC staff has reviewed and evaluated the licensee's proposed RI-ISI program, including those portions related to the applicable methodology and processes contained in Reference 3, based on guidance and acceptance criteria provided in RGs 1.174 (Ref. 6) and 1.178 (Ref. 7) and in SRP Chapter 3.9.8 (Ref. 8).

3.4.1 Proposed Changes to the ISI Program

The scope of the licensee's proposed RI-ISI program is limited to ASME Class 1 piping only. The RI-ISI program was proposed as an alternative to the existing ISI program, which is based on the requirements of the ASME Code. A general description of the proposed changes to the ISI program was provided in Sections 3 and 5 of the licensee's submittal (Ref. 1). In Table 5-1 of Reference 1, a comparison of inspection location selection between the current ISI program and the proposed RI-ISI program is provided. The staff finds that the information submitted adequately defines the proposed changes resulting from the RI-ISI program.

3.4.2 Engineering Analysis

In accordance with the guidance provided in RGs 1.174 and 1.178 (Refs. 6 and 7), the licensee provided the results of an engineering analysis of the proposed changes, using a combination of traditional engineering analysis and PRA. Defense-in-depth in RI-ISI programs is accomplished by evaluating a location's susceptibility to each potential degradation mechanism that may be a precursor to leak or rupture and then performing an independent assessment of the consequence of a failure at that location. The RI-ISI program for Turkey Point Unit 4 includes surface and volumetric examinations on the main reactor coolant piping and main safety injection lines (downstream of the first check valve). The licensee stated that inspections at these locations, which include reactor vessel, steam generator, and pressurizer dissimilar metal welds, assure that defense-in-depth is maintained. No changes to the evaluation of design basis accidents in the final safety analysis report are being made by the RI-ISI process. Therefore, defense-in-depth and sufficient safety margins will be maintained.

There are no augmented inspection programs in the Class 1 piping. The licensee stated that other non-related portions of the ASME Section XI Code will be unaffected by the proposed alternative RI-ISI program. This is consistent with approved WCAP-14572, Rev. 1-NP-A and is acceptable.

Piping systems within the scope of the proposed RI-ISI program were divided into piping segments. A pipe segment is defined as a portion of pipe length whose failure at any location within the segment will lead to the same consequence. Pipe segments are separated by flow splits and locations of pipe size changes, and include piping to a point at which a pipe break could be isolated. The licensee reported no deviations from the identification and definition of segments in WCAP-14572, Rev. 1-NP-A, and their process is, therefore, acceptable.

Piping failure mechanisms identified by the licensee include thermal fatigue, thermal striping/stratification, and vibratory fatigue. The failure probabilities for the Turkey Point Unit 4 piping segments were all derived using the Westinghouse SRRA software program. This is consistent with the guidelines in WCAP-14572, Rev. 1-NP-A, and in conformance with SRP 3.9.8 (Ref. 8).

The licensee reported a deviation in the WCAP-14572, Rev. 1-NP-A, methodology regarding credit taken for leak detection when calculating pipe failure probabilities. WCAP-14572, Rev. 1-NP-A, allows credit for detecting (and isolating, repairing, or otherwise terminating a potential accident sequence) a leak in the reactor coolant system (RCS) piping before it develops into a pipe break for piping inside of containment. This credit reflects the highly developed leak detection systems used to monitor leakage from the reactor coolant piping. In Reference 1, the licensee states that detection of a leak before break is credited for any non-RCS segment located inside the containment that interfaces with the RCS because the radiation and sump level monitors can detect a leak in the segment as reliably as that of an RCS leak. Because the segments are subject to essentially the same leak detection capabilities as that of an RCS leak, the extension of credit for leak detection in these segments is reasonable and acceptable. The licensee has developed the consequence of each segment failure based on the direct and indirect effects of the segment failure. The licensee has reported no deviations from the consequence characterization methodology in WCAP-14572, Rev. 1-NP-A, and, therefore, their analyses are acceptable.

The licensee requested the performance of visual VT-2 examinations during each refueling outage as an alternative to the volumetric examinations specified in WCAP-14572, Rev. 1-NP-A, for the HSS ASME Code Class 1 socket welds identified in the RI-ISI program. The staff finds that volumetric examination of socket welds is inconclusive and impractical due to the geometric limitations imposed by the socket weld. However, the staff notes that Table IWB-2500-1 of the ASME Code requires surface examinations at socket welds, and surface examination (i.e., liquid penetrant examination) is an effective method for discovery of potential surface flaws on the external surface, specifically, flaws induced by low-cycle, high-bending stress thermal fatigue or by external chloride stress corrosion cracking (ECSCC). The licensee indicated in Reference 4 that the subject piping is not affected by the postulated external degradation mechanisms. The ASME Code Class 1 socket weld piping is not located in areas that are subject to ECSCC environment. In addition, industry experience has shown that flaws in small diameter connections, especially small diameter socket-welded connections are predominantly due to vibratory fatigue. Such a flaw is likely to take a long period for initiation. After the initiation phase, the flaw will likely propagate rapidly and cause the pipe to leak. Hence, the staff concludes that performance of a VT-2 visual examination is sufficiently effective for the postulated failure mechanism applicable to the subject socket welds.

The licensee proposes the performance of visual VT-2 visual examinations each refueling outage for the five segments categorized as HSS that contain only socket welds consisting of piping with a nominal diameter of 2 inches or less as an alternative to the volumetric examinations. The NRC staff concurs that volumetric examination of socket welds is inconclusive and impractical due to the geometric limitations imposed by a socket weld. The NRC staff also concurs that to perform ASME Code-required surface examination of socket welds is not useful due to the absence of an environment that would cause outside surface-initiated flaws. Therefore, the use of a VT-2 visual examination for the HSS socket welds in lieu of the current examination requirements is authorized for the remainder of the third 10-year ISI interval pursuant to 10 CFR 50.55(a)(3)(i) on the basis that performing the examinations provides an acceptable level of quality and safety.

### 3.4.3 Probabilistic Risk Assessment

FPL has one PRA model that can represent either of the sister units, Turkey Point Unit 3 or Turkey Point Unit 4. By letter dated January 19, 2000, FPL submitted a request for a RI-ISI program for Turkey Point Unit 3 (Ref. 9). The Turkey Point Unit 3 RI-ISI relief request was based on the 1997 version of the PRA. The Turkey Point Unit 3 relief request was approved by the staff by letter dated November 30, 2000 (Ref. 10). The safety evaluation (SE) enclosed in the November 30, 2000, letter, concluded that the quality of the 1997 version of the PRA was sufficient to support the development of the proposed RI-ISI program. In the July 8, 2002, RI-ISI submittal for Turkey Point Unit 4, FPL stated that the 2000 PRA model update was used to support the Turkey Point Unit 4 RI-ISI program development. The total core damage frequency (CDF) and large early release frequency (LERF) estimates in the 2000 PRA are 9.84E-6/year and 3.85E-8/year, respectively. The staff noted that the estimates were quite different from the 6.09E-5/year CDF and 1.00E-5/year LERF estimates from the 1997 version of the PRA. The staff visited FPL headquarters in Florida and audited the PRA in order to review the changes to the PRA.

During the audit, the staff was informed that about one-half the decrease in the CDF was attributable to modifying the initiating event frequencies from the values used in the 1997 PRA

to those recommended in NUREG/CR-5750 (Ref. 11) and modifying the modeling of a loss-of-coolant accident (LOCA) caused by failure of the reactor coolant pump seals following failure to cool the seals. The dominant risk contribution from pipe segment failures in RI-ISI are failures that directly cause a plant transient. A small risk contribution arises from independent initiating events that, in turn, cause a plant transient that is aggravated by a subsequent pipe segment failure. In the independent initiating event scenarios, the initiating event must occur and the affected piping must be degraded and ready to fail under operating loads during the time that the operation is required. Consequently, changes in the initiating event frequencies and the seal LOCA model have a negligible impact on the RI-ISI program.

Most of the rest of the reduction in the CDF was attributed to the addition in the PRA models of the use of Unit 3's reactor water storage tank (RWST) to provide water for injection into Unit 4's reactor vessel if the Unit 4 RWST empties before recirculation is successfully aligned. Injection from Unit 4's RWST is initially required for all LOCAs. The use of Units 3's RWST as a source of injection water for Unit 4 was only credited for the two smallest LOCA sizes where sufficient time for diagnosis and human actions required to provide the water was judged to be available. Discussion during the audit revealed that this action, although straightforward, is not explicitly described in any of the emergency operating procedures and only implicitly described in the severe accident management guidelines. The staff expressed concern that the small failure probability assigned to this non-proceduralized recovery action (about 1E-4/demand) could not be justified. The licensee responded that several proceduralized actions to refill Unit 4's RWST using other sources of water were not modeled and proposed that the use of Unit 3's RWST be deleted from the two smallest LOCA sequences and the proceduralized refill options be added to the smallest LOCA sequence. Credit can, and should, be taken for proceduralized human recovery actions (including consideration of the available time) and the staff found this proposal acceptable. The licensee re-evaluated the RI-ISI program after making the change to the PRA and reported (Ref. 2) that several piping segments moved between the low and the medium safety significance categories, but that the population of segments with risk reduction worth greater than 1.005 (i.e., HSS) remained the same.

During the audit, the staff also questioned the justification for the use of 4 LOCA sizes instead of the three sizes normally (but not exclusively) used in PRAs. Many pressurized water reactor PRAs define LOCAs with equivalent break diameters greater than 5 or 6 inches as large LOCAs. The licensee responded that it had divided the "normal" large LOCA (requiring, in part, only low pressure injection (LPI) of water into the reactor vessel) into two sizes. The licensee defined medium LOCA as a LOCA with an equivalent break diameter between 6 and 13½ inches, and the large LOCA as a LOCA with an equivalent break diameter greater than 13½ inches. The medium LOCA requires an initial high pressure injection (HPI) of water into the reactor vessel, followed by LPI. The large LOCA requires only the LPI of water. Although more equipment is required when both HPI and LPI of water is required, the conditional core damage probability for the large LOCA is greater because the operators have less time to respond to the event and to recover from any failures than they do following a medium LOCA. In response to a request for additional information, the licensee reported (Ref. 3) that calculations using a different thermal hydraulic computer program than that initially used to develop the success criteria indicated that both LPI and HPI were necessary for 6 and 8 inch equivalent diameter LOCAs. The staff finds that consistent results between the two computer codes are sufficient to justify the use of the medium LOCA to support the development of the proposed RI-ISI program.

The staff also questioned the cause of the reduction in the LERF estimate from 1E-5/year in the 1997 PRA to about 4E-8/year in the 2000 PRA. The licensee responded that large early containment failure models remained unchanged and that the reduction was caused by reducing the likelihood of energetic containment failure modes. The likelihood of hydrogen explosion, direct containment heating, steam explosion within the reactor vessel, and steam explosions outside of the reactor vessel were reduced, some by several orders of magnitude. The staff recognizes that almost all the Class 1 piping failures included in the RI-ISI evaluation are LOCAs that, by definition, lead to a core melt without an intact reactor pressure boundary, thereby greatly reducing the likelihood of energetic containment failure scenarios. Consequently, energetic containment failure modes are not expected to be significant contributors to LERF for the scenarios used to support the proposed RI-ISI program and the staff finds that the modifications to the LERF evaluation will not affect the proposed RI-ISI program. The staff noted that there was little justification for the changes in the energetic containment failure mode likelihoods and did not review the acceptability of the changes to the LERF estimates.

The staff did not review the baseline PRA analysis to assess the accuracy of the quantitative estimates. Quantitative results of the PRA are used, in combination with a quantitative characterization of the pipe segment failure likelihood, to support the assignment of segments into broad safety significance categories reflecting the relative importance of pipe segment failures on CDF and LERF. Inaccuracies in the models or assumptions large enough to invalidate the broad categorizations developed to support the RI-ISI should have been identified in the licensee’s or in the staff’s review. Minor errors or inappropriate assumptions will only affect the consequence categorization of a few segments and will not invalidate the general results or conclusions. As a result, the continuous use and maintenance of the PRA provides further opportunities to identify inaccuracies and inappropriate assumptions, if any, in the PRA models. The staff finds that the quality of the PRA is sufficient to support the submittal.

The licensee stated in Reference 1 that the risk ranking and change in risk calculations were performed according to the guidance provided in Section 4.4.2 of WCAP-14572, Rev. 1-NP-A, aside from the one deviation discussed in Section 3.4.2 of this SE. The change in CDF is estimated to be about -1E-7/yr with and without operator action. The change in LERF is estimated to be about -1E-10/yr with and without operator action.

The licensee did not submit estimates for the other risk change criteria in Section 4.4.2 of WCAP-14572, Rev. 1-NP-A, but stated in Reference 1 that all the changes in risk calculations were performed according to the guidance on page 213 of the WCAP (as applicable) and all four criteria for evaluating the results were applied. Seven segments and inspection locations were added until all the four criteria discussed on pages 214 and 215 of the WCAP were satisfied. Based on the use of the approved methodology and on the reported results, the staff finds that the change in risk associated with the implementation of the RI-ISI program is small and consistent with the intent of the Commission’s Policy Statement and with RG 1.178.

The Turkey Point Unit 4 risk-informed methodology provides for conducting an analysis of the proposed changes using a combination of engineering analysis with supporting insights from a PRA. Defense-in-depth and quality are not degraded in that the methodology provides reasonable confidence that any reduction in existing inspections will not lead to degraded piping performance when compared to existing performance levels. Inspections are focused

on locations with active degradation mechanisms as well as selected locations that monitor the performance of system piping.

3.4.4 Integrated Decision-Making

The proposed RI-ISI program presents an integrated approach that considers, in concert, the traditional engineering analysis, the risk evaluation, and the implementation and the performance monitoring of piping. This is consistent with the guidelines of RG 1.178.

The selection of pipe segments to be inspected is described in Section 3.8 of Reference 1 using the results of the risk category rankings and other operational considerations. Table 5-1 of Reference 1 provides a summary table comparing the number of inspections required under the existing ASME Section XI ISI program at Turkey Point Unit 4 with the alternative RI-ISI program. The licensee stated that it used the methodology described in WCAP-14572, Rev. 1-NP-A to guide the selection of the number and the location of examination elements within the piping segments.

WCAP-14572, Rev. 1-NP-A describes targeted examination volumes (typically associated with welds) and methods of examination based on the type(s) of degradation expected. The staff has reviewed these guidelines and has determined that, if implemented as described, the RI-ISI examinations should result in improved discovery of service-related discontinuities over that currently provided by the ASME Code.

The objective of ISI required by the ASME Code is to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary that may impact plant safety. Therefore, the RI-ISI program must meet this objective to be found acceptable for use. Further, since the RI-ISI program is based on inspection for cause, element selection should target specific degradation mechanisms.

Section 4 of WCAP-14572, Rev. 1-NP-A, provides guidelines for the areas and/or volumes to be inspected as well as the examination method, acceptance standard, and evaluation standard for each degradation mechanism. Based on a review of the cited portion of WCAP-14572, Rev. 1-NP-A, the staff concludes that the examination methods are appropriate since they are selected based on specific degradation mechanisms, pipe sizes, and materials of concern. The licensee reported no deviations in this area from the WCAP-14572, Rev. 1-NP-A, methodology and, therefore, its evaluation is acceptable.

The NRC staff finds that the results of different elements of the engineering analysis are considered in an integrated decision-making process. The impact of the proposed changes in the ISI program is founded on the adequacy of the engineering analysis and acceptable estimation of changes in plant risk in accordance with RG 1.174 and RG 1.178 guidelines.

3.4.5 Implementation and Monitoring

Implementation and performance monitoring strategies are addressed in Element 3 of RG 1.178 and SRP 3.9.8. The objective of Element 3 is to assess performance of the affected piping systems under the proposed RI-ISI program by implementing monitoring strategies that confirm the assumptions and analyses used in the development of the RI-ISI program. To approve an alternative pursuant to 10 CFR 50.55a(a)(3)(i), implementation of the RI-ISI program, including inspection scope, examination methods, and methods of evaluation of examination results, must provide an adequate level of quality and safety.

In Reference 1, the licensee stated that upon approval of the RI-ISI program, procedures that comply with the WCAP-14572, Rev. 1-NP-A guidelines will be prepared to implement and monitor the RI-ISI program. The licensee confirmed that the applicable portions of the ASME Code not affected by the change, such as inspection methods, acceptance guidelines, pressure testing, corrective measures, documentation requirements, and quality control requirements would be retained.

The licensee stated in Section 4 of Reference 1 that the RI-ISI program is a living program and its implementation will require feedback of new relevant information to ensure the appropriate identification of HSS piping locations. Reference 1 also stated that as a minimum, risk ranking of piping segments will be reviewed and evaluated every ISI period and that significant changes may require more frequent adjustments as generally directed by NRC generic communications, or by industry and plant-specific feedback. In Reference 2 the licensee stated that if changes to the RI-ISI program decrease the percentage of examinations required for the 10-year interval, the revised program would then be resubmitted to the NRC for review and approval.

The proposed periodic reporting requirements meet existing ASME Code requirements and applicable regulations and, therefore, are considered acceptable. The staff finds that the proposed process for RI-ISI program updates meets the guidelines of RG 1.174 that risk-informed applications should include performance monitoring and feedback provisions; therefore, the process for program updates is acceptable.

The licensee considered implementation and performance monitoring strategies. Inspection strategies ensure that failure mechanisms of concern have been addressed and there is adequate assurance of detecting damage before structural integrity is affected. The risk significance of piping segments is taken into account in defining the inspection scope for the RI-ISI program. System pressure tests and visual examination of piping structural elements will continue to be performed on all ASME Code Class 1 in accordance with the ASME Code Section XI program. The RI-ISI program applies the same performance measurement strategies as existing ASME Code requirements.

As stated in 10 CFR 50.55a(a)(3)(i), alternatives to regulatory requirements are permitted when authorized by the NRC if the applicant demonstrates that the alternative provides an acceptable level of quality and safety. In this case, the licensee's proposed alternative is to use the risk-informed process described in the NRC-approved report WCAP-14572, Rev. 1-NP-A. As discussed above, the staff concludes that the licensee's proposed RI-ISI program, as described in the submittal, will provide an acceptable level of quality and safety with regard to the number of inspections, locations of inspections, and methods of inspection.

## 4.0 CONCLUSION

Based on the information provided in the licensee's submittals, the NRC staff has determined that the licensee's proposed RI-ISI program is an acceptable alternative to the current ISI program, which is based on ASME Code, Section XI, requirements for Code Class 1, Categories B-F and B-J welds. Therefore, the licensee's proposed RI-ISI program is authorized for the remainder of the third 10-year ISI interval at Turkey Point Unit 4, which began April 15, 1994, and ends April 14, 2004, pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the request provides an acceptable level of quality and safety. In addition, the use of a VT-2 visual examination for the HSS socket welds in lieu of the current examination requirements is authorized for the remainder of the third 10-year ISI interval pursuant to 10 CFR 50.55(a)(3)(i) on the basis that performing the examinations provides an acceptable level of quality and safety.

This authorization is limited to those components described in Section 3.1 above. All other ASME Code, Section XI, requirements for which relief was not specifically requested, and approved in this SE remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

## 5.0 REFERENCES


1. Letter, dated July 8, 2002, J. P. McElwain (Turkey Point Plant, Vice President) to U.S. Nuclear Regulatory Commission, containing *Florida Power and Light Company, Turkey Point Unit 4, Risk-Informed Inservice Inspection Piping Program Submittal Using Westinghouse Owners Group (WOG) Methodology (WCAP-14572, Revision 1-NP-A, February 1999)*.

2. Letter, dated January 15, 2003, J. P. McElwain (Turkey Point Plant, Vice President) to U.S. Nuclear Regulatory Commission, containing *Response to Request for Additional Information Regarding Risk-Informed Inservice Inspection (RI-ISI) Relief Request for Turkey Point Unit 4.*

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