February 2, 2001

Mr. Thomas F. Plunkett
President - Nuclear Division
Florida Power & Light Company
P. O. Box 14000
Juno Beach, FL 33408-0420

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE TURKEY POINT, UNITS 3 AND 4, LICENSE RENEWAL APPLICATION

Dear Mr. Plunkett:

By letter dated September 8, 2000, Florida Power and Light (FPL), submitted for the Nuclear Regulatory Commission's (NRC) review an application pursuant to 10 CFR Part 54, to renew the operating license for Turkey Point Nuclear Plant, Units 3 and 4. The NRC staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete its safety review. Specifically, the enclosed questions relate to several areas in the Aging Management Program in Appendix B, and the Time Limited Aging Analysis Program in Section 4 of the application.

Please provide a schedule by letter, electronic mail, or telephonically for the submittal of your responses within 30 days of the receipt of this letter. Additionally, the staff would be willing to meet with FPL prior to the submittal of the responses to provide clarifications of the staff's requests for additional information.

Sincerely,

/RA/

Rajender Auluck, Senior Project Manager
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure: Request for Additional Information

cc w/encl: See next page

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Request for Additional Information
Turkey Point Units 3 and 4

Auxiliary Feedwater Pump Oil Coolers Inspection

RAI 3.8.1-1

You state in the scope of this inspection program that it is intended to be a one time inspection of an oil cooler for one of the three shared auxiliary feedwater pumps. Provide justification for only inspecting the oil cooler of one of the three pumps. Also, provide justification for doing a one time inspection instead of multiple inspections with intervals of three or five years, as is generally prescribed in ASME Section XI programs for similar components.

RAI 3.8.1-2

Provide the bases for the quantitative acceptance criteria which will be used to make the determination that inspection of other coolers and additional future monitoring are required.

Auxiliary Feedwater Steam Piping Inspection Program

RAI 3.8.2-1

In Section 3.1.2 of Appendix B of the application you state that the auxiliary feedwater steam piping inspection program will provide for representative volumetric examinations to detect loss of material in the auxiliary feedwater steam piping between the steam supply check valves and each of the three auxiliary feedwater pump turbines. Provide a detailed description of how samples will be selected for the examination and the basis of the selection.

RAI 3.8.2-2

In Table 3.5-3 of the application you list piping/fittings, auxiliary feedwater pump turbine casings, valves, and steam traps as the in-scope components to be managed for aging effects by the Auxiliary Feedwater Steam Piping Inspection Program. In Section 3.1.2 of Appendix B to the application, under the Scope, you only list piping and fittings as components to be managed by the program. Clarify the above discrepancy, and discuss in detail how the program will be credited for aging management of the loss of material for the auxiliary feedwater pump turbine casings, valves, and steam traps, by addressing each of the pertinent review elements.

Emergency Containment Cooler Inspection

RAI 3.8.3-1

Provide a justification for your determination that a one time inspection of the emergency containment coolers is adequate. Operating experience with these coolers at other nuclear power plants indicates that loss of material caused by erosion and flow induced vibration can vary during plant operation due to unanticipated transients and flow conditions. It seems that a one time inspection would not be able to reliably detect damage over a long period of operation.

RAI 3.8.3-2

You plan to only examine a percentage of the components within the scope of the program. You stated that you will choose those areas of greatest susceptibility based on geometry and flow conditions for the initial inspection sample. Provide the percentage of components that will be examined for the inspection, compared to the entire population under consideration. This information is needed for us to determine whether the results of a limited sample size may be considered representative of, and therefore applied to, the entire population.

RAI 3.8.3-3

Discuss the acceptance criteria which you will use for tube examination in the emergency containment coolers inspection program. You stated that you will verify that the minimum required wall thickness will be maintained. Clarify the source and basis for the acceptance criteria to be applied for this examination.

RAI 3.8.3-4

Discuss how the acceptance criteria for the emergency containment cooler heat exchanger tubes consider fatigue failure due to flow induced vibration. If flow induced vibration is not considered, provide the technical justification for this position.

<u>Field Erected Tanks Internal Inspection</u>

RAI 3.8.4-1

The Field Erected Tanks Internal Inspection (FETII) Aging Management Program (AMP), described in Section 3.1.4 of Appendix B in the application is a one-time inspection of the condensate storage tanks, the refueling water storage tanks, and the shared demineralized water storage tank. Justify your use of a one-time inspection rather than periodic examinations for each of these tanks.

RAI 3.8.4-2

For each of the tanks to be examined as part of the FETII AMP, describe the locations within each of the tanks that are the most susceptible to corrosion and discuss why these locations are the most susceptible.

RAI 3.8.4-3

Describe the visual examination procedures for the FETII AMP, including any lighting and resolution requirements. Also describe any provisions for additional volumetric or surface examinations in the event that the scheduled visual examination reveals extensive loss of material.

RAI 3.8.4-4

Describe the relationship between the Chemistry Control AMP and the FETII AMP for the refueling water storage tanks, the demineralized water storage tank, and the condensate storage tanks. How do these programs interact?

<u>ASME Section XI, Subsection IWE In-service Inspection (ISI) Program</u>

RAI 3.9.1.2-1

In describing preventive actions, you state that coatings, cathodic protection, and moisture barriers are not credited in the determination of the aging effects requiring management. However, it is the degradation of coating and moisture barriers and malfunction of the cathodic protection system that could give rise to the degradation of the protected safety related components. That is the reason Subsection IWE requires periodic examination of moisture barriers, and coatings. The effectiveness of these preventive measures should be periodically assessed as part of the aging management program for the protected components. Provide a summary of the procedures used for managing the effectiveness of these preventive measures.

RAI 3.9.1.2-2

With respect to the detection of aging effects, the bottom liner plate of the containment structure at Turkey Point is covered with fill concrete, therefore, it is not feasible to perform direct examinations. Borated water leakage and thermal and shrinkage related cracking of the fill concrete could give rise to corrosion of the bottom liner plate. Describe any program, whether as part of the IWE ISI or as part of the maintenance rule programs, to detect the degradation and aging effects of the bottom liner plate. If no such programs exist, explain how you concluded the bottom liner plate is not susceptible to such degradation.

RAI 3.9.1.2-3

How does your process provide for the confirmation of the adequacy of repairs. Do you require reexamination of the repaired areas during subsequent inspection interval(s)?

RAI 3.9.1.2-4

Based on the inspections performed prior to the implementation of Subsection IWE, provide a summary of significant events at Turkey Point related to:

A. Liner corrosion.

B. Major penetration leakage (equipment hatches, airlocks, main steam line, feedwater line) not meeting the Type B leakage rate requirements.

C. Leakage and corrosion of bellows (if applicable).

D. Isolation valve leakage (system or Type B test).

E. Type A tests not meeting the containment leak rate criteria.

Include the corrective actions taken to prevent such events in the future.

ASME Section XI, Subsection IWF In-service Inspection Program

RAI 3.9.1.3-1

Section 3.2.1.3 of Appendix B of the application states that the extent and frequency of the IWF in-service inspection program of component supports is in accordance with ASME Section XI, Subsection IWF. Provide a description of the extent and frequency of the inspections, including sample selection. Also specify the edition and addenda of the ASME Code used for the program.

ASME Section XI, Subsection IWL In-service Inspection Program

RAI 3.9.1.4-1

In this section of the application, you discuss the aging management of the containment post-tensioning system components. However, Subsection IWL of Section XI of the ASME Code also requires the in-service inspection of the concrete and the post-tensioning system. If Subsection IWL is not used for aging management of the containment concrete, provide a description of the program for managing the aging of the containment concrete, including, the inspection interval, the personnel qualification requirements, the examination method(s), the acceptance criteria, and the quality assurance requirements related to this program.

If ASME Subsection IWL is used for managing the aging effects on concrete, but inadvertently left out in the description, supplement the description of the in-service inspection requirements for concrete. As ASME Subsection IWL does not contain specific acceptance criteria for examination of concrete, incorporate your criteria as part of this revised description.

RAI 3.9.1.4-2

You state that all metallic components are interconnected to an impressed current cathodic protection system (CPS) to prevent galvanic corrosion, and that this system is not credited in the determination of the aging effects requiring management. A number of components (e.g., reinforcing bars, tendon anchorage components) to which the CPS is connected are embedded or not available for direct examination. Considering the reliability of continuous sources, the CPS may or may not be effective at certain times (power outage, low battery voltage, etc.). Such incidents could lead to adverse effects to the protected components. Thus, if the CPS is relied upon for preventing corrosion of the protected components, its effectiveness in performing its function has to be periodically assessed. Provide a summary of the procedures used to assess the effectiveness of the CPS.

RAI 3.9.1.4-3

Based on the inspections performed prior to the implementation of ASME Subsection IWL, as part of the plant's operating experience, provide a summary of significant events at Turkey Point related to:

A. Containment concrete (e.g. dome delamination, wide spread scaling).

B. Containment prestressing force (unusual systematic losses).

C. Corrosion of post-tensioning system hardware (breakage of wires or anchor-head components, water in the sheathing).

D. Grease leakage through concrete.

Include the corrective actions taken to alleviate such events in the future. Also, provide a description of the condition of the tendon galleries' environments and the measures implemented to control the environment and to alleviate the corrosion of vertical tendon anchorage hardware.

<u>Containment Spray System Piping Inspection Program</u>

RAI 3.9.5-1

In Section 3.2.5, Appendix B of the application you state that surveillance procedures require the closure of a second isolation valve in the containment spray headers when the pumps are started for testing. Identify the test procedures and the basis for determining the effectiveness of the preventive action.

RAI 3.9.5-2

Indicate whether or not the required minimum wall thickness of the piping/fittings and valves has been evaluated to withstand damage due to fatigue resulting from flow induced vibrations.

RAI 3.9.5-3

According to the information in Section 3.3.1 of the LRA, all piping/fitting joints in the Containment Spray System are accessible. However it is not clear whether or not they are accessible to ultrasonic test (UT) examinations. For those joints which may not be accessible to (UT) examinations provide additional information to describe the management of the aging effects.

RAI 3.9.5-4

Previous license renewal applicants identified loss of material and cracking due to stress corrosion as an issue for stainless steel components in this system. Discuss the differences in design, construction or operation of this system at Turkey Point that explain why the scope of your program is limited to loss of material for carbon steel components.

Fire Protection Program

RAI 3.9.8-1

In Section 3.2.8, Appendix B of the application you state that the scope of the fire protection program will be enhanced to include additional components. Provide the bases and guidelines which are to be used for selection of these additional components and indicate which additional components will be considered.

RAI 3.9.8-2

Identify the specific programs which are credited for monitoring external and internal material degradation of the fire protection system components and piping.

RAI 3.9.8-3

Identify the specific fire protection procedures which specify the acceptance criteria for evaluating the inspection and test results of the components/piping. Also identify the applicable documents which list the parameters required to be monitored and controlled.

Intake Cooling Water System Inspection Program

RA 3.9.10-1

In Section 3.2.10, Appendix B of the application you state that the intake cooling water system program will be enhanced to improve documentation of the scope and the frequency of the inspections. Clarify whether or not the scope and frequency of the inspections will be enhanced or simply the documentation aspects of the existing inspection programs will be changed.

RAI 3.9.10-2

Identify the specific plant procedures and applicable documents which contain detailed guidance related to the performance monitoring, testing and tube examinations of the component cooling water system piping and heat exchangers. Also provide the acceptance criteria and the bases for the evaluation of the inspection results.

Systems and Structures Monitoring Program

RAI 3.9.15-1

With respect to the attribute related to the scope of systems and structures monitoring program, indicate how you will manage aging effects of structural components that are inaccessible for inspection. Discuss how you intend to manage or monitor aging effects of inaccessible structural components when conditions in accessible areas may not indicate the presence of degradation in inaccessible areas. Also, provide a summary discussion of specific program attributes that will be enhanced to address inspection requirements to manage certain aging effects pursuant to 10 CFR Part 54.

RAI. 3.9.15-2

With respect to the attribute covering parameter monitored or inspected, the parameter description is incomplete. Augment the discussion to demonstrate that the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected and to what extent the degradation can be determined. The parameters monitored or inspected must be commensurate with industry standard practice and, must also consider industry and plant specific operating experience. For concrete structural elements, typical parameters to be monitored or inspected are structural cracking, spalling, scaling, erosion, corrosion of reinforcement bars, settlements and deformation. For structural steel elements (including connections), typical parameters to be monitored or inspected are corrosion, cracking, erosion, discoloration, wear, pitting, gouges, dents, and other signs of surface irregularities. Augment and enhance this section of the plant-specific program to include sufficient details on the parameters monitored or inspected so that a staff technical audit can reach a conclusion that this program attribute is adequate.

RAI 3.9.15-3

For the Systems and Structures Monitoring Program presented, provide additional description of the criteria for assessing or categorizing the overall condition of the structures and systems that are monitored. Also discuss Turkey Point specific criteria that are used to assess the severity of observed degradations and determine whether corrective action(s) are needed for the observed degradations. As applicable, briefly describe walkdown procedures, checklists, or inspection forms that are provided to personnel that implement “Systems and Structures Monitoring Program.”

RAI 3.9.15-4

With respect to the monitoring and training aspects of the program, your discussion does not appear to specifically address the monitoring part. Pro-active monitoring and understanding of trending behavior is needed to monitor structural aging so that corrective actions can be taken prior to exceeding the acceptance criteria. Describe the monitoring and analysis activities that are to be included for each of the commodity groups to track the extent and rate of degradation and their relationship to the acceptance criteria in the program. If you do not plan a monitoring and trending attribute for your program, justify your conclusion.

RAI 3.9.15-5

The discussion in the detecting of aging effects does not provide enough information for the staff to reach a reasonable assurance finding. Provide the inspection methods, inspection schedule (frequency), and inspector qualifications for each structure/aging effect combination to ensure that aging degradation will be detected and quantified before there is loss of intended functions. Describe the method(s) used to determine the frequency of inspections as well as the minimum walkdown frequency for the various applications of the structural and systems/component walkdowns. Also, the program description does not provide information about the training and qualifications of the personnel that (1) perform the inspections required by the program including structures and systems/components walkdowns and (2) evaluate the adequacy of the inspection/walkdown procedures and findings.

RAI 3.9.15-6

The description of operating experience and the demonstration provided is too general and does not contain a description of the findings from the Maintenance Rule baseline inspection and subsequent Maintenance Rule inspection activities. Discuss your actions relating to the treatment of aging you identified prior to the loss of intended function or failures not detected prior to the loss of intended function. In addition, indicate whether these findings have been used to enhance or improve the proposed systems and structures monitoring program.

<u>Metal Fatigue</u>

RAI 4.3.1-1

In Section 4.3.1 of the application you discuss your evaluation of the fatigue time limited aging analyses for ASME Class 1 components. The discussion indicates that, based on your review of the plant operating history, you concluded that the number of cycles assumed in the design of the ASME Class 1 components are conservative and bounding for the period of extended operation. Table 4.1-8 of the Updated Final Safety Analysis Report contains a list of transient design conditions and associated design cycles. Provide the following information for each transient listed in Table 4.1-8:

A. The current number of operating cycles and a description of the method used to determine the number and severity of the design transients from the plant operating history.

B. The number of operating cycles estimated for 60 years of plant operation and a description of the method used to estimate the number of cycles at 60 years.

RAI 4.3.1-2

Flaws in ASME Class 1 components that exceed the size of allowable flaws defined in IWB-3500 of the ASME Code need not be repaired if they are analytically evaluated to the criteria in IWB-3600 of the ASME Code. The analytic evaluation requires the licensee to project the amount of flaw growth due to fatigue and stress corrosion cracking mechanisms, or both, where applicable, during a specified evaluation period. Identify all Class 1 components that have flaws exceeding the allowable flaw limits defined in IWB-3500 and have been analytically evaluated to IWB-3600 of the ASME Code. Provide the results of the analyses that indicate whether the flaws will satisfy the criteria in IWB-3600 for the period of extended operation.

RAI 4.3.1-3

Indicate whether calculations that meet the definition of a time limited aging analyses were performed in response to NRC Bulletin 88-08, “Thermal Stresses in Piping Connected to Reactor Coolant Systems,” and NRC Bulletin 88-11, “Pressurizer Surge Line Thermal Stratification.” Describe the actions to be taken to address these bulletins during the period of extended operation.

RAI 4.3.1-4

In Section 3.2.3 “Pressurizers” of the application you state that Westinghouse report WCAP-14754 is not incorporated in the application. However, in Subsection 2.3.1.4 “Pressurizers” and Section 3.2.3 you also state that the Turkey Point 3 & 4 pressurizers are bounded by the description of the pressurizer in WCAP-14574 with regard to design criteria and features, modes of operation, intended functions, and environments/exposures. Table 2-10 of WCAP- 14574 indicates that, based on current licensing basis fatigue calculations, the ASME Boiler & Pressure Vessel Section III Class 1 fatigue cumulative usage factor (CUF) criterion (CUF$\leq$1.0) will be exceeded for several pressurizer subcomponents in less than the extended period of operation. We conclude that this is also applicable to the Turkey Point 3 & 4 pressurizers.

A. Show the ASME Section III Class 1 current licensing basis CUFs for the applicable subcomponents of Turkey Point 3 & 4 pressurizers specified in Table 2-10 of WCAP-14574, including consideration of environmental effects on the fatigue curves, and the corresponding CUFs for the extended period of operation.

B. WCAP-14574 lists other off-normal and additional transients in Section 3.8.3, and recently discovered surge line inflow/outflow thermal transients described in Section 3.8.4. These thermal cyclic transients were not considered in the current licensing basis fatigue analyses of Westinghouse pressurizers, including Turkey Point 3 & 4. Provide the highest CUFs considering these transients for the following pressurizer subcomponents, for the extended period of operation:

    Surge nozzle
    Lower head region
    Heater wells
    Support skirt and flange

C. Describe the aging management programs that will be used to manage fatigue of the Turkey Point 3 & 4 pressurizer subcomponents for the extended period of operation, considering the transients listed above and environmental effects on fatigue.

RAI 4.3.5-1

In Section 4.3.5 of the application you discuss your evaluation of the impact of the reactor water environment on the fatigue life of components. The discussion references the fatigue sensitive component locations for an early vintage Westinghouse plant identified in NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components.” The application indicates that the results of the NUREG/CR-6260 studies were used to scale up the Turkey Point plant-specific usage factors for the same locations to account for environmental effects. The application also indicates that the later environmental fatigue correlations contained in NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” and NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue on Fatigue Design Curves of Austenitic Stainless Steels,” were considered in the evaluation. Provide the results of the usage factor evaluation for each of the six component locations listed in NUREG/CR-6260. Discuss how the factors used to scale up the Turkey Point plant-specific usage factors were derived. Also discuss how the later environmental data provided in NUREG/CR-6583 and NUREG/CR-5704 were factored into the evaluations.

RAI 4.3.5-2

In Section 4.3.5 of the application you indicate that the pressurizer surge line required further evaluation for environmental fatigue during the period of extended operation. You further indicated that you would use an aging management program to address fatigue of the surge line during the period of extended operation. Your aging management program would rely on ASME Section XI inspections to address surge line fatigue during the period of extended operation. As indicated in the draft safety evaluation on Westinghouse Owners Group generic technical report WCAP -14575, “License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components,” the NRC has not endorsed a procedure on a generic basis which allows for ASME Section XI inspections in lieu of meeting the fatigue usage criteria. You have not provided a technical basis demonstrating the technical adequacy of your proposal. Provide a detailed technical evaluation which demonstrates that the proposed inspections provide an adequate technical basis for detecting fatigue cracking before such cracking leads to through wall cracking or pipe failure. The detailed technical evaluation should be sufficiently conservative to address all uncertainties associated with the technical evaluation (e.g., fatigue crack initiation and detection, fatigue crack size, and fatigue crack growth rate considering environmental factors). As an alternative to the detailed technical evaluation, provide a commitment to monitor the fatigue usage, including environmental effects, during the period of extended operation, and to take corrective actions, as approved by the staff, if the usage is projected to exceed one.

Containment Tendon Loss of Prestress

RAI 4.5-1

You have performed the time-limited aging analysis of the prestressing forces in accordance with10 CFR 54.21(c)(1)(ii) to demonstrate that after considering the projected loss of tendon prestress forces, the residual prestressing forces in each direction (i.e., hoop, meridional, and dome) will remain above the minimum required prestressing forces for the extended period of operation. Provide the following information:

A. Curves showing the comparison of the projected measured prestressing forces (i.e. trend lines) versus the minimum required prestressing forces in each major direction, with a short description of the method used to project the measured forces (for both Turkey Point units, if they are different).

B. How do the trend lines represent the large number of exempt tendons (i.e. not subjected to lift-off testing because of personnel safety considerations)?

Containment Liner Plate Fatigue

RAI 4.6-1

With respect to Item 2 in Section 4.6, provide the basis for determining that the original projected number of maximum reactor coolant system design cycles is conservative enough to envelop the projected cycles for the extended period of operation. Also, provide the basis for the projected number of cycles for the extended period of operation for the containment liner plate and the containment liner penetrations.

RAI 4.6-2

In Item 4 in Section 4.6 you state that the design of the containment penetrations meet the general requirements of the 1965 Edition of the ASME Boiler and Pressure Vessel, Section III.

A. Did the fatigue analyses of the main steam piping, feedwater piping, blowdown piping and letdown piping, containment penetration assemblies and welds include stresses due to restrained piping system thermal expansion loads, in addition to the stresses due to local thermal expansion? If they did not, explain why you consider the analyses to be adequate.

B. Were the stresses due to restrained piping system thermal expansion loads, and the stresses due to local thermal expansion of the penetration assemblies also included in the fatigue analysis of the containment liner plate? If they were not included, explain why you consider the analyses to be adequate.

RAI 4.6-3

How did you include the effects of leak rate pressure testing in the fatigue analysis of the containment liner plate and the containment liner penetrations? Provide justifications, if these effects were not included.

A. Provide the minimum number of allowable cycles determined under the thermal cycling design loading conditions for the containment liner plate and the containment liner penetrations.

B. Are the containment liner plate and the containment liner penetrations included within the scope of the Turkey Point Fatigue Monitoring Program, referred to in Section 4.3.1 of the application? If not, provide justifications for not including these components in the program.

Crane Load Cycle Limits

RAI 4.7.4-1

In Section 4.7.4 of the LRA, the applicant identified the crane cycle limit as a TLAA for the cranes within the scope of license renewal. They include the polar cranes, reactor cavity manipulator cranes, spent fuel pool bridge cranes, spent fuel cask crane turbine grantry crane, and intake structure bridge crane. The applicant stated that the spent fuel pool bridge cranes were analyzed for up to 200,000 cycles of maximum load. The other cranes in the scope of license renewal were analyzed for up to 2,000,000 cycles of maximum load based on the design codes utilized for these cranes. The applicant further stated that for each crane, the actual usage over the projected life through the period of extended operation will be far less than the analyzed number of cycles. In order to determine the adequacy of the applicant analyses, the applicant is requested to provide the load cycles experienced thus far, and cycles estimated to occur up to the end of the extended period of operation including the conditions and assumptions used in it’s analyses for the applicable cranes. The applicant is also requested to provide the basis of the 200,000 load cycle limit for the spent fuel pool bridge cranes.

Florida Power & Light Company

Turkey Point Nuclear Plant

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