July 1, 2002

Mr. J. A. Stall
Senior Vice President
Nuclear and Chief Nuclear Officer
Florida Power and Light Company
P. O. Box 1400
Juno Beach, FL 33408-0420

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE APPLICATION FOR RENEWED OPERATING LICENSES FOR ST. LUCIE, UNITS 1 AND 2, SECTION 3.3, "AGING MANAGEMENT REVIEW RESULTS: AUXILIARY SYSTEMS"

Dear Mr. Stall:

By letter dated November 29, 2001, Florida Power and Light Company (FPL) submitted to the U.S. Nuclear Regulatory Commission (NRC) an application, pursuant to Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), to renew the operating licenses for the St. Lucie Nuclear Plant, Units 1 and 2. The NRC staff is reviewing the information contained in this license renewal application and has identified, in the enclosure, areas where additional information is needed to complete its review. Specifically, the enclosed requests for additional information (RAIs) concern Section 3.3, "Aging Management Review Results: Auxiliary Systems."

Please provide a schedule, by letter or electronic mail, for submitting your response 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 response to clarify the staff's request for additional information.

Sincerely,

/Original signed by/

Noel Dudley, Senior Project Manager
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-335 and 50-389

Enclosure: As stated

cc w/encl: See next page

July 1, 2002

Mr. J.A. Stall
Senior Vice President
Nuclear and Chief Nuclear Officer
Florida Power and Light Company
P. O. Box 1400
Juno Beach, FL 33408-0420

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE APPLICATION FOR RENEWED OPERATING LICENSES FOR ST. LUCIE, UNITS 1 AND 2, SECTION 3.3, "AGING MANAGEMENT REVIEW RESULTS: AUXILIARY SYSTEMS"

Dear Mr. Stall:

By letter dated November 29, 2001, Florida Power and Light Company (FPL) submitted to the U.S. Nuclear Regulatory Commission (NRC) an application, pursuant to Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54), to renew the operating licenses for the St. Lucie Nuclear Plant, Units 1 and 2. The NRC staff is reviewing the information contained in this license renewal application and has identified, in the enclosure, areas where additional information is needed to complete its review. Specifically, the enclosed requests for additional information (RAIs) concern Section 3.3, "Aging Management Review Results: Auxiliary Systems."

Please provide a schedule, by letter or electronic mail, for submitting your response 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 response to clarify the staff's request for additional information.

Sincerely,

Original signed by:

Noel Dudley, Senior Project Manager
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-335 and 50-389
Enclosure: As stated
cc w/encl: See next page
DISTRIBUTION: See next page
* See previous concurrences
Document Name:C:\ORPCheckout\FileNET\ML021830321.wpd

OFFICE	PM:RLEP*	LA*	SC: DE*	SC:RLEP	PD:RLEP
NAME	NDudley	EGHylton	KManoly	SLee	PTKuo
DATE	06/ 14 /02	06/ 17 /02	06/ 25 /02	06/ 26/02	07/01/02

OFFICIAL RECORD COPY

DISTRIBUTION:
HARD COPY
RLEP RF
E. Hylton
E-MAIL:
PUBLIC
J. Johnson
W. Borchardt
D. Matthews
F. Gillespie
RidsNrrDe
R. Barrett
E. Imbro
G. Bagchi
K. Manoly
W. Bateman
J. Calvo
C. Holden
P. Shemanski
H. Nieh
G. Holahan
H. Walker
S. Black
B. Boger
D. Thatcher
G. Galletti
C. Li
J. Moore
R. Weisman
M. Mayfield
A. Murphy
W. McDowell
S. Droggitis
T. Kobetz
RLEP Staff

R. McIntyre
Y. Li

cc:
Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
P.O. Box 6090
Jensen Beach, Florida 34957-2000

Mr. Craig Fugate, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

M. S. Ross, Attorney
Florida Power and Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Douglas Anderson
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

Mr. William A. Passetti, Chief
Department of Health
Bureau of Radiation Control
2020 Capital Circle, SE, Bin #C21
Tallahassee, Florida 32399-1741

Attorney General
Department of Legal Affairs
The Capitol
Tallahassee, Florida 32304

Mr. Donald E. Jernigan, Site Vice President
St. Lucie Nuclear Plant
Florida Power and Light Company
6351 South Ocean Drive
Jensen Beach, Florida 34957-2000

Mr. Steve Hale
St. Lucie Nuclear Plant
Florida Power and Light Company
6351 South Ocean Drive
Jensen Beach, Florida 34957-2000

Mr. R. G. West
Plant General Manager
St. Lucie Nuclear Plant
Florida Power and Light Company
6351 South Ocean Drive
Jensen Beach, Florida 34957-2000

Mr. T.L. Patterson
Licensing Manager
St. Lucie Nuclear Plant
Florida Power and Light Company
6351 South Ocean Drive
Jensen Beach, Florida 34957-2000

Mr. Don Mothena
Manager, Nuclear Plant Support Services
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Rajiv S. Kundalkar
Vice President - Nuclear Engineering
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J. Kammel
Radiological Emergency
Planning Administrator
Department of Public Safety
6000 SE. Tower Drive
Stuart, Florida 34997

Mr. Alan P. Nelson
Nuclear Energy Institute
1776 I Street, N.W., Suite 400
Washington, DC 20006-3708
APN@NEI.ORG

David Lewis
Shaw Pittman, LLP
2300 N Street, N.W.
Washington, D.C. 20037

Mr. Stan Smilan
5866 Bay Hill Circle
Lake Worth, FL 33463

Mr. Mark P. Oncavage
12200 SW 110th Avenue
Miami, FL 33176

Mr. Frank Leslie
1017 Glenham Drive N.E.
Palm Bay, FL 32905

REQUEST FOR ADDITIONAL INFORMATION
ST. LUCIE UNITS 1 AND 2
LICENSE RENEWAL APPLICATION

The staff of the U.S. Nuclear Regulatory Commission (NRC) met with representatives of Florida Power and Light Company (FPL) on May 15–16, 2002, to discuss draft requests for additional information (RAIs) concerning the license renewal application (LRA) for St. Lucie, Units 1 and 2. The NRC staff and FPL representatives also held teleconference calls on May 28 and 29, 2002, to continue their discussions regarding the draft RAIs. On the basis of these discussions, the staff is issuing the following RAIs.

The staff requests that FPL provide a schedule for submitting its response within 30 days of the receipt of these RAIs. The staff is willing to meet with FPL prior to the submittal of the response to clarify its requests for additional information.

3.3 AGING MANAGEMENT REVIEW RESULTS: AUXILIARY SYSTEMS

RAI 3.3 - 1

For carbon steel, stainless steel, bronze, brass, and copper bolting in the following systems and for the environments to which they are exposed, justify why the LRA excludes the aging effects that involve loss of material and cracking. Include the bounding humidity level for the outdoor, indoor-not air conditioned, containment, and buried environments. The systems that should be considered are instrument air, component cooling water, diesel generator, intake cooling water, primary water makeup, service water system, turbine cooling water (Unit 1 only), ventilation, sampling, and steam and power conversion.

Provide a summary of the plant-specific operating experience associated with the degradation of bolting.

RAI 3.3 - 2

Recent experience with extensive wastage of the vessel head as a result of boric acid leakage at the David Bessie Nuclear Power Plant suggests the seriousness of boric acid corrosion (see NRC Information Notice (IN) 2002-11, “Recent Experience With Degradation of Reactor Pressure Vessel Head,” dated March 12, 2002). Clarify whether the following components are likely to be externally exposed to borated coolant leaking from any adjacent systems or components:

(1) component cooling water system carbon steel surge tanks, pump bodies, and heat exchanger shells;

(2) demineralized makeup water system (any component);

Enclosure

(3) instrument air system carbon and galvanized steel components, such as instrument air receivers, bolting, dryers, and compressor cooler shells;

(4) intake cooling water system carbon steel basket strainers and valve bodies; and

(5) turbine cooling water (Unit 1 only) system carbon steel components.

RAI 3.3 - 3

In Table 3.3-5, “Emergency Cooling Canal,” and Table 3.3-9, “Intake Cooling Water,” please clarify the environment to which the concrete with embedded/encased carbon steel piping/fitting is exposed. In particular, state whether that environment is raw water-salt water, outdoor air, or some other(s).

The raw water-salt water environment contains chlorides. Similarly, the outdoor environment of St. Lucie is defined in the LRA as moist, salt-laden atmospheric air, with temperatures of 27°F – 93°F, 73% average humidity, and exposure to weather, including precipitation and wind. Therefore, the outdoor environment also contains chlorides. These chlorides in the moist, salt-laden atmospheric air may reach the steel/concrete interface in the interior of the concrete through the process of permeation, infiltration, and condensation through the pores of the concrete. Accumulation of high enough levels of chlorides will result in attacks on and disruption of the protective film formed on the surfaces of the steel as a result of the originally high pH levels in the concrete environment. Once some particular region of the protective film is destroyed, localized corrosion of the steel will begin through an electrochemical process. However, Tables 3.3-5 and 3.3-9 of the LRA do not identify any aging effects for carbon steel components in the emergency cooling canal system and the intake cooling water system associated with external exposure to an embedded/encased environment.

Explain why the aging process as described is not applicable to St. Lucie, and discuss the operating history of the plant to support the conclusion regarding the absence of applicable aging effects with respect to cracking and loss of materials.

RAI 3.3 - 4

In Table 3.3-11, “Primary Makeup Water,” of the LRA, the applicant stated that no aging effect requiring aging management is applicable to stainless steel piping/fittings embedded/encased in concrete. Stainless steel components are much more resistant to chloride-related corrosion than carbon steel components. However, the applicant also stated that plant experience has identified loss of materials and cracking as applicable aging effects for stainless steel components in the emergency core cooling system (ECCS) pipe tunnel.

Explain why the aging effects applicable to stainless steel components in the ECCS pipe tunnel are not applicable to the stainless steel piping/fittings embedded/encased in concrete at St. Lucie. Also discuss the operating history with regards to stainless steel components in the embedded/encased environment to support the conclusion regarding the absence of applicable aging effects with respect to cracking and loss of materials.

RAI 3.3 - 5

If the concrete structure in which the carbon steel components are embedded is only exposed to atmospheric air with negligible levels of chlorides, the embedded/encased steel piping/fittings may still be susceptible to a corrosion process attributable to the carbon dioxide present in the atmospheric air. This corrosion process operates via the generation of carbonic acid, which reduces the pH level in the vicinity of the steel/concrete interface. This neutralization process, in turn, disrupts the passivity of the protective films and permits attacks on the underlying carbon steel substrate. The water/cement ratio of the concrete is an important factor in affecting the rate of this corrosion process. Justify why this aging process is not applicable to St. Lucie. Discuss the operating history to support the absence of applicable aging effects with respect to cracking and loss of materials.

3.3.1 Chemical and Volume Control System (CVCS)

RAI 3.3.1 - 1

In Appendix C, Section 4.1.3, "Air/Gas," of the LRA, the applicant describes the air/gas environments found at St. Lucie, Units 1 and 2. Aging effects of components exposed to the air/gas environment depend, in part, on the type of air/gas environment, the operating temperature, and the water content. Provide the characteristic parameters of the air/gas environments applicable to the components found in the CVCS. Also provide the bases by which the applicant determined that there are no aging effects requiring management for those components that are exposed to the air/gas environment.

RAI 3.3.1 - 2

Explain the difference between the outdoor environments described in Appendix C, Section 4.2.1, of the LRA, and the outdoor environment in the ECCS pipe tunnel. Also explain how this difference leads to differences in aging effects.

3.3.2 Component Cooling Water (CCW)

RAI 3.3.2 - 1

In Appendix C, Section 4.1.1, "Treated Water," the applicant states that crevice corrosion is insignificant for an environment with extremely low oxygen content (less than 0.1 ppm). The applicant also states that oxygen is required for pitting corrosion. Oxygen can be a contributor, but is not needed for crevice and pitting corrosion of metal. The applicant is requested to provide references supporting its position.

RAI 3.3.2 - 2

The applicant did not identify stress-corrosion cracking (SCC) as an aging effect for the CCW system components that are exposed to treated water. However, stainless steel components exposed to treated water can experience SCC. In addition, field experience reported in Appendix C of Topical Report (TR) 107396, "Closed Cycle Water Chemistry Guideline," prepared by the Electric Power Research Institute (EPRI), indicates that if component cooling water is treated with nitrite as a corrosion inhibitor, carbon steel components exposed to treated water can experience intergranular stress corrosion cracking (IGSCC). Cracking of CCW piping is also reported in NRC Licensee Event Report (LER) 91-019-00, "Loss of Containment Integrity Due to Crack in Cooling Water Piping," dated October 26, 1991.

Provide the bases for excluding cracking as an applicable aging effect for CCW system carbon and stainless steel components that are exposed to treated water.

RAI 3.3.2 - 3

The applicant did not identify SCC as an aging effect for the CCW heat exchanger tubes that are exposed to raw water. The operating experience at Turkey Point Station, shows that the CCW heat exchanger tubes, which are made of aluminum brass and exposed to raw water on the tube side, are susceptible to SCC (see U. S. Nuclear Regulatory Commission "Safety Evaluation Report with Open Items Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4," dated August 2001, p. 239). Provide the bases for excluding cracking as an applicable aging effect for CCW heat exchanger tubes that are exposed to raw water at St. Lucie.

RAI 3.3.2 - 4

Aging effects for CCW system components exposed to the air/gas environment depend, in part, on the type of air/gas environment, the operating temperature, and the water content. Provide the characteristic parameters of the air/gas environments applicable to the components found in the CCW system. Also provide the bases for excluding corrosion as an applicable aging effect for CCW components that are exposed to the air/gas environment.

RAI 3.3.2 - 5

On page B-45 of Appendix B to the LRA, the applicant states that for the Intake Cooling Water System Inspection Program, branch connections are examined as plant and industry experience warrants. Since this is an existing program, describe the findings of past examinations and discuss which aging effect(s), if any, have been observed at the branch connections. Include the corresponding root cause of any identified aging effects.

3.3.4 Diesel Generators and Support Systems

RAI 3.3.4 - 1

In Section 9.5.6.3, "System Evaluation," on page 9.5-12b of the Unit 2 updated Final Safety Analysis Report (UFSAR), the applicant states that the air receiver for the air-start system of the emergency diesel generator collects moisture to preclude fouling of the air-start valve with moisture and contamination. Provide justification for not identifying loss of material as an aging effect for the carbon steel, aluminum alloy, and copper alloy air-start system components that are exposed to the internal moist air environment.

RAI 3.3.4 - 2

Provide justification for not identifying loss of material as an aging effect for air-start system components fabricated from aluminum alloy or copper alloy exposed externally to an indoor-not air conditioned environment.

<u>RAI 3.3.4 - 3</u>

In Table 3.3-4 on page 3.3-33 of the LRA, the applicant identifies loss of material as a potential aging effect for the carbon steel fuel oil tanks exposed to an air/gas environment, as a result of the potential for moisture contamination. Please provide justification for not identifying loss of material for the carbon steel day tanks, which are also exposed to the same air/gas environment.

<u>RAI 3.3.4 - 4</u>

In Table 3.3-4 on page 3.3-26 of the LRA, the applicant states that plant experience shows a history of loss of material as a result of corrosion of the copper and aluminum cooling water radiator fins in the cooling water system exposed to an indoor-not air conditioned environment. The applicant is requested to explain why other copper and aluminum alloy components exposed to indoor or outdoor environments in the diesel generators and support systems are not subject to aging management. These components include tubing/fittings, air start motors, air start motor lubricators, frame arrestors (in outdoor environment), and filter housings.

3.3.6 Fire Protection

<u>RAI 3.3.6 - 1</u>

In Section B.3.2.8, “Fire Protection Program,” on page B-39 of the LRA, the applicant states that the Fire Protection Program is credited for managing the aging effects of loss of material attributable to corrosion (including selective leaching). Please identify those components and locations that are susceptible to leaching, and the associated aging management programs.

<u>RAI 3.3.6 - 2</u>

The fire water supply system consists of a 12-inch cement-lined, cast-iron, underground pipe that loops around the plant. The cement lining may degrade due to cracking or spalling and cause flow blockage in the piping. Explain why an aging management review was not performed for the cement lining.

<u>RAI 3.3.6 - 3</u>

The fire water supply system consists of a 12-inch cement-lined, cast-iron, underground pipe that loops around the plant. Explain how the aging effect of loss of material as a result of corrosion is managed for the external surfaces of the buried pipe.

RAI 3.3.6 - 4

In Section B.3.2.8 of Appendix B to the LRA, the applicant states that functional testing and flushing of the system clear away internal scale and corrosion products that could lead to blockage or obstruction of the system. If this statement refers to biofouling as an applicable aging effect, discuss why Table 3.3.6 of the LRA does not include biofouling as an applicable aging effect.

3.3.8 Instrument Air

RAI 3.3.8 - 1

In Table 3.3-8, "Instrument Air," of the LRA, the applicant identifies loss of material as an applicable aging effect for carbon steel, stainless steel, and copper alloy components that are located upstream of the air dryers and, therefore, internally exposed to a wet air/gas environment. Other components made of similar materials but located downstream of the dryers are exposed to a dry air/gas environment and, therefore, have no applicable aging effect. This identification of the aging effect is reasonable for an instrument air system that has an ideal dryer, but this identification may not be supported by the operating experience at St. Lucie. As an example, NRC Information Notice (IN) 1987-28, "Air System Problems at U.S. Light Water Reactors," states that: "A loss of decay heat removal and significant primary system heatup at Palisades in 1978 and 1981 were caused by water in the air system." This experience implies that the air/gas system downstream of the dryer may not be dry.

Provide the technical basis for not identifying loss of material as an applicable aging effect for the components downstream of the air dryer. If loss of material is identified as an applicable aging effect for these components, provide an appropriate aging management program for that effect.

3.3.9 Intake Cooling Water

RAI 3.3.9 - 1

Explain why loss of material is not an aging effect for stainless piping/fittings and tubing/fittings in the intake cooling water system that are exposed to an indoor-not air conditioned environment.

RAI 3.3.9 - 2

Several bronze, aluminum bronze, and aluminum brass components in the intake cooling water system are externally exposed to outdoor or indoor-not air conditioned environments. These components include pump and valve bodies and piping/fittings. The applicant states that there is no applicable aging effect for these components. In Section 5.1 of Appendix C to the LRA, however, the applicant states, "Additionally, bronze and brass are considered susceptible to pitting when zinc content is greater than 15%, and aluminum bronze is considered susceptible to pitting when the aluminum content is greater than 8%."

Since the zinc content in brass can be greater than 15% and the aluminum content in aluminum bronze may vary from 4 to 15%, explain why loss of material is not an applicable aging effect for the bronze, aluminum bronze, and aluminum brass components in the intake cooling water system.

RAI 3.3.9 - 3

The applicant relies on detection of leakage for managing loss of material on the inside surface of several components that are exposed to raw water. The presence of leakage from a component, however, would indicate that the component could not perform its intended function as a pressure boundary. The applicant is requested to justify why the use of this program alone is adequate for managing loss of material from the inside surface of the components that are exposed to raw water.

3.3.11 Primary Makeup Water

RAI 3.3.11 - 1

Clarify whether hardening is an applicable aging effect for the rubber materials of the expansion joints in the primary makeup water system. If so, discuss how this aging effect will be managed. If not, please provide the basis.

RAI 3.3.11 - 2

Identify the composition of the internal air/gas environment to which the fittings and nozzles of the hose station of Unit 2 are exposed, and specify the level of humidity of this particular environment. Also clarify whether loss of material is an applicable aging effect and, if so, identify and describe the applicable aging management program. If not, please provide the basis.

3.3.13 Service Water

RAI 3.3.13 - 1

The applicant states that the Periodic Surveillance and Preventive Maintenance Program provides visual inspection of component surfaces. Describe how visual inspection is conducted for the submerged surfaces of the sump pump.

3.3.14 Turbine Cooling Water (Unit 1 0nly)

RAI 3.3.14 - 1

Identify the composition of the internal air/gas environment to which the Unit 1 instrument air compressor cooling water head tank is exposed, and specify the level of humidity of this particular environment. Also clarify whether the tank wall is subjected to a changing wetting environment as the water level changes. In addition, state whether loss of material is an applicable aging effect and, if not, please provide the basis.

3.3.15 Ventilation

RAI 3.3.15 - 1

In Table 3.3.15, “Ventilation,” the applicant identifies, for the control room air-conditioning subsystem, loss of material as an applicable aging effect for the carbon steel filter housing, which is internally exposed to an air/gas environment, but not for carbon steel component valves and piping/fittings that are exposed to the same environment. Please explain this discrepancy.

RAI 3.3.15 - 2

In Table 3.3-15, “Ventilation,” of the LRA, the applicant indicates that the Periodic Surveillance and Preventive Maintenance Program manages the loss of material on the inside surface of several components, such as the plenums and filter housing, which are exposed to an internal air/gas environment. In Section B.3.2.11, “Periodic Surveillance and Preventive Maintenance Program,” of the LRA, the applicant states that surface conditions of systems, structures, and components are monitored through visual examinations and leakage inspections to determine the existence of external and internal corrosion or deterioration.

The presence of leakage from a component indicates that the component has lost its ability to perform its intended pressure boundary integrity function. Explain whether the components’ capability to perform its intended function is maintained by managing the loss of material or by periodic replacement. If it is by replacement, discuss the frequency with which replacement will be performed.

3.3.16 Waste Management

RAI 3.3.16 - 1

In Table 3.3-13 of the LRA, the applicant identifies loss of material as an applicable aging effect for the stainless steel yard sump pump of the service water system, which is exposed to an internal environment of raw water (drains). The applicant also identifies the Periodic Surveillance and Preventive Maintenance Program as the applicable aging management program. Explain why loss of material is not identified as an applicable aging effect for the stainless steel valves and piping/fittings of the waste management system, which are exposed to the same environment of raw water (drains).