NUREG-1759
Supplement 1

Safety Evaluation Report

Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4

Supplement 1

Docket Nos. 50-250 and 50-251

Florida Power & Light Company

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

May 2002

ABSTRACT

This document is a supplement to NUREG-1759, "Safety Evaluation Report Related to the License Renewal of the Turkey Point Nuclear Plant, Units 3 and 4." The Florida Power and Light Company (FPL) filed the application to renew the operating licenses for Turkey Point Nuclear Plant, Units 3 and 4, by letter dated September 8, 2000. In the submittal of September 8, 2000, FPL requested renewal of the operating licenses for Turkey Point, Units 3 and 4 (License Nos. DPR-31 and DRP-41, respectively), which were issued under Section 104b of the Atomic Energy Act of 1954, as amended, for a period of 20 years beyond the current license expiration dates of July 19, 2012, and April 10, 2013, respectively. Turkey Point Units 3 and 4 are located in Miami-Dade County east of Florida City, Florida. Each unit consists of a Westinghouse pressurized-water reactor nuclear steam supply system designed to produce a core thermal power of 2,300 megawatts or approximately 693 net megawatts electric.

The U.S. Nuclear Regulatory Commission (NRC) received the application from FPL on September 11, 2000. The NRC's Office of Nuclear Reactor Regulation reviewed the Turkey Point license renewal application for compliance with inter alia the requirements of Title 10 of the *Code of Federal Regulations*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and in April 2002 published NUREG-1759 to document its findings.

On April 1, 2002, the staff issued "Staff Guidance on Scoping of Equipment Relied Upon to Meet the Requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for License Renewal (10 CFR 54.4(a)(3)) to the Nuclear Energy Institute. In this guidance the staff stated, that "consistent with the requirements specified in 10 CFR 54.4(a)(3) and 10 CFR 50.63(a)(1), the plant system portion of the offsite power system should be included within the scope of license renewal." This supplemental safety evaluation report provides the staff's review and conclusions regarding FPL's response dated April 19, 2002 (Letter L-2002-071).

THIS PAGE IS INTENTIONALLY LEFT BLANK

CONTENTS [1]

Page

ABSTRACT iii

1 INTRODUCTION AND GENERAL DISCUSSION 1-1

2 STRUCTURES AND COMPONENTS SUBJECT TO AN AGING MANAGEMENT REVIEW 2-1

2.4 Scoping and Screening Results - Structures 2-1

2.4.2 Other Structures 2-1

2.4.2.18 Yard Structures 2-2

2.5 Scoping and Screening Results - Electrical and Instrumentation and Controls (I&C) 2-3

3 AGING MANAGEMENT REVIEW RESULTS 3-1

3.1 Common Aging Management Programs 3-1

3.1.3 Systems and Structural Monitoring Program 3-1

3.6 Structures and Structural Components 3-2

3.6.2 Other Structures 3-2

3.6.2.1 Steel-in-Air Structural Components 3-2

3.6.2.3 Concrete Structural Components 3-3

3.7 Electrical and Instrumentation and Controls (I&C) 3-3

6 CONCLUSIONS 6-1

Appendix A: CHRONOLOGY A-1

Appendix C: ABBREVIATIONS C-1

Appendix D: PRINCIPAL CONTRIBUTORS D-1

Appendix E: STAFF POSITION ON STATION BLACKOUT E-1

---

[1] The numbering of the sections listed in this NUREG supplement is based on the numbering of the corresponding chapters and sections in NUREG-1759.

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

1 INTRODUCTION AND GENERAL DISCUSSION

This document is a supplemental safety evaluation report (SSER) on the application to renew the operating licenses for Turkey Point Nuclear Plant, Units 3 and 4, filed by Florida Power and Light Company (hereafter referred to as FPL or the applicant).

By letter dated September 8, 2000, FPL submitted its application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of the operating licenses for Turkey Point, Units 3 and 4, for an additional 20 years. The NRC received the application on September 11, 2000. The NRC staff reviewed the Turkey Point license renewal application (LRA) for compliance with the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," and prepared a safety evaluation report (SER) to document its findings. The final SER was issued on February 27, 2002. The NRC's license renewal project manager for Turkey Point, Units 3 and 4, is Rajender Auluck. Dr. Auluck may be contacted by calling 301-415-1025 or by writing to the License Renewal and Environmental Impacts Program, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

The staff's position on the scoping of equipment relied on to meet the requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for license renewal was issued on April 1, 2002. A copy of this letter is provided in Appendix E of this SSER. FPL responded to the staff's position on SBO by letter dated April 19, 2002. This SSER summarizes the staff's review of the applicant's response to the staff's position on SBO, as it relates to the scoping and aging management reviews of structures and components for license renewal. The public can review the LRA, and all pertinent information and material, including the updated final safety analysis report (UFSAR), at the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD 20852-2738. The Turkey Point, Units 3 and 4, LRA and significant information on the license renewal review are also available on the NRC's Web site at www.nrc.gov.

THIS PAGE IS INTENTIONALLY LEFT BLANK

2 STRUCTURES AND COMPONENTS SUBJECT TO AN AGING MANAGEMENT REVIEW

The final SER on the LRA for Turkey Point, Units 3 and 4, was issued on February 27, 2002. The staff's position on the scoping of equipment relied on to meet the requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for license renewal was issued to the Nuclear Energy Institute (NEI) on April 1, 2002. The staff's evaluation of the applicant's response dated April 19, 2002, is provided in Sections 2.4 and 2.5 below. Section 2.5 of this NUREG supplement replaces Section 2.5 of NUREG-1759 in its entirety.

2.4 Scoping and Screening Results - Structures

2.4.2 Other Structures

In the staff's SER, dated February 27, 2002, the staff concluded that there was reasonable assurance that the applicant had identified the following structures and components (SCs) within the scope of license renewal and subject to an aging management review (AMR):

- auxiliary building
- cold-chemistry laboratory
- control building
- cooling-water canals
- diesel-driven fire pump enclosure
- electrical-penetration rooms
- emergency diesel generator building
- fire protection monitoring station
- fire-related assemblies
- intake structure
- main steam and feedwater platforms
- plant vent stack
- spent fuel storage and handling areas
- turbine building
- turbine gantry cranes
- Turkey Point Units 1 and 2 chimneys
- yard structures

By letter dated April 19, 2002 (FPL Letter L-2002-071), the applicant provided supplemental information supporting its evaluation of systems, structures, and components (SSCs) needed to recover from a SBO event. These SSCs were evaluated as a result of the NRC staff position on SBO dated April 1, 2002, as it relates to the identification of SSCs within the scope of license renewal. In this position, the staff stated that, "consistent with the requirements specified in 10 CFR 54.4(a)(3) and 10 CFR 50.63, the plant system portion of the offsite power system should be included within the scope of license renewal." The staff's letter of April 1, 2002, also provided the technical basis (rationale) for its position on SBO.

Section 10 CFR 50.63(c)(1)(ii) requires licensees to implement procedures to recover from an SBO. The staff has provided an acceptable means of complying with this requirement in Section 1.3 and Section 2 of NRC Regulatory Guide (RG) 1.155. To meet this requirement, the applicant included additional structural components from the yard structure and switchyard within the scope of license renewal. These additional yard structures and switchyard SCs are listed and evaluated in Section 2.4.2.18.

2.4.2.18 Yard Structures

In its SER dated February 27, 2002, the staff concluded that there is reasonable assurance that the applicant identified the SCs relied on for onsite power restoration in accordance with 10 CFR 54.4(a)(3) for SBO. As a result of the NRC staff position on SBO, dated April 1, 2002, the applicant provided the staff with its evaluation of SCs within the scope of license renewal for restoration of offsite power at Turkey Point. The supplemental information in the applicant's letter of April 19, 2002, describes the additional SCs of the yard and switchyard at the plant site, and identifies which of these SCs are within the scope of license renewal and subject to an AMR.

2.4.2.18.1 Summary of Technical Information in the Application

The applicant identified switchyard structures and structural components, and additional yard structures within the scope of license renewal following the staff guidance for SCs needed to recover from an SBO. The applicant identified these SCs in Table 2, "Switchyard Additional Structural Components," and Table 3, "Yard Structures Additional Structural Components," which include structures such as startup transformer circuit breaker foundations, transmission towers, the transmission tower foundation, and startup transformer circuit breaker electrical enclosures. The applicant identified these structural components in Table 2 and 3 of its response dated April 19, 2002, as being within the scope of license renewal because they fulfill one or more of the following intended functions:

- Provide structural support for components required for SBO.
- Provide structural support/shelter for components required for SBO.

As stated by the applicant, the additional yard structures and switchyard SCs are subject to an AMR because they are passive components that support equipment within the scope of license renewal pursuant to 10 CFR 54.4(a)(3). As a result, they perform their intended functions without moving parts or without change in configuration or properties, and are not subject to periodic replacement based on a qualified life or specified time limit.

2.4.2.18.2 Staff Evaluation

The NRC staff reviewed the applicant's supplemental information, dated April 19, 2002, for Turkey Point, Units 3 and 4, supporting the evaluation of SCs needed for offsite power recovery following an SBO to determine whether there is reasonable assurance that the SCs of the yard and switchyard structures have been adequately identified as being within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.4(a)(3) and staff guidance on SBO. The staff found that the additional switchyard and yard structural components, as identified in the applicant's letter dated April 19, 2002, are part of the regulated-event SSCs and

are consistent with staff guidance issued on April 1, 2002. The staff did not identify any omissions in the additional yard and switchyard structural components identified by the applicant as being subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.4.2.18.3 Conclusion

On the basis of the review described above, the staff finds that there is reasonable assurance that the applicant has adequately identified the additional yard structures and switchyard structural components that are within the scope of license renewal and subject to an AMR in accordance with the requirements of 10 CFR 54.4(a)(3), 10 CFR 54.21(a)(1), and the staff SBO guidance.

2.5 Scoping and Screening Results - Electrical and Instrumentation and Controls (I&C)

In Section 2.5, "Scoping and Screening Results – Electrical and Instrumentation and Controls (I&C)," of the Turkey Point, Units 3 and 4 LRA, the applicant describes the electrical components that are within the scope of license renewal and subject to an AMR. The staff reviewed this section of the LRA and the FPL letter dated April 19, 2002, which identified additional electrical components required for restoration of offsite power for station blackout, to determine whether there is reasonable assurance that all SSCs within the scope of license renewal have been identified, as required by 10 CFR 54.4(a)(3), and that all SCs subject to an AMR have been identified, as required by 10 CFR 54.21(a)(1).

2.5.1 Summary of Technical Information in the Application

The screening for electrical/I&C components was performed on a generic-component-commodity-group basis for the in-scope electrical/I&C systems listed in Tables 2.2-1, 2.2-2, and 2.2-3 of the LRA, and the methodology employed is consistent with the guidance in NEI 95-10. The screening methodology included electrical/I&C components that were separate and not part of larger components. For example, circuit breakers were screened but not the wiring, terminal blocks, and connections inside the breaker cubicles. These components were considered parts of the breaker.

A review of controlled drawings, the plant equipment database, and their interfaces with the parallel mechanical and civil/structural screening efforts were used to identify the electrical/I&C component commodity groups within the scope of license renewal. The list includes all electrical/I&C NEI 95-10, Appendix B component commodity groups.

The applicant's scoping methodology identified the following electrical/I&C component/commodity groups as meeting the screening criteria of 10 CFR 54.21(a)(1)(i) and requiring further evaluation against the criteria of 10 CFR 54.21(a)(1)(ii):

- insulated cables and connections (including splices, connectors, and terminal blocks)
- uninsulated ground conductors
- electrical/I&C penetration assemblies
- transmission conductors, bus bar, and connections
- transmission insulators

2.5.2 Staff Evaluation

The staff reviewed Section 2.5 of the LRA and the FPL letter dated April 19, 2002, which identified additional electrical components required for restoration of offsite power for SBO to determine whether there is reasonable assurance that the applicant has identified the electrical components within the scope of license renewal, in accordance with 10 CFR 54.4(a)(3), and subject to an AMR, in accordance with 10 CFR 54.21(a)(1).

2.5.2.1 Electrical Components Within the Scope of License Renewal and Subject to an Aging Management Review

In the first step of its evaluation, the staff determined that the applicant had properly identified the electrical component types installed in the plant. The applicant developed the following comprehensive list of electrical component types installed in the plant without regard for system function or license renewal in-scope status:

- Alarm units
- Analyzers
- Annunciators
- Batteries
- Bus-insulated cables and connectors
- Bus-uninsulated ground cables
- Cables and connections (terminal blocks, connectors, and splices)
- Chargers
- Converters
- Circuit breakers
- Communication equipment
- Electrical/I&C controls and panel internal component assemblies
- Electrical/I&C penetration assemblies
- Elements
- Fuses
- Generators/motors
- Heat tracing
- Heaters
- Indicators
- Inverters
- Isolators
- Light bulbs
- Loop Controllers
- Meters
- Motor control centers
- Power distribution panels
- Power supplies
- Radiation monitors
- Recorders
- Regulators
- Relays
- Resistance temperature detectors (RTDs)
- Sensors
- Signal conditioners
- Solenoid operators
- Solid-state devices
- Surge arresters
- Switches
- Switchgear
- Thermocouples
- Transducers
- Transformers
- Transmitters
- Transmission conductors, bus bar, connections
- Transmission insulators

In the second step of its evaluation, the staff reviewed the basic function of each component type and the applicant's determination of which component types perform their functions without moving parts or a change in configuration or properties (passive and long-lived components) and therefore are subject to an AMR. The staff concluded that the applicant had properly identified the passive, long-lived electrical component types.

In the third step of its evaluation, the staff reviewed the list of passive, long-lived electrical component types to determine which met the criteria of 10 CFR 54.4(a)(1) through (3). This step defined the set of electrical component types subject to an AMR.

The following is a list of in-scope electrical component types subject to an aging management review:

- Insulated cables and connections (including splices, connectors, and terminal blocks) not included in the Environmental Qualification Program
- uninsulated ground conductors
- 22 electrical/I&C penetration assemblies within the scope of license renewal but not included in the Environmental Qualification Program
- transmission conductors, bus bar, and connections
- transmission insulators

Finally, the staff reviewed the information submitted by the applicant and verified that the applicant had not omitted or misclassified any electrical components requiring an AMR.

2.5.3 Conclusions

On the basis of the staff's review of the information presented in Section 2.5 of the LRA, the FPL letter on SBO dated April 19, 2002, and the supporting information in the Turkey Point Units 3 and 4 UFSAR, the staff finds no omissions by the applicant, and therefore concludes that there is reasonable assurance that the applicant has identified those parts of the electrical systems that are within the scope of license renewal, as required by 10 CFR 54.4(a)(1) through (3), and subject to an AMR, as required by 10 CFR 54.21(a)(1).

THIS PAGE IS INTENTIONALLY LEFT BLANK

3 AGING MANAGEMENT REVIEW RESULTS

This section provides the staff's evaluation of the applicant's aging management reviews (AMRs) and aging management programs (AMPs) for the additional systems, structures, and components (SSCs) identified in Chapter 2 of this supplement, in order to meet the requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for license renewal. Sections 3.1.3 and 3.6.2 have been expanded to include additional concrete and steel components, and an AMR of these components. Section 3.7 has been expanded to include an AMR of the additional electrical components that are now within the scope of license renewal.

3.1 Common Aging Management Programs

3.1.3 Systems and Structures Monitoring Program

3.1.3.1 Summary of Technical Information in the Application

In a letter dated April 19, 2002, the applicant stated that it had revised the systems and structures monitoring program to include the additional concrete and steel components necessary to meet the requirements of the SBO Rule for license renewal. The additional concrete components are the foundations for the transmission towers and startup transformer circuit breakers. The additional steel components are the electrical enclosures for the startup transformer circuit breakers.

3.1.3.2 Staff Evaluation

The staff has reviewd the additional steel and concrete components placed within scope by the applicant in order to meet the SBO Rule for license renewal The applicant has proposed to use the systems and structures monitoring program to manage the aging effects for these additional steel and concrete components. The staff finds that the applicant's systems and structures monitoring program is adequate to manage the aging effects for the additional steel and concrete components for the periods of extended operation of the Turkey Point nuclear units. A complete review of the systems and structures monitoring program is given in Section 3.1.3 of NUREG-1759.

3.1.3.3 Conclusion

The staff has reviewed the information provided by the applicant concerning the additional steel and concrete components placed within scope by the applicant in order to meet the SBO Rule for license renewal. On the basis of this review, the staff concludes that the applicant's systems and structures monitoring program is adequate to manage the aging effects identified for the additional steel and concrete components placed within the scope of license renewal.

3.6 Structures and Structural Components

3.6.2 Other Structures

3.6.2.1 Steel-in-Air Structural Components

3.6.2.1.1 Summary of Technical Information in the Application

In a letter dated April 19, 2002, the applicant provided additional steel components in order to meet the requirements of the Station Blackout (SBO) Rule for license renewal. These additional steel components are (1) the startup transformer circuit breaker electrical enclosures, which are made of carbon steel, and (2) the transmission towers, which are made of galvanized carbon steel. The startup transformer circuit breaker electrical enclosures are located in the switchyard and the transmission towers are located in the switchyard and yard structures. Both of these additional components are located in an outdoor environment. The applicant identified loss of material as the aging effect for the startup transformer circuit breaker electrical enclosures, since they are made from carbon steel, and proposed to use the systems and structures monitoring program as the aging management program for this component. Consistent with the applicant's treatment of other galvanized carbon steel components, the applicant did not identify any applicable aging effects for the transmission towers.

3.6.2.1.2 Staff Evaluation

The staff has reviewed the information provided by the applicant concerning the additional steel components placed in scope by the applicant in order to meet the SBO Rule for license renewal. The staff finds that the applicant has properly identified loss of material as the applicable aging effect for the carbon steel electrical enclosures for the startup transformer circuit breakers. Section 3.6.2.1.2.1, "Effects of Aging," of the staff's SER discusses the applicable aging effects for steel-in-air structural components in greater detail. The applicant will use the systems and structures monitoring program to manage loss of material for the electrical enclosures. Consistent with the applicant's treatment of other galvanized carbon steel components, the applicant did not identify any applicable aging effects for the transmission towers. The staff finds the applicant's approach for evaluating the applicable aging effects for these additional SBO steel components to be reasonable and acceptable.

3.6.2.1.3 Conclusions

The staff has reviewed the information provided by the applicant concerning the additional steel components placed in scope by the applicant to meet the SBO Rule for license renewal. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effect associated with these additional steel components will be adequately managed so that there is reasonable assurance that these SBO steel components will perform their intended functions in accordance with the CLB during the period of extended operation.

Section 3.6.2.3 Concrete Structural Components

3.6.2.3.1 Summary of Technical Information in the Application

In a letter dated April 19, 2002, the applicant identified additional concrete components in order to meet the requirements of the SBO Rule for license renewal. These additional concrete components are (1) the startup transformer circuit breaker foundations, which are in the switchyard, and (2) the transmission tower foundations, which are in the yard structures. Both of these concrete components are exposed to an outdoor environment. Consistent with the applicant's treatment of other accessible concrete components, the applicant identified concrete degradation (cracking, loss of material, change in material properties) as the aging effect applicable to license renewal and will use the systems and structures monitoring program as the aging management program for these two additional concrete components.

3.6.2.3.2 Staff Evaluation

The staff has reviewed the information provided by the applicant concerning the additional concrete components placed in scope by the applicant in order to meet the SBO Rule for license renewal. The staff finds that the applicant has properly identified concrete degradation (cracking, loss of material, change in material properties) as the applicable aging effect for the concrete foundations for the transmission towers and startup transformer circuit breakers. Section 3.6.2.3.2.1, "Effects of Aging," of the staff's SER discusses the applicable aging effects for concrete structural components in greater detail. The applicant will use the systems and structures monitoring program to manage concrete degradation for these foundations. The staff finds the applicant's approach for evaluating the applicable aging effects for these additional SBO concrete components to be reasonable and acceptable.

3.6.2.3.3 Conclusions

The staff has reviewed the information provided by the applicant concerning the additional concrete components placed in scope by the applicant to meet the SBO Rule for license renewal. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with these additional concrete components will be adequately managed so that there is reasonable assurance that these SBO concrete components will perform their intended functions in accordance with the CLB during the period of extended operation.

3.7 Electrical and Instrumentation and Controls (I&C)

On April 19, 2002, the applicant submitted Letter L-2002-071 in response to the April 1, 2002, staff position on the SBO Rule. This letter, in part, provides FPL's aging management reviews of additional offsite electrical and I&C components brought within the scope of license renewal in compliance with the SBO Rule. The following sections provide the staff's evaluation of the applicant's aging management reviews for the additional offsite electrical and I&C equipment brought within the scope of license renewal. The evaluation supplements the staff's evaluation in Section 3.7 of NUREG-1759 regarding aging management reviews of electrical and I&C within the scope license renewal for Turkey Point, Units 3 and 4.

3.7.1 Summary of Technical Information in the Application

3.7.1.3 Transmission Conductors, Bus Bar, Connections

The applicant states that the materials used for transmission conductors, bus bar, and connections at Turkey Point, Units 3 and 4, are aluminum conductor steel reinforced (ACSR), copper, and bronze. No applicable aging effects have been identified for the copper bus bar and the bronze connections since they are rigid bus parts and not subject to wear from vibration. The aging effects for the transmission conductors are loss of strength due to corrosion and loss of material (wear) due to vibration. Corrosion in ACSR conductors is very slow, beginning with a loss of zinc from the galvanized steel core. Corrosion rates are largely dependent on air quality, which depends on suspended-particle chemistry, sulfur dioxide concentration, precipitation, fog chemistry, and meteorological conditions.

The National Electric Safety Code (NESC) requires that tension on installed conductors be a maximum of 60% of the ultimate conductor strength. Corrosion tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength in an 80-year-old ACSR conductor due to corrosion. Based on a 30% loss of strength, significant margin would still remain between what is required by the NESC and the actual conductor strength. Therefore, loss of material strength of the transmission conductors for Turkey Point, Units 3 and 4, is not an aging effect requiring an aging management program. This is further supported by the fact that FPL has been installing and maintaining transmission conductors on its transmission system for more than 60 years and has not had to replace any conductors due to aging problems.

The applicant states that wind loading can cause transmission lines to vibrate and vibration is considered in the design and installation. Thus, loss of material (wear) and metal fatigue that could be caused by transmission conductor vibration or sway are not aging effects requiring an aging management program for the extended period of operation at Turkey Point, Units 3 and 4.

The applicant reviewed industry operating experience and NRC generic communications related to the aging of transmission conductors in order to ensure that no additional aging effects exist beyond those identified above. The applicant also reviewed Turkey Point, Units 3 and 4, plant-specific operating experience, including non-conformance reports, licensee event reports, and condition reports, and documented interviews with transmission engineering personnel. The applicant's review did not identify any unique aging effects for transmission conductors beyond those identified above.

3.7.1.4 Transmission Insulators

The applicant states that the materials used for the transmission insulators are porcelain, aluminum, and cement. The aging effects for the transmission insulators are surface contamination and loss of material. Airborne materials such as dust, salt and industrial effluents can contaminate insulator surfaces; however, the buildup of surface contamination is gradual and in most areas is washed away by rain due to the glazed insulator surface.

Insulator flashover can occur when a large buildup of contamination enables the conductor voltage to track along the surface of the insulator. However, periodic rainfall tends to wash away any salt deposits from insulator surfaces. Turkey Point, Units 3 and 4, are built on a shallow bay and are not subject to a harsh salt environment primarily due to the lack of significant wave action.

Mechanical wear is an aging effect for strain and suspension insulators if the wind swings the supported transmission conductor from side to side. Frequent swinging could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. Industry experience has shown that transmission conductors do not normally swing and when they do swing, they don't swing for very long after the wind subsides. Routine inspections of the Turkey Point, Units 3 and 4, insulators has not identified loss of material due to wear. Therefore, loss of material due to wear of the Turkey Point, Units 3 and 4, insulators is not an aging effect requiring an aging management program for the extended period of operation.

The applicant reviewed industry operating experience and NRC generic communications related to the aging of transmission insulators in order to ensure that no additional aging effects exist beyond those identified above. The applicant identified that the following document is applicable to the aging of transmission insulators: IN 93-95, "Storm-Related Loss of Offsite Power Events Due to Salt Buildup on Switchyard Insulators."

The applicant also reviewed Turkey Point, Units 3 and 4, plant-specific operating experience including nonconformance reports, licensee event reports, condition reports, and documented interviews with transmission engineering personnel. The applicant did not identify any additional aging effects for the transmission insulators resulting from its review of these documents.

3.7.2 Staff Evaluation

3.7.2.4 Transmission Conductors, Bus Bar, Connections

The materials used for transmission conductors, bus bar, and connections at Turkey Point, Units 3 and 4, are aluminum conductor steel reinforced (ACSR), copper, and bronze. Transmission conductors, bus bar, and connections are installed in areas exposed to outside ambient conditions (104° F [40° C], precipitation, and negligible radiation). These outdoor conditions and materials were compared by the applicant to the Oconee Nuclear Station environment and materials and found to be similar. No applicable aging effects have been identified for the copper bus bar and bronze connections since they are rigid bus parts and not subject to wear from vibration. The aging effects for the transmission conductors requiring evaluation are loss of conductor strength due to corrosion and the effects associated with vibration from wind loading. Corrosion of ACSR conductors tends to occur at slow rate of reaction and is largely dependent on air quality, which depends suspended-particle chemistry, sulfur dioxide concentration, precipitation, fog chemistry and meteorological conditions.

Corrosion tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength in an 80-year-old ACSR conductor due to corrosion. The National Electrical Safety

Code (NESC) requires that tension on installed conductors be a maximum of 60% of the ultimate conductor strength. Therefore, assuming a 30% loss of strength, there would still be significant margin between what is required by the NESC and the actual conductor strength. Based on these test results, loss of material strength of the Turkey Point, Units 3 and 4, ACSR transmission conductors is not an aging effect requiring an aging management program for the period of extended operation. This is further confirmed by the fact that FPL has been installing and maintaining transmission conductors on its transmission system for more than 60-years and has not had to replace any conductors due to aging problems. Therefore, loss of conductor strength due to corrosion of the Turkey Point, Units 3 and 4, transmission conductors is not an aging effect requiring an aging management program for the period of extended operation.

Transmission conductor vibration could be caused by wind loading. Since wind loading is considered in the design and installation of transmission conductors, the loss of material (wear) and metal fatigue that could be caused by conductor vibration or sway are not considered aging effects that require an aging management program for the period of extended operation for Turkey Point, Units 3 and 4.

Based on the similarity of materials and outdoor environments at Turkey Point, Units 3 and 4, and the Oconee Nuclear Station, and a review of industry information, NRC generic communications and Turkey Point operating experience, there are no aging effects requiring aging management for transmission conductors, bus bar, and connections for the period of extended operation. The staff agrees with the applicant that no aging management program is required for transmission conductors, bus bar, and connections.

3.7.2.5 Transmission Insulators

The materials used for transmission insulators at Turkey Point, Units 3 and 4, are porcelain, aluminum, and cement. Transmission insulators are installed in areas exposed to outside ambient conditions (104° F [40° C], precipitation, and negligible radiation). The applicant compared the outdoor conditions and materials for the Turkey Point transmission insultors to the corresponding outdoor conditions and materials at Oconee Nuclear Station and found to be similar. Transmission insulators are subject to the aging effects of surface contamination and loss of material due to wear. Various airborne materials such as dust, salt and industrial effluents can contaminate insulator surfaces. However, in most areas, the buildup of surface contamination is gradual and is washed away by rain due to the glazed insulator surface. A large buildup of contamination can enable the conductor voltage to track along the surface of the insulator, resulting in insulator flashover. Turkey Point, Units 3 and 4, are built on a shallow bay but are not subject to a harsh salt environment primarily due to the lack of significant wave action. The applicant also reviewed IN 93-95," Storm-Related Loss of Offsite Power Events Due to Salt Buildup on Switchyard Insulators" for applicability. Periodic rainfall tends to wash away any salt deposits from the insulator surfaces. Therefore, the staff does not consider surface contamination of the Turkey Point, Units 3 and 4, transmission insulators to be an aging effect requiring management during the extended periods of operation.

Another aging effect for strain and suspension insulators is loss of material due to mechanical wear if they are subject to significant movement. Winds can swing the supported transmission conductor from side to side and can result in movement of the insulators. Wear in the metal

contact points of the insulator string and between an insulator and the supporting hardware can occur if this swinging is frequent enough. While this mechanism is possible, industry experience has shown that the transmission conductors do not normally swing and that when they do, they don't swing for very long after the wind subsides. Routine inspections of the transmission insulators at Turkey Point, Units 3 and 4, has not identified loss of material due to wear. Therefore, loss of material due to wear of the Turkey Point, Units 3 and 4, transmission insulators is not an aging effect requiring an aging management program for the extended period of operation.

Based on the similarity of materials and outdoor environments at Turkey Point, Units 3 and 4, and the Oconee Nuclear Station, and a review of industry information, NRC generic communications, and Turkey Point operating experience, there are no aging effects requiring aging management for transmission insulators for the period of extended operation. The staff agrees with the applicant that no aging management program is required for transmission insulators.

3.7.4 Conclusion

On the basis of the applicant's AMR of transmission conductors, bus bar, connections, and transmission insulators, the staff concurs with the applicant that no AMPs are required for the offsite transmission conductors, bus bar, connections, and transmission insulators added to the scope of license renewal in compliance with the requirements of 10 CFR 54.4(a)(3) and the SBO Rule. Therefore, the staff's previous conclusions regarding electrical components and instrumentation and controls, as stated in Section 3.7.4 of NUREG-1759, remain unchanged.

THIS PAGE IS INTENTIONALLY LEFT BLANK

6. CONCLUSIONS

The staff reviewed the license renewal application for Turkey Point Nuclear Plant, Units 3 and 4, in accordance with Commission's regulations and the NRC's draft "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," dated August 2000. The revised SRP was issued as NUREG-1800 in July 2001. Section 54.29 of 10 CFR identifies the standards for issuance of a renewed license.

The staff's safety evaluation of the application is contained in NUREG-1759, "Safety Evaluation Report Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4," dated April 2002. On the basis of its evaluation of the application, as discussed in NUREG-1759 and in this supplement, the staff has determined that the requirements of 10 CFR 54.29(a) have been met.

The staff notes that the requirements of Subpart A of 10 CFR Part 51 are documented in the final plant-specific supplement to the Generic Environmental Impact Statement, dated January 2002.

THIS PAGE IS INTENTIONALLY LEFT BLANK

APPENDIX A
CHRONOLOGY

This appendix is a chronological listing since February 27, 2002, of routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and Florida Power & Light Company (FPL) and other correspondence regarding the NRC staff's review of the Turkey Point Nuclear Plant, Units 3 and 4 (under Docket Nos. 50-250 and 50-251).
A chronology of correspondence for the Turkey Point LRA before February 27, 2002, is given in Appendix A of NUREG-1759, published April 2002. Reference to other documents the staff used for the review of the Turkey Point LRA are listed in Appendix B of NUREG-1759.

February 27, 2002	By letter (signed by C.I. Grimes), NRC issued "Safety Evaluation Report Related to the License Renewal of Turkey Point, Units 3 and 4."
April 1, 2002	By letter (signed by D.B. Matthews), NRC issued "Staff Guidance on Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for License Renewal (10 CFR 54.4(a)(3))."
April 19, 2002	By letter (L-2002-071, signed by J.P. McElwain), FPL issued "Response to NRC Guidance on Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout Rule for License Renewal."
April 19, 2002	By letter to the Commission (signed by G.E. Apostolakis), the Advisory Committee on Reactor Safeguards issued "Report on the Safety Aspects of the License Renewal Application for the Turkey Point Nuclear Plant, Units 3 and 4."
April 2002	U.S. Nuclear Regulatory Commission published NUREG-1759, "Safety Evaluation Report Related to the License Renewal of Turkey Point, Units 3 and 4."

APPENDIX C
ABBREVIATIONS

A/C	air conditioning
ABVS	auxiliary building ventilation system
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
AMP	aging management program
AMR	aging management review
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without scram
B&W	Babcock and Wilcox
BL	bulletin
BTP	branch technical position
CASS	cast austenitic stainless steel
CBVS	control building ventilation system
CCW	component cooling water
CCSRVS	computer/cable spreading room ventilation system
CFR	*Code of Federal Regulations*
CLB	current licensing basis
CMAA	Crane Manufacturers Association of America
CRDM	control rod drive mechanism
CRVS	control room ventilation system
CS	condensate system
CST	condensate storage tank
CUF	cumulative usage factor
CVCS	chemical and volume control system
DBD	design-basis document
DCEIRVS	dc equipment/inverter room ventilation system
DG	draft regulatory guide
DOR	Division of Operating Reactors
DWST	demineralized water storage tank
ECCS	emergency core cooling system
ECT	eddy current testing
EDG	emergency diesel generator
EDGB	emergency diesel generator building
EDGBVS	emergency diesel generator building ventilation system
EER	electrical equipment room
EERV	electrical equipment room ventilation
EFPD	effective full-power day
EFPY	effective full-power year
EOL	end of life

EPRI	Electric Power Research Institute
EQ	environmental qualification
ESF	engineered safety features
FAC	flow-accelerated corrosion
FP	fire protection
FPL	Florida Power and Light Company
FSAR	final safety analysis report
FSER	final safety evaluation report
GALL	generic aging lessons learned
GEIS	generic environmental impact statement
GL	generic letter
GSI	generic safety issue
HEPA	high-efficiency particulate air (filter)
HVAC	heating, ventilation, and air conditioning
IASCC	irradiation-assisted stress-corrosion cracking
IEB	Inspection and Enforcement Bulletin
IEEE	Institute of Electrical and Electronics Engineers
IGSCC	intergranular stress-corrosion cracking
IN	information notice
INPO	Institute of Nuclear Power Operations
IPA	integrated plant assessment
ISI	inservice inspection
ITS	improved technical specification
LBB	leak-before-break
LOOP	loss of offsite power
LRA	license renewal application
MCRE	main control room environment
MFS	main feedwater system
MIC	microbiologically influenced corrosion
MRV	minimum required value
NDE	nondestructive examination
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NUREG	NRC technical report designation
PLL	prescribed lower limits
PTS	pressurized thermal shock
PWR	pressurized-water reactors
PWSCC	primary water stress-corrosion cracking
QA	quality assurance

RAI	request for additional information
RCP	reactor coolant pump
RCS	reactor coolant system
RG	regulatory guide
RHR	residual heat removal
RI-ISI	risk-informed ISI
RPV	reactor pressure vessel
RT	reference temperature
RVHPIP	reactor vessel head Alloy 600 penetration inspection program
SC	structure and component
SCC	stress-corrosion cracking
SER	safety evaluation report
SFP	spent fuel pool
SI	safety injection
SOC	statement of considerations
SPCS	steam and power conversion systems
SRP	standard review plan
SSC	structure, system, and component
TBVS	turbine building ventilation system
TEMA	Tubular Exchanger Manufacturers Association
TLAA	time-limited aging analyses
TS	technical specification
UFSAR	updated final safety analysis report
USE	upper-shelf energy
UT	ultrasonic testing
VHP	vessel head penetration
WCAP	Westinghouse Owners Group generic technical report
WOG	Westinghouse Owners Group

THIS PAGE IS INTENTIONALLY LEFT BLANK

APPENDIX D
PRINCIPAL CONTRIBUTORS

NAME	RESPONSIBILITY
R. Auluck	Project Manager
G. Bagchi	Structural Engineering
W. Bateman	Management Oversight
B. Boger	Management Oversight
J. Hannon	Management Oversight
G. Hatchett	Plant Systems
G. Holahan	Management Oversight
C. Holden	Electrical Engineering
S. Hom	Legal Counsel
P. Kuo	Management Oversight
C. Li	Plant Systems
J. Ma	Structural Engineering
K. Manoly	Structural Engineering
J. Medoff	Materials Engineering/Project Manager
J. Moore	Legal Counsel
C. Munson	Structural Engineering
A. Pal	Electrical Engineering
P. Shemanski	Electrical Engineering
J. Strosnider	Management Oversight
A. Walker	Secretarial Support
J. Lazevnick	Electrical Engineering
J. Calvo	Management Oversight
E. Imbro	Management Oversight

THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK

APPENDIX E
STAFF POSITION ON STATION BLACKOUT

THIS PAGE IS INTENTIONALLY LEFT BLANK

April 1, 2002

Mr. Alan Nelson
Nuclear Energy Institute
1776 I Street, NW., Suite 400
Washington, DC 20006-3708

Mr. David Lochbaum
Union of Concerned Scientists
1707 H Street, NW., Suite 600
Washington, DC 20006-3919

SUBJECT: STAFF GUIDANCE ON SCOPING OF EQUIPMENT RELIED ON TO MEET THE REQUIREMENTS OF THE STATION BLACKOUT (SBO) RULE (10 CFR 50.63) FOR LICENSE RENEWAL (10 CFR 54.4(a)(3))

Dear Messrs. Nelson and Lochbaum:

The Nuclear Regulatory Commission (NRC) staff has reviewed the Nuclear Energy Institute's (NEI) comments, dated March 19, 2002, and the Union of Concerned Scientists' letter, dated February 19, 2002, on the proposed staff guidance for identifying equipment relied on to meet the requirements of the SBO rule 10 CFR 50.63, as it affects scoping for license renewal rule under 10 CFR 54.4(a)(3). The staff is enclosing a copy of the revised staff position on scoping of SBO equipment for license renewal.

However, the staff would like to clarify the use of alternate ac power sources within the context of the SBO rule. Alternate ac power sources were accepted under the SBO rule as an alternate means of withstanding an SBO. The definition of an alternate ac power source is contained in 10 CFR 50.2. The definition addresses the capability of these power sources to cope with an SBO but not to recover from an SBO. While a very small number of alternate ac power sources may have capabilities beyond those required for coping, the staff nevertheless finds that they were only reviewed as a means of coping with an SBO for the plant specified coping duration. Reference to alternate ac power sources as a means of recovering from an SBO is therefore not intended within the context of the SBO rule. Within the context of the rule, only offsite power and onsite power are credited as means of recovering from an SBO event; and both must therefore be included within the scope of license renewal.

An aging management program for SBO equipment that is within the scope of license renewal should address the 10 attributes described in the Standard Review Plan for License Renewal. For the attributes that address corrective action, confirmation process, and administrative controls, the staff has determined that 10 CFR Part 50, Appendix B is acceptable. However, Appendix A "Quality Assurance Guidance for Non-Safety Systems and Equipment" of Regulatory Guide 1.155, "Station Blackout" may be used subject to the staff review if and when a specific SBO aging management program is submitted by the applicant.

The implementation of this staff position will start with the license renewal applications currently under review. Additional staff guidance for implementation of this staff position at Calvert Cliffs, Oconee, ANO-1, and Hatch will be issued separately.

With the enclosed staff position, it is also possible that comparable changes might need to be made to NEI 95-10, Revision 3, "Industry Guidance for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule." If you have any questions regarding this matter, please contact Peter Kang at 301-415-2779.

Sincerely,

/RA/

David B. Matthews, Director
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project 690

Enclosure: As stated

cc w/encl: See next page

NRC Staff Position on the License Renewal Rule (10 CFR 54.4) as it relates to The Station Blackout Rule (10 CFR 50.63)

Staff Position

Consistent with the requirements specified in 10 CFR 54.4(a)(3) and 10 CFR 50.63(a)(1), the plant system portion of the offsite power system should be included within the scope of license renewal. The reasons for support of this position follow:

Rationale

The license renewal rule, 10 CFR 54.4(a)(3), requires that, "All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for.....station blackout (10 CFR 50.63)" be included within the scope of license renewal. The station blackout (SBO) rule, 10 CFR 50.63(a)(1), requires that each light-water-cooled nuclear power plant licensed to operate be able to withstand and recover from a station blackout of a specified duration that is based upon factors that include: "(iii) The expected frequency of loss of offsite power; and (iv) The probable time needed to restore offsite power." The SBO rule in this regard is consistent with the staff findings identified in the statement of considerations and NUREG-1032, "Evaluation of Station Blackout Accidents at Nuclear Power Plants." In particular, with regard to factor (iv), the staff found that offsite power is more likely to be restored (0.6 hours median time to restore) than the emergency diesel generators (8 hours median time to repair) in terminating an SBO event.

Station Blackout is the loss of offsite and onsite ac electric power to the essential and non-essential switchgear buses in a nuclear power plant. It does not include the loss of ac power fed from inverters powered by station batteries nor loss of ac power from an SBO defined alternate ac power source. The SBO rule was added to the regulations in 10 CFR Part 50 because, as operating experience accumulated, concern arose that the reliability of both the offsite and onsite ac power systems might be less than originally anticipated, even for designs that met the requirements of General Design Criteria 17 and 18. As a result, the SBO rule required that nuclear power plants have the capability to withstand and recover from the loss of offsite and onsite ac power of a specified duration (the coping duration).

Licensees' plant evaluations followed the guidance specified in NRC Regulatory Guide (RG) 1.155 and NUMARC 87-00 to determine their required plant-specific coping duration. The criteria specified in RG 1.155 to calculate a plant-specific coping duration were based upon the expected frequency of loss of offsite power <u>and</u> the probable time needed to restore offsite power, as well as the other two factors (onsite emergency ac power source redundancy and reliability) specified in 10 CFR 50.63(a)(1). In requiring that a plant's coping duration be based in part on the probable time needed to restore offsite power, 10 CFR 50.63(a)(1) is specifying that the offsite power system be an assumed method of recovering from an SBO. Disregarding the offsite power system as a means of recovering from an SBO would not meet the requirements of the rule and would result in a longer required coping duration.

Enclosure

The use of the offsite power system within 10 CFR 50.63(a)(1) as a means of recovering from an SBO should not be construed to be the only acceptable means of recovering from an SBO. A licensee could for example recover offsite power or emergency (onsite) power. It is not possible to determine prior to an actual SBO event which source of power can be returned first. As a result, 10 CFR 50.63(c)(1)(ii) and its associated guidance in RG 1.155, Section 1.3 and Section 2, requires procedures to recover from an SBO that include restoration of offsite and onsite power.

Based on the above, both the offsite and onsite power systems are relied upon to meet the requirements of the SBO rule. Elements of both offsite and onsite power are necessary to determine the required coping duration under 10 CFR 50.63(a)(1), and the procedures required by 10 CFR 50.63(c)(1)(ii) must address both offsite power and onsite power restoration. It follows, therefore, that both systems are used to demonstrate compliance with the SBO rule and must be included within the scope of license renewal consistent with the requirements of 10 CFR 54.4(a)(3). License renewal applicants are presently including the onsite power system within the scope of license renewal on the basis of the requirements under 10 CFR 54.4 (a)(1) (safety-related systems). They are also including equipment that is relied upon to cope with an SBO (e.g., alternate ac power sources) on the basis of the requirements under 10 CFR 54.4(a)(3). Only the addition of the offsite power system is therefore necessary to complete the required scope of the electrical power systems under license renewal.

The offsite power systems of U.S. nuclear power plants consist of a transmission system (grid) component that provides a source of power and a plant system component that connects that power source to a plant's onsite electrical distribution system which powers safety equipment. The staff has historically relied upon the well-distributed, redundant, and interconnected nature of the grid to provide the necessary level of reliability to support nuclear power plant operations. For purposes of the license renewal rule, the staff has determined that the plant system portion of the offsite power system that is used to connect the plant to the offsite power source should be included within the scope of the rule. This path typically includes the switchyard circuit breakers that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead or underground circuits between circuit breaker and transformer and transformer and onsite electrical distribution system, and the associated control circuits and structures. Ensuring that the appropriate offsite power system long-lived passive structures and components that are part of this circuit path are subject to an aging management review will assure that the bases underlying the SBO requirements are maintained over the period of the extended license. This is consistent with the Commission's expectations in including the SBO regulated event under 10 CFR 54.4(a)(3) of the license renewal rule.