Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

March 7, 2000

L-2000-063
10 CFR 50.4

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: St. Lucie Unit 1
Docket No. 50-335
FPL Reply to NRR Halon TIA Response

Reference: NRR Response to Task Interface Agreement 99-01, St. Lucie Plant, Units 1 and 2 – Resolution of St. Lucie Fire Protection Functional Inspection Items (TAC Nos. MA46555 and MA4656), United States Nuclear Regulatory Commission, Memorandum from Suzanne C. Black to Loren R. Plisco, dated November 29, 1999.

The above reference documents the NRC's determination that the St. Lucie Unit 1 cable spread room (CSR) Halon 1301 fire suppression system does not meet licensing bases requirements. FPL reviewed the staff's response to the Task Interface Agreement (TIA) and prepared Fire Protection Evaluation Record (FPER) PSL-FPER-00-007, "Evaluation of Unit 1 Cable Spreading Room Halon 1301 Design for conformance with 10 CFR 50 Appendix R Section III.G.3," to provide supplemental information and document FPL's response to the TIA. The FPER is enclosed with this correspondence.

In brief, the staff asserted that FPL did not demonstrate that the St. Lucie Unit 1 CSR Halon 1301 system is adequate to suppress the "expected" fire in the CSR, i.e. a deep-seated cable fire. Specifically, the staff's response to the TIA concludes that:

- The system does not meet the guidance specified in the 1980 memorandum.
- The system does not meet the guidelines of NFPA 12A for a deep-seated fire, as required by the operating license.
- The licensee did not provide fire testing documentation or other analysis, to demonstrate that the system would be adequate or effective for suppressing a deep-seated cable fire.
- The system design, using cross-zoned thermal detectors for system actuation in conjunction with the required door and damper interlocks, could allow time for a fire to become deep-seated and therefore, its design parameters (hold time and concentration) does not provide a reasonable assurance that the Halon 1301 system would suppress a deep-seated cable fire.

These issues are addressed in detail in the enclosed FPER. The Halon suppression system issues revolve around the credibility of, and the need to design for, postulated deep-seated cable fires in the St. Lucie Unit 1 CSR. The design of the CSR Halon suppression system utilized NFPA

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guidelines and industry experience for the combustible materials present in the area. When designing Halon fire suppression systems, a determination must be made concerning the type of fire hazard present, i.e., surface or deep-seated fires. The Halon concentrations and hold times are based on this determination.

The enclosed FPER documents FPL's evaluation of the following issues:

1. Fire Hazard Determination:

   FPL evaluated fire testing documentation and analyses for fire hazards associated with the combustible materials present in the CSR (predominantly comprised of IEEE rated and unrated cables). The fixed and transient combustibles in the areas reviewed were found not to be of a quantity or type that provided the conditions necessary to create a cable fire which would propagate significantly or be of the strength and duration required to create a deep-seated fire. As a result, postulated fires in the CSR would be of a size and intensity that would remain confined to the area of origin. Most importantly, industry fire tests demonstrate that the combustible materials present in the CSR exhibit fire characteristics representative of surface fires, not the deep-seated fires that are postulated by the staff's response to the TIA. Therefore, FPL concludes that there is no technical basis for a Halon suppression system design that is required to extinguish a deep-seated cable fire.

2. Halon Concentration and Hold Time:

   The NFPA Handbook states that most plastics behave as flammable liquids and can be extinguished rapidly and completely with a concentration of 4%-6% of Halon 1301. The handbook further states that Halon 1301 is generally considered useful when live electrical or electric circuits are present, and for surface burning flammable solids such as thermoplastics (e.g., electrical cable). Industry fire testing supports the NFPA Handbook and demonstrates that fires involving both IEEE rated and unrated cables are successfully extinguished at Halon concentrations less than 4% by volume and a 10 minute hold time. The St. Lucie Unit 1 CSR Halon suppression system was designed to deliver a minimum Halon concentration of 5% for 10 minutes, a design supported by the NFPA and industry test results.

   FPL also evaluated the methodology and results of NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires," JM Chavez and LD Lambert, Sandia National Laboratories, dated October 1986. FPL identified several performance issues with this report, in that: a) final Halon concentrations were nonconservatively measured (the probe was placed too low and did not give representative Halon concentration data at the top of the tested configurations); and, b) the calculated Halon design concentration was too high (the flooding factor results in a Halon concentration of 5% at 60 °F). Additionally, the Sandia test results do not refute the previous industry fire test results which show that a 5% Halon concentration held for 10 minutes extinguishes cable fires. The Sandia test selected a 15 minute soak time without a specific engineering basis and no consideration was given for the validation of the typical soak time of 10 minutes.

3. Detection and Automatic Suppression Capabilities:

FPL evaluated requirements related to the fire detection and suppression capabilities of the St. Lucie Unit 1 Halon suppression system. In this respect, NFPA 12A, the code of record for St. Lucie Unit 1, requires the use of automatic detection and fixed suppression systems. This limits the size and intensity of the fire with which the system must contend and reduces (but does not eliminate) the need for human intervention. St. Lucie Unit 1 employs cross-zoned thermal detectors and ionization detection for the CSR. The cross-zone thermal detection system is used for automatic actuation of the Halon 1301 fixed suppression system. Both the thermal and ionization detection systems provide fire alarms in the control room. These detectors are installed at reduced spacing from their UL listed spacing. Based on NFPA Code and industry practice, reducing the spacing of the detectors increases system sensitivity and results in greatly reduced fire detection response times. Additionally, the interlocks in the automatic sequence of the operation of the Halon 1301 system provides further enhancement to meeting the requirements of Branch Technical Position 9.5-1, Appendix A, Section D.4(i) by confirming the closure of all openings from the CSR prior to Halon discharge. Therefore, FPL concludes that the thermal detection system provides reasonable assurance that the application of the Halon 1301 agent would occur before any major fire damage occurred.

4. NFPA 12A Deep-Seated Fire Guidance:

NFPA guidance provides that if a 5% concentration does not extinguish a fire within 10 minutes of application then the fire is considered deep-seated. Experiments show a rather sharp dividing line between deep-seated and surface fires. Deep-seated fires usually require much higher Halon concentrations than 10% and much longer soaking times than 10 minutes. Furthermore, based on NFPA guidance, the Sandia NUREG/CR-3656 fire report did not establish that cable fires were deep-seated in nature (the Halon concentrations used were much less than 10%, and the 15 minute hold time assumption was deterministic). Industry data supports that cable fires result in a surface fire hazard, and that cable fires do not represent a deep-seated fire hazard. The CSR fire suppression system Halon concentration and hold times were designed to suppress the fire hazards associated with the CSR by utilizing industry fire test reports and NFPA guidelines. Therefore, the design of the St. Lucie Unit 1 CSR suppression system did not require extinguishment of deep-seated fires.

FPL's compliance with Appendix R for St. Lucie Unit 1 was the subject of numerous docketed letters between FPL and the NRC in the 1980s. Although it appears as though the staff had some recommendations for the design of the St. Lucie Unit 1 CSR Halon suppression system, this issue was not one of the many open items that were documented and resolved on the St. Lucie Unit 1 docket. If the staff's 1980 memoranda had established Appendix R requirements for St. Lucie Unit 1, we presume that this would have been a docketed issue.

The basis for the NRC staff's 1980 recommendations for the design of the St. Lucie Unit 1 CSR Halon suppression system is not clear, but the recommendations appear not to be based on the fire hazards in the area nor on the supporting industry fire testing, analyses, and NFPA 12A

guidelines for these identified hazards. In contrast, the design of the St. Lucie Unit 1 CSR Halon suppression system utilized existing industry data and NFPA guidelines, all of which are still applicable today.

Contrary to what was stated in the staff's response to the TIA, the staff's 1980 recommendations were not substantiated based on the conclusions drawn by the Sandia fire testing documented in NUREG/CR-3656. The Sandia fire testing conclusions do not invalidate the results of previously performed industry fire testing and analyses concerning the nature and characteristics of cable fires. Additionally, it is important to note that the Sandia fire testing occurred subsequent to the design and implementation of the St. Lucie Unit 1 CSR suppression system, and that these results did not establish regulatory requirements for St. Lucie Unit 1.

The St. Lucie Unit 1 operating license requires compliance with 10 CFR 50 Appendix R. 10 CFR 50 Appendix R Section III.G.3 requires the installation of a fire detection system and fixed fire suppression system in the St. Lucie Unit 1 CSR. FPL is committed to comply with NFPA 12A for the St. Lucie Unit 1 CSR Halon suppression system. As summarized above and discussed in more detail in the enclosed FPER, the fire detection and suppression systems were designed to mitigate credible fires based on the use of industry fire testing, analysis, and NFPA 12A guidelines. The St. Lucie Unit 1 CSR fire detection and suppression systems meet all applicable NFPA guidance and 10 CFR 50 Appendix R requirements.

We propose a meeting to discuss the information present in the enclosed FPER. If there are any questions related to this correspondence, please call us.

Very truly yours,

Rajiv S. Kundalkar

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Vice President
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Enclosure

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant