



April 23, 2000

L-2000-067  
10 CFR 50.90

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

RE: St. Lucie Unit 1  
Docket No. 50-335  
Proposed License Amendment  
Containment Hydrogen Recombiner  
Surveillance Testing

Pursuant to 10 CFR 50.90, Florida Power and Light Company (FPL) requests to amend Facility Operating License DPR-67 for St. Lucie Unit 1 by incorporating the attached Technical Specifications revision. The proposed amendment is associated with the required timing for containment hydrogen recombiner post operation insulation resistance testing. This proposed change deletes the word "immediately" from the statement, "Verifying the integrity of the heater electrical circuits by performing a continuity and resistance to ground test immediately following the above required functional test." This change is consistent with operating experience, the equivalent Unit 2 Technical Specification Surveillance, and NUREG-1432.

Attachment 1 is an evaluation of the proposed changes. Attachment 2 is the "Determination of No Significant Hazards Consideration." Attachment 3 contains copies of the affected Technical Specifications pages marked up to show the proposed changes.

The proposed amendment has been reviewed by the St. Lucie Facility Review Group and the FPL Company Nuclear Review Board. In accordance with 10 CFR 50.91 (b) (1), copies of the proposed amendment are being forwarded to the State Designee for the State of Florida. There is no specific implementation date requested, please process this amendment normally. Contact us if there are any questions about this submittal.

Very truly yours,

Rajiv S. Kundalkar  
Vice President  
St. Lucie Plant

RSK/EJW/KWF

Attachments

cc: Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, St. Lucie Plant  
Mr. W. A. Passetti, Florida Department of Health and Rehabilitative Services

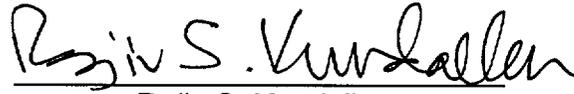
ADD

STATE OF FLORIDA     )  
                                  )     ss.  
COUNTY OF ST. LUCIE    )

Rajiv S. Kundalkar being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant, for the Nuclear Division of Florida Power and Light Company, the Licensee herein;

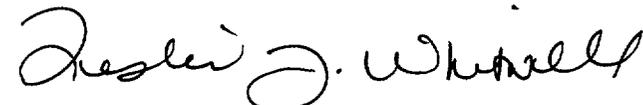
That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

  
Rajiv S. Kundalkar

STATE OF FLORIDA  
COUNTY OF St. Lucie

Sworn to and subscribed before me  
this 23 day of April, 2000

by Rajiv S. Kundalkar, who is personally known to me.

  
Signature of Notary Public-State of Florida  
Leslie J. Whitwell  
MY COMMISSION # CC646183 EXPIRES  
May 12, 2001  
BONDED THRU TROY FAIN INSURANCE, INC.

Name of Notary Public (Print, Type, or Stamp)

St. Lucie Unit 1  
Docket No. 50-335  
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Attachment 1  
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Attachment 1 to FPL Letter L-2000-067

EVALUATION OF PROPOSED TS CHANGES

## EVALUATION OF PROPOSED TS CHANGES

### **Introduction**

Florida Power and Light Company (FPL) requests to amend Facility Operating License DPR-67 for St. Lucie Unit 1 by incorporating the attached Technical Specifications (TS) revision. The proposed license amendment (PLA) is associated with the required timing for containment hydrogen recombiner post operation insulation resistance testing.

### **Background**

The Unit 1 TS require post operation insulation resistance testing of containment hydrogen recombiners. TS surveillance 4.6.4.2.b.4 requires verification of operability by "Verifying the integrity of the heater electrical circuits by performing a continuity and resistance to ground test immediately following the above required functional test. The resistance to ground for any heater phase shall be  $\geq 10,000$  ohms." The functional test to which this section refers involves operation of the recombiner at sustained high temperature. Conducting resistance readings for this surveillance immediately following the required functional test results in inconsistent and often unacceptable results. Following testing with a period of time to allow a cooldown of the recombiner results in acceptable readings. It is this "timing restriction" issue for conducting the surveillance resistance measurements that is the basis for this proposed TS change. More specifically, the PLA change involves deletion of the word "immediately" from TS Surveillance 4.6.4.2.b.4. The Unit 2 TS for the hydrogen recombiners is not impacted by this PLA since the specification does not have a timing restriction, such as "immediately," in the wording for the specification.

Per UFSAR Section 6.2.5.1, the hydrogen recombiner is the primary means of hydrogen control inside containment without allowing a release to the environment. Unit 1 UFSAR Section 6.2.5.2.1 describes the recombiner system. In that section, a discussion is provided for the quality control of the recombiner and it is noted that the "recombiner, control panel, and power supply are also subjected to 80 heatup and cooldown cycles, twice the expected number of service life cycles to verify endurance of the system." This description basically describes testing of the hydrogen recombiner, similar to the testing provided in TS. The containment hydrogen recombiners are required to be operable in Modes 1 and 2.

In addition to the UFSAR description, an INPO operating experience report OE9380 documents industry experience with Westinghouse hydrogen recombiners concerning the observed behavior of the heater insulation material related to resistance testing. It was noted in the report that insulation readings taken within 2 hours following recombiner operation did not meet acceptance criteria. The observed behavior is attributed to the negative temperature coefficient of the heater insulation material, magnesium mono oxide (MgO). This material exhibits lower electrical resistance as its temperature increases.

Conducting the test “immediately” following the recombinder run results in unacceptable testing conditions. The INPO report concludes that the heater insulation material does not adversely affect equipment operability. The material has proven reliable. The issue is related to the conditions under which testing is performed, and not the test itself. Taking resistance readings on recombinder heater phases should be based on information that has been received from the vendor and on in-house testing methodology, not solely on a time criteria. It is noted that the standard for improved TS for Combustion Engineering (CE) plants (NUREG-1432) does not impose a time restriction for conducting these resistance test readings.

### **Description of the Proposed Change**

This PLA revises Unit 1 TS 3/4.6.4.2, Electric Hydrogen Recombiners - W, to clarify the requirement for the post operation insulation resistance test of Surveillance 4.6.4.2.b.4. This proposed change deletes the word “immediately” from the statement, “Verifying the integrity of the heater electrical circuits by performing a continuity and resistance to ground test immediately following the above required functional test.” See Attachment 1 for the wording of proposed TS changes. This change is considered administrative in nature since it is making the explicit terms of the specification consistent with the intent of performing post operation insulation resistance readings in order to trend the material condition of the hydrogen recombinder heaters. This change is also considered administrative since the change provides consistency with the Unit 2 TS surveillance (wording to be identical with Unit 2).

### **Justification for the Proposed Change**

#### **System Configuration - UFSAR**

Combustible gas control for containment following a maximum hypothetical accident is provided primarily by the hydrogen recombiners. The hydrogen recombiners allow control of hydrogen concentration without any release of containment atmosphere to the environment. The hydrogen purge system is a back-up control system for the recombiners. The recombinder is to be operated only after a LOCA. The operation of one stationary thermal unit processes 100 – 120 scfm of containment air, which is sufficient to provide more than twice the required hydrogen removal capacity. This system is redundant in that two hydrogen recombiners are provided. Operational testing of these units is provided to ensure system reliability. The Unit 1 UFSAR Section 6.2.5.2.1 describes the recombinder system. In that section, a discussion is provided for the quality control of the recombinder and it is noted that the “recombinder, control panel, and power supply are also subjected to 80 heatup and cooldown cycles, twice the expected number of service life cycles to verify endurance of the system.”

### Hydrogen Recombiner Operability – Technical Specification

Operability of the hydrogen recombinder requires verification testing by performing a recombinder system functional test to demonstrate that the minimum heater sheath temperature increases to  $\geq 700^{\circ}\text{F}$  within 90 minutes and is maintained for at least 2 hours. This test is conducted once per 6 months (TS 4.6.4.2.a). At less frequent intervals, 18 months, operability is verified by performing channel calibration of the recombinder instrumentation and control circuits (TS 4.6.4.2.b.1). Visual examinations are also performed (TS 4.6.4.2.b.2). The recombiners are functionally tested to demonstrate that the heater sheath temperature increases to  $\geq 1200^{\circ}\text{F}$  within 5 hours and is maintained for at least 4 hours (TS 4.6.4.2.b.3). Finally, integrity of the heater electrical circuits are checked by performing a continuity and resistance to ground test immediately following the required functional test. The resistance to ground for any heater phase shall be  $\geq 10,000$  ohms (TS 4.6.4.2.b.4). This latter test is the test that is being evaluated to delete the wording “immediately” so that consistent test methodology and vendor recommendations can be followed to permit appropriate conditions for testing of the recombiners. The bases for the test is to allow trending for potentially degraded material condition of the recombinder heaters. In the future, the testing conditions shall be established based on information that has been received from the vendor and on in-house testing methodology.

Section 3/4.6 of the TS addresses various systems and components associated with maintaining containment integrity within design and analysis parameters (including containment combustible gas control). TS 3.6.4.2 provides the Limiting Condition for Operation (LCO) for the containment electric hydrogen recombiners. Specifically, the LCO requires “two independent containment hydrogen recombinder systems shall be operable.” The surveillance requirements support operability.

TS Surveillance Requirement 4.6.4.2.b.4 states:

*At least once per 18 months by: Verifying the integrity of the heater electrical circuits by performing a continuity and resistance to ground test immediately following the above required functional test. The resistance to ground for any heater phase shall be  $\geq 10,000$  ohms.*

It is clear that the intent of the resistance testing is to ensure the reliability of the recombinder heaters. This type of testing allows the results to be trended for evaluation and degradation of heater material. Exceeding limits would be an indication of heater degradation. Having a time restriction for this type of surveillance can cause false testing results and does not provide assurance that the true material condition of the recombinder heater will be ascertained. The prior testing conditions may not have been consistent between the various periodic surveillance tests and therefore, their results do not support the bases or intent for the test.

### Industry Operating Experience

INPO operating experience report OE9380, "Primary Containment Hydrogen Recombiners Declared Inoperable Due to Interpretation of Surveillance Test Requirement," documents industry experience with Westinghouse hydrogen recombiners concerning an observed behavior with the heater insulation material related to resistance testing. It was noted that insulation readings taken within 2 hours following recombinder operation did not meet acceptance criteria, but eventually they did increase to satisfy the resistance (ohm) criteria following an additional cooldown period. The observed behavior is attributed to the negative temperature coefficient of the heater insulation material, magnesium mono oxide (MgO). This material exhibits lower electrical resistance as its temperature increases. Unit 1 recombinder heaters are made of the same heater insulation material and have exhibited this behavior. Conducting the test "immediately" following the recombinder functional run results in unacceptable testing conditions. The report concludes that the heater insulation material does not adversely affect equipment operability. In fact, the material has proven reliable. The issue is related to the testing conditions that have resulted in observation of the negative temperature coefficient when tested with the unit still hot. This gives a false indication of equipment problems that may not exist. Taking resistance readings should be based on information that has been received from the vendor and on an in-house testing methodology, not solely on a time restriction. It is also noted that the standard for improved TS at CE plants (NUREG-1432) does not impose a time restriction for conducting these test readings.

### NRC Safety Evaluation Report (SER)

With respect to testing during the initial licensing of Unit 1, the NRC had reviewed tests that have been conducted for a full-scale prototype and a production recombinder. The tests consisted of a proof-of-principle test, testing of a prototype recombinder, environmental qualification testing and functional tests for a production recombinder. The results of these tests demonstrate that the recombinder should be capable of controlling the hydrogen in a post-LOCA containment environment (Section 6.2.5). It is the functional test that is being addressed in this PLA. The surveillance wording is being changed to allow appropriate testing based on vendor guidance and in-house methodology without any time restriction. There is no discussion in the SER related to any time restriction imposed for testing.

The NRC accepted the system design on the basis of its conformance to Regulatory Guide 1.7 and General Design Criteria 41, 42 and 43.

### **Environmental Consideration**

The proposed license amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The proposed amendment involves no significant increase in the amounts and no

significant change in the types of any effluents that may be released offsite, and no significant increase in individual or cumulative occupational radiation exposure. FPL has concluded that the proposed amendment involves no significant hazards consideration and meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and that, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment need not be prepared in connection with issuance of the amendment.

### **Conclusions**

Based on review of the above, there was no basis developed by the NRC during original plant licensing that would require the performance of the resistance reading within any defined time period following (less than 2 hours) shutting the system down after recombinder functional testing. In fact, the term "immediately" has no basis in TS and is not defined related to performing the surveillance. It is also noted that the standard for improved TS for CE plants (NUREG-1432) does not impose a time restriction for conducting these test readings. The proposed TS wording change of Attachment 1 is therefore acceptable.

Attachment 2 to FPL Letter L-2000-067

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

## DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

*Description of amendment request:* The proposed license amendment (PLA) to Facility Operating License DPR-67 for St. Lucie Unit 1 is necessary to revise the timing requirement for containment hydrogen recombiner post operation insulation resistance testing. This proposed change deletes the word "immediately" from the statement, "Verifying the integrity of the heater electrical circuits by performing a continuity and resistance to ground test immediately following the above required functional test." This change is consistent with operating experience, the equivalent Unit 2 Technical Specification Surveillance, and NUREG-1432.

Pursuant to 10 CFR 50.92, a determination may be made that a proposed license amendment involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Each standard is discussed as follows.

**(1) Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.**

The proposed amendment does not involve an increase in the probability or consequences of any accident previously evaluated. This PLA provides a clarification of the Technical Specification surveillance requirements for verifying hydrogen recombiner operability and reliability. This PLA has no effect on the testing requirements, test frequency, or acceptance criteria for recombiner operability. This change allows vendor recommended guidance and in-house methodology to be established when conducting recombiner heater resistance testing. This will enable consistency in testing and will allow trending for determination of the material condition of the recombiner heaters. The PLA change provides clarification and preserves the intent of the basis to monitor the material condition of the recombiner heaters. Additionally, this change provides consistency and is identical with the Unit 2 Technical Specification surveillance. As such, this change is considered administrative in nature.

**(2) Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.**

The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated. This PLA is considered

administrative in nature and will not alter the way in which the hydrogen recombiner is operated or tested. This PLA allows vendor recommended guidance to be established in order to perform consistent testing and to allow meaningful trending of the results to verify recombiner operability. This PLA has no affect on the testing requirements, test frequency, or acceptance criteria for recombiner operability. This PLA does not result in any plant configuration changes or new failure modes.

**(3) Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.**

The proposed amendment does not involve a reduction in the margin of safety. This administrative PLA clarifies the surveillance requirement of the subject Technical Specification by allowing the establishment of vendor recommendations and in-house testing methodology to provide consistent testing conditions and allow meaningful trending of results. This PLA has no affect on the testing requirements, test frequency, or acceptance criteria for recombiner operability. As such, the assumptions and conclusions of the accident analyses in the UFSAR remain valid and the associated safety limits will continue to be met.

Based on the above discussion and the supporting Evaluation of Technical Specification changes, FPL has determined that the proposed license amendment involves no significant hazards consideration.

Attachment 3 to FPL Letter L-2000-067

ST. LUCIE UNIT 1 MARKED UP TECHNICAL SPECIFICATION PAGES

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CONTAINMENT SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

3. Verifying during a recombiner system functional test that the heater sheath temperature increases to  $\geq 1200^{\circ}\text{F}$  within 5 hours and is maintained for at least 4 hours.
4. Verifying the integrity of the heater electrical circuits by performing a continuity and resistance to ground test ~~immediately~~ following the above required functional test. The resistance to ground for any heater phase shall be  $\geq 10,000$  ohms.