

February 7, 1989

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Mr. W. F. Conway  
Senior Vice President - Nuclear  
Nuclear Energy Department  
Florida Power & Light Company  
P.O. Box 14000  
Juno Beach, Florida 33408-0420

Dear Mr. Conway:

SUBJECT: ST. LUCIE UNIT 2 - ISSUANCE OF AMENDMENT RE: DIESEL GENERATORS  
(TAC NOS. 59634 and 64190)

The Commission has issued the enclosed Amendment No.39 to Facility Operating License No. NPF-16 for the St. Lucie Plant, Unit No. 2. This amendment consists of changes to the Technical Specifications in response to your application dated August 27, 1985, as supplemented May 7, 1986 and superseded October 19, 1987. This amendment also responds to your application dated December 12, 1986.

This amendment changes the diesel generator Technical Specifications to reflect the recommendations contained in Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability." The above changes are made in response to your letter dated October 19, 1987. The amendment also deletes existing diesel generator fuel oil sampling requirements and replaces them with more effective sampling requirements which you requested by letter dated December 12, 1986.

The staff has made six minor changes to your proposed Technical Specifications which were discussed with and agreed to by your staff. You proposed to perform the diesel fuel oil particulate contamination test per ASTM D2276-78, Method A or Appendix A-2. The staff recommended the use of the 1983 revision of the standard, instead of the 1978 revision. The testing requirements of both revisions are identical. Thus, the 1983 revision is used in the Technical Specifications.

Your current Technical Specifications permit Unit 2 to use a Unit 1 startup transformer when one of the Unit 2 startup transformers is inoperable (Action Statement f. for LCO 3.8.1.1). You proposed that this exception be made part of the LCO itself as a footnote to the LCO. However, the exception was kept as Action Statement f., instead of a footnote to the LCO.

A footnote was proposed which would permit engine prelubrication and warmup before conducting the 18-month diesel start tests (loss-of-offsite power test, ESF actuation test, and loss-of-offsite power and ESF actuation test) and the 10-year diesel start test. The footnote was modified to delete the warmup portion.

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A footnote was proposed which would permit engine prelubrication and warmup before conducting the monthly diesel start test. The warmup part of the footnote was changed to make it clearer that warmup is allowed in order to minimize stress and wear on the diesel generator.

You also proposed a footnote which described the loading of the generator for monthly testing. The footnote was clarified to ensure that the generator would be loaded within 60 seconds at least once every 184 days.

Lastly, proposed Table 4.8-1, entitled "Diesel Generator Test Schedule," was amended to include 7-day testing when more than five failures are encountered in the last 100 valid tests.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by

Jan. A. Norris, Senior Project Manager  
Project Directorate II-2  
Division of Reactor Projects-I/II  
Office of Nuclear Reactor Regulation

Enclosures:

- 1. Amendment No. 39 to NPF-16
- 2. Safety Evaluation

cc w/enclosures:  
See next page

\*See previous concurrence

LA/RDII-2  
Dwyler  
1/4/89

PM:RDII-2  
JNorris:jd  
1/4/89

D:PLI-2  
HBelkow  
1/17/89

PSB  
FRosa  
1/4/89

\*NRR/PD4  
ETomlinson  
5/6/88

OGC *Bath*  
1/17/89

Mr. W. F. Conway  
Florida Power & Light Company

St. Lucie Plant

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

FLORIDA POWER & LIGHT COMPANY  
ORLANDO UTILITIES COMMISSION OF  
THE CITY OF ORLANDO, FLORIDA

AND

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. 50-389

ST. LUCIE PLANT UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 3g  
License No. NPF-16

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Florida Power & Light Company, et al. (the licensee), dated August 27, 1985, as supplemented May 7, 1986 and superseded October 19, 1987, and application for amendment dated December 12, 1986, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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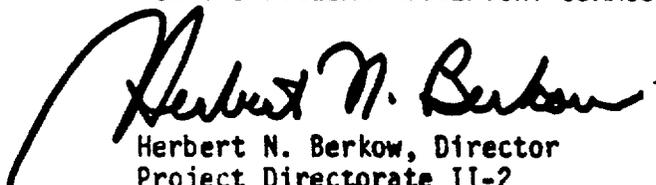
2. Accordingly, Facility Operating License No. NPF-16 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 2.C.2 to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 39, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Herbert N. Berkow, Director  
Project Directorate II-2  
Division of Reactor Projects-I/II  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: February 7, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 39  
TO FACILITY OPERATING LICENSE NO. NPF-16  
DOCKET NO. 50-389

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

<u>Remove Pages</u>	<u>Insert Pages</u>
3/4 8-1	3/4 8-1
3/4 8-2	3/4 8-2
3/4 8-3	3/4 8-3
3/4 8-4	3/4 8-4
3/4 8-5	3/4 8-5
3/4 8-6	3/4 8-6
3/4 8-7	3/4 8-7
- -	3/4 8-7a
3/4 8-8	3/4 8-8
3/4 8-9	3/4 8-9
B3/4 8-1	B3/4 8-1

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### 3/4.8.1 A.C. SOURCES

##### OPERATING

##### LIMITING CONDITION FOR OPERATION

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3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Two separate and independent diesel generators, each with:
  1. Two separate engine-mounted fuel tanks containing a minimum volume of 200 gallons of fuel each,
  2. A separate fuel storage system containing a minimum volume of 40,000 gallons of fuel, and
  3. A separate fuel transfer pump.

APPLICABILITY: MODES 1, 2, 3, and 4.

##### ACTION:

- a. With one offsite circuit of 3.8.1.1.a inoperable, except as provided in Action f. below, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter. If either EDG has not been successfully tested within the past 24 hours, demonstrate its OPERABILITY by performing Surveillance Requirement 4.8.1.1.2a.4 separately for each such EDG within 24 hours. Restore the offsite circuit to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.
- b. With one diesel generator of 3.8.1.1.b inoperable, demonstrate the OPERABILITY of the A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter; and if the EDG became inoperable due to any cause other than preplanned preventative maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE EDG by performing Surveillance Requirement 4.8.1.1.2a.4 within 24 hours\*; restore the diesel generator to OPERABLE status within

\*This test is required to be completed regardless of when the inoperable EDG is restored to OPERABILITY.

## ELECTRICAL POWER SYSTEMS

### ACTION (Continued)

- 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Additionally, verify within 2 hours or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours that:
1. All required systems, subsystems, trains, components and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and
  2. When in MODE 1, 2 or 3, the steam-driven auxiliary feed pump is OPERABLE.
- c. With one offsite A.C. circuit and one diesel generator inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; and if the EDG became inoperable due to any cause other than preplanned preventative maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE EDG by performing Surveillance Requirement 4.8.1.1.2a.4 within 8 hours\*. Restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the other A.C. power source (offsite circuit or diesel generator) to OPERABLE status in accordance with the provisions of Section 3.8.1.1. ACTION Statement a or b, as appropriate, with the time requirement of that ACTION Statement based on the time of initial loss of the remaining inoperable A.C. power source. Additionally, verify within 2 hours or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours that:
1. All required systems, subsystems, trains, components and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and
  2. When in MODE 1, 2, or 3, the steam-driven auxiliary feed pump is OPERABLE.

\*This test is required to be completed regardless of when the inoperable EDG is restored to OPERABILITY.

## ELECTRICAL POWER SYSTEMS

### ACTION (Continued)

- d. With two of the required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by sequentially performing Surveillance Requirement 4.8.1.1.2a.4 on both diesels within 8 hours, unless the diesel generators are already operating; restore one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. Following restoration of one offsite source, follow ACTION Statement a. with the time requirement of that ACTION Statement based on the time of initial loss of the remaining inoperable offsite A.C. circuit.
- e. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter; restore one of the inoperable diesel generators to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Following restoration of one diesel generator unit, follow ACTION Statement b. with the time requirement of that ACTION Statement based on the time of initial loss of the remaining inoperable diesel generator.
- f. With one Unit 2 startup transformer (2A or 2B) inoperable and with a Unit 1 startup transformer (1A or 1B) connected to the same A or B offsite power circuit and administratively available to both units, then should Unit 1 require the use of the startup transformer administratively available to both units, Unit 2 shall demonstrate the operability of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1a. and 4.8.1.1.2a.4 within 1 hour and at least once per 8 hours thereafter; restore the inoperable startup transformer to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

### SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability; and
- b. Demonstrated OPERABLE at least once per 18 months by transferring (manually and automatically) unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS BY:

SURVEILLANCE REQUIREMENTS (Continued)

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1. Verifying the fuel level in the engine-mounted fuel tank,
  2. Verifying the fuel level in the fuel storage tank,
  3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the engine-mounted tank,
  4. Verifying the diesel starts from ambient condition and accelerates to approximately 900 rpm in less than or equal to 10 seconds\*\*. The generator voltage and frequency shall be  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the start signal\*\*. The diesel generator shall be started for this test by using one of the following signals:
    - a) Manual.
    - b) Simulated loss-of-offsite power by itself.
    - c) Simulated loss-of-offsite power in conjunction with an ESF actuation test signal.
    - d) An ESF actuation test signal by itself.
  5. Verifying the generator is synchronized, loaded\*\*\* to greater than or equal to 3685 kW in less than or equal to 60 seconds, and
  6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. By removing accumulated water:
1. From the engine-mounted fuel tank at least once per 31 days and after each occasion when the diesel is operated for greater than 1 hour, and
  2. From the storage tank at least once per 31 days.

\*\*The diesel generator start (10 sec) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other diesel generator starts for purposes of this surveillance testing may be preceded by an engine prelube period and may also include warmup procedures (e.g., gradual acceleration) as recommended by the manufacturer so that mechanical stress and wear on the diesel generator is minimized.

\*\*\*Generator loading in less than or equal to 60 seconds shall be performed at least once every 184 days; timing for this loading test shall start upon the closing of the diesel generator breaker. All other loading for the purpose of this surveillance test may be performed according to manufacturer's recommendations. The indicated load band is meant as guidance to avoid routine overloading. Variations in loads in excess of the band due to changing bus loads shall not invalidate this test.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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- c. By sampling new fuel oil in accordance with ASTM D4057-81 prior to addition to the storage tanks and:
  1. By verifying in accordance with the tests specified in ASTM D975-81 prior to addition to the storage tanks that the sample has:
    - a) An API Gravity of within 0.3 degrees at 60°F or a specific gravity of within 0.0016 at 60/60°F, when compared to the supplier's certificate or an absolute specific gravity at 60/60°F of greater than or equal to 0.83 but less than or equal to 0.89 or an API gravity at 60°F of greater than or equal to 27 degrees but less than or equal to 39 degrees.
    - b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes, if gravity was not determined by comparison with the supplier's certification.
    - c) A flash point equal to or greater than 125°F, and
    - d) A clear and bright appearance with proper color when tested in accordance with ASTM D4176-82.
  2. By verifying within 31 days of obtaining the sample that the other properties specified in Table 1 of ASTM D975-81 are met when tested in accordance with ASTM D975-81 except that the analysis for sulfur may be performed in accordance with ASTM D1552-79 or ASTM D2622-82.
- d. At least once every 31 days by obtaining a sample of fuel oil from the storage tanks in accordance with ASTM D2276-83 and verifying that total particulate contamination is less than 10 mg/liter when checked in accordance with ASTM D2276-83, Method A, or Annex A-2.
- e. At least once per 18 months during shutdown by:
  1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
  2. Verifying the generator capability to reject a load of greater than or equal to 453 kW while maintaining voltage at  $4160 \pm 420$  volts and frequency at  $60 \pm 1.2$  Hz.
  3. Verifying the generator capability to reject a load of 3685 kW without tripping. The generator voltage shall not exceed 4784 volts during and following the load rejection.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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4. Simulating a loss-of-offsite power by itself, and:
  - a) Verifying deenergization of the emergency busses and load shedding from the emergency busses.
  - b) Verifying the diesel starts on the auto-start signal, \*\*\*\* energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz during this test.
5. Verifying that on an ESF actuation test signal (without loss-of-offsite power) the diesel generator starts\*\*\*\* on the auto-start signal and operates on standby for greater than or equal to 5 minutes. The steady-state generator voltage and frequency shall be  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the auto-start signal; the generator voltage and frequency shall be maintained within these limits during this test.
6. Simulating a loss-of-offsite power in conjunction with an ESF actuation test signal, and
  - a) Verifying deenergization of the emergency busses and load shedding from the emergency busses.
  - b) Verifying the diesel starts on the auto-start signal,\*\*\*\* energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz during this test.

\*\*\*\*This test may be conducted in accordance with the manufacturer's recommendations concerning engine prelube period.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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- c) Verifying that all automatic diesel generator trips, except engine overspeed and generator differential, are automatically bypassed upon loss of voltage on the emergency bus concurrent with a safety injection actuation signal.
7. Verifying the diesel generator operates for at least 24 hours.\*\*\*\*  
During the first 2 hours of this test, the diesel generator shall be loaded within a load band of 3800 to 3985 kW# and during the remaining 22 hours of this test, the diesel generator shall be loaded within a load band of 3450 to 3685 kW#. The generator voltage and frequency shall be 4160 + 420 volts and 60 + 1.2 Hz within 10 seconds after the start signal; the steady-state generator voltage and frequency shall be maintained within these limits during this test. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2e.4.b).
8. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000-hour rating of 3935 kW.
9. Verifying that the diesel generator's capability to:
  - a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power.
  - b) Transfer its loads to the offsite power source, and
  - c) Be restored to its standby status.
10. Verifying that with the diesel generator operating in a test mode (connected to its bus), a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizes the emergency loads with offsite power.
11. Verifying that the fuel transfer pump transfers fuel from each fuel storage tank to the engine-mounted tanks of each diesel via the installed cross connection lines.

#This band is meant as guidance to avoid routine overloading of the engine. Variations in load in excess of this band due to changing bus loads shall not invalidate this test.

\*\*\*\*This test may be conducted in accordance with the manufacturer's recommendations concerning engine pre-lube period.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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12. Verifying that the automatic load sequence timers are operable with the interval between each load block within  $\pm 1$  second of its design interval.

- f. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting\*\*\*\* the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to approximately 900 rpm in less than or equal to 10 seconds.
- g. At least once per 10 years by:
  - 1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution, and
  - 2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110% of the system design pressure.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.1. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests (on a per nuclear unit basis) is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

4.8.1.1.4 The Class 1E underground cable system shall be demonstrated OPERABLE within 30 days after the movement of any loads in excess of 80% of the ground surface design basis load over the cable ducts by pulling a mandrel with a diameter of at least 80% of the duct's inside diameter through a duct exposed to the maximum loading (duct nearest the ground's surface) and verifying that the duct has not been damaged.

\*\*\*\*This test may be conducted in accordance with the manufacturer's recommendations concerning engine prelube period.

TABLE 4.8-1

DIESEL GENERATOR TEST SCHEDULE

<u>Number of Failures in Last 20 Valid Tests*</u>	<u>Number of Failures in Last 100 Valid Tests*</u>	<u>Test Frequency</u>
<u>&lt;1</u>	<u>&lt;5</u>	At least once per 31 days
<u>&gt;2**</u>	<u>&gt;5</u>	At least once per 7 days

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\*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the number of tests and failures is determined on a per diesel generator basis.

\*\*This test frequency shall be maintained until seven consecutive failure free demands have been performed and the number of failures in the last 20 valid demands has been reduced to one or less.

## ELECTRICAL POWER SYSTEMS

### A.C. SOURCES

#### SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

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3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and
- b. One diesel generator with:
  1. Two engine-mounted fuel tanks each containing a minimum volume of 200 gallons of fuel,
  2. A fuel storage system containing a minimum volume of 40,000 gallons of fuel, and
  3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

#### ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, immediately suspend all operations involving CORE ALTERATIONS, positive reactivity changes, movement of irradiated fuel, or crane operation with loads over the fuel storage pool, and within 8 hours, depressurize and vent the Reactor Coolant System through a greater than or equal to 3.58 square inch vent. In addition, when in MODE 5 with the reactor coolant loops not filled, or in MODE 6 with the water level less than 23 feet above the reactor vessel flange, immediately initiate corrective action to restore the required sources to OPERABLE status as soon as possible.

#### SURVEILLANCE REQUIREMENTS

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4.8.1.2.1 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 (except for requirement 4.8.1.1.2a.5).

4.8.1.2.2 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.1. Reports of diesel generator failures shall include the information recommended in Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests (on a per nuclear unit basis) is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

## ELECTRICAL POWER SYSTEMS

### 3/4.8.2 D.C. SOURCES

#### OPERATING

#### LIMITING CONDITION FOR OPERATION

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3.8.2.1 As a minimum the following D.C. electrical sources shall be OPERABLE:

- a. 125-volt Battery bank No. 2A and a full capacity charger.
- b. 125-volt Battery bank No. 2B and a full capacity charger.

APPLICABILITY: MODES 1, 2, 3, and 4.

#### ACTION:

- a. With one of the required battery banks inoperable, restore the inoperable battery bank to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With one of the required full capacity chargers inoperable, demonstrate the OPERABILITY of its associated battery banks by performing Surveillance Requirement 4.8.2.1a.1 within 1 hour, and at least once per 8 hours thereafter. If any Category A limit in Table 4.8-2 is not met, declare the battery inoperable.

#### SURVEILLANCE REQUIREMENTS

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4.8.2.1 Each 125-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The parameters in Table 4.8-2 meet the Category A limits, and
  2. The total battery terminal voltage is greater than or equal to 129-volts on float charge.

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

#### 3/4.8.1, 3/4.8.2 and 3/4.8.3 A.C. SOURCES, D.C SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source. The A.C. and D.C. source allowable out-of-service times are based on Regulatory Guide 1.93, "Availability of Electrical Power Sources," December 1974. When one diesel generator is inoperable, there is an additional ACTION requirement to verify that all required systems, subsystems, trains, components and devices, that depend on the remaining OPERABLE diesel generator as a source of emergency power, are also OPERABLE, and that the steam-driven auxiliary feedwater pump is OPERABLE. This requirement is intended to provide assurance that a loss of offsite power event will not result in a complete loss of safety function of critical systems during the period one of the diesel generators is inoperable. The term verify as used in this context means to administratively check by examining logs or other information to determine if certain components are out-of-service for maintenance or other reasons. It does not mean to perform the surveillance requirements needed to demonstrate the OPERABILITY of the component.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guides 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979, Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability" dated July 2, 1984, and NRC staff positions reflected in Amendment No. 48 to Facility Operating License No. NPF-7 for North Anna Unit 2, dated April 25, 1985.

## ELECTRICAL POWER SYSTEMS

### BASES

#### A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

The Surveillance Requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts and .015 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts and not more than .020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than .010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8-2 is permitted for up to 7 days. During this 7 day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than .020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity, ensures that an individual cell's specific gravity will not be more than .040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts, ensures the battery's capability to perform its design function.



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 39

TO FACILITY OPERATING LICENSE NO. NPF-16

FLORIDA POWER & LIGHT COMPANY, ET AL.

ST. LUCIE PLANT, UNIT NO. 2

DOCKET NO. 50-389

INTRODUCTION

On July 2, 1984, the Nuclear Regulatory Commission issued Generic Letter 84-15 entitled "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability." The generic letter concluded that the frequency of diesel generator fast, cold starts from ambient conditions should be reduced to prevent premature diesel engine degradation, and encouraged licensees to amend their Technical Specifications accordingly. Acceptable Technical Specifications were included in the generic letter.

On April 25, 1985, the Commission issued Amendment No. 48 to Facility Operating License No. NPF-7 for the North Anna Power Station, Unit No. 2. The amendment included a set of acceptable Technical Specifications in response to Generic Letter No. 84-15.

By letter dated August 27, 1985, the Florida Power and Light Company (FP&L, the licensee) proposed to amend the St. Lucie Plant, Unit No. 2 diesel generator Technical Specifications (TS). The proposed TS were in response to the generic letter and used both the generic letter and North Anna TS as guidance. The August 27, 1985 submittal was noticed in the Federal Register on October 9, 1985 (50 FR 41247).

The licensee updated the August 27, 1985 submittal by letter dated May 7, 1986, and then superseded the May 7, 1986 submittal by letter dated October 19, 1987. Therefore, the October 19, 1987 letter superseded both the August 27, 1985 and May 7, 1986 submittals. The October 19, 1987 letter was renoticed in the Federal Register on December 2, 1987 (52 FR 45886).

In a separate but related matter, the licensee proposed to amend the Unit 2 fuel oil TS for the diesel generators. The submittal was dated December 12, 1986. The licensee's proposed change to the fuel oil TS was noticed in the Federal Register on January 14, 1987 (52 FR 1549).

The following contains the staff's evaluation of the December 12, 1986 and October 19, 1987 proposed TS changes.

#### BACKGROUND

The St. Lucie Plant is a two unit nuclear plant with a total of four emergency diesel generator (EDG) sets. Two EDG sets are fully dedicated to each nuclear unit, with one EDG set assigned to each of the redundant electric power divisions of each unit. There is no normal sharing of EDG sets between the nuclear units. Power from one EDG set to one electrical division of each unit is sufficient to provide for either safe shutdown loads or for accident loads.

One EDG set at the St. Lucie Plant, Unit No. 1 consists of two diesel engines and one generator between the engines. The diesel engines are manufactured by General Motors. The model and type is 654-E4. One diesel engine has 16 cylinders and the other has 12 cylinders. The engine speed is 900 rpm, and the method of cooling is air radiators with shaft-driven fans. There is one fan per diesel engine. The generators are manufactured by Electric Machinery.

One EDG set at the St. Lucie Plant, Unit No. 2 consists of two diesel engines and one generator between the engines. The diesel engines are the same as for Unit No. 1. However, each diesel engine has two fans, instead of one. The generators are manufactured by General Motors, Electric Product Division.

The EDG sets for Unit 2 are rated for continuous duty at 3685 kw, for 2000 hours/year at 3935 kw, and for 30 minutes at 3985 kw. The initial peak accident load is approximately 3506 kw.

#### EVALUATION OVERVIEW

The following evaluation is divided into two major sections: Limiting Condition for Operation (LCO)/Action Statement Proposed Changes and Surveillance Requirements Proposed Changes. The Surveillance Requirements Proposed Changes are further divided into Surveillance Requirements Other Than Fuel Oil and Surveillance Requirements for Fuel Oil.

#### Evaluation - LCO /Action Statement Proposed Changes

The licensee proposed changes to TS 3.8.1.1 (A. C. Sources - Operating - LCO). TS 3.8.1.1.a requires two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system. The licensee proposed to add a footnote to this LCO which states that this operability requirement can be met with one Unit 2 startup transformer (2A or 2B) inoperable, provided that a Unit 1 startup transformer (1A or 1B) connected to the same A or B offsite power circuit is administratively available to both units and not required for use in Unit 1. This footnote is essentially the present Action Statement 3.8.1.1.f, which addresses the inoperability of one of the Unit 2 startup transformers and the use of one of the two Unit 1 startup transformers. By making Action Statement 3.8.1.1.f part of LCO 3.8.1.1.a, the licensee proposed to delete Action Statement 3.8.1.1.f. The proposed footnote to LCO 3.8.1.1.a is essentially what is required in Action Statement 3.8.1.1.f, therefore, Action Statement 3.8.1.1.f would be deleted. One startup transformer for

Unit 1, if not required for use in Unit 1, is physically capable of completing the connection between the offsite transmission network and the onsite Class 1E distribution system for Unit 2 and supplying the required loads. There is no need to declare one of the independent circuits inoperable when one of the Unit 2 startup transformers is inoperable. The staff believes that the use of a Unit 1 startup transformer for use on Unit 2 is an exception and is more appropriately located as an action statement, instead of making this a part of the LCO. This was discussed with the licensee and it was agreed to keep this exception as Action Statement 3.8.1.1.f. No other changes are associated with LCO 3.8.1.1.a and b, or the applicable modes.

The licensee proposed to change Action Statements a. through e. to reflect the format of the action statements in Generic Letter 84-15 and also to reflect the reduction of starts on the diesel generators, with particular focus on reducing fast, cold starts. The format of Generic Letter 84-15 divides the action statements into five categories: one offsite circuit inoperable, one diesel generator inoperable, one offsite circuit and one diesel generator inoperable, two offsite circuits inoperable, and two diesel generators inoperable. The licensee is proposing this same format sequence.

Generic Letter 84-15 also provided the basis for reduced diesel operator testing because it was determined that fast, cold starts result in undue wear and stress on the diesel engines. Generic Letter 84-15 also took into account the use of manufacturer-recommended preparatory actions, such as prelubrication of all moving parts and warmup procedures, which are necessary to reduce engine wear, extend life, and improve availability. This position should not be construed to conclude that fast, cold starts should be completely eliminated, because the design basis for the plant, i.e., large LOCA coincident with loss of offsite power, requires such a capability. Thus, the frequency of fast, cold starts from ambient conditions should be reduced, not eliminated. The staff proposed a fast, cold start from ambient conditions at least once per 184 days and all other starts may be preceded by an engine prelubrication period and/or warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized. The licensee's proposed changes, as discussed in more detail below, reflect this guidance.

Proposed Action Statement 3.8.1.1.a will address the case in which one offsite circuit is inoperable and Action Statement 3.8.1.1.b will address the case in which one diesel generator is inoperable. Present Action Statement 3.8.1.1.a addresses both of these cases and this statement would be deleted as part of this change. Proposed Action Statement 3.8.1.1.a will retain the same surveillance requirement for the offsite circuit and will also retain the requirement to return the inoperable offsite circuit to operable status within 72 hours. The plant shutdown requirement will also remain if the inoperable circuit cannot be made operable within 72 hours. In particular, the proposed change would reduce the frequency of diesel engine starts and diesel engine fast, cold starts. The current frequency is to test the diesel generator within 1 hour and at least once per 8 hours thereafter, using the fast, cold start approach. The licensee proposed to test each diesel within 24 hours if each diesel generator was not successfully tested within the past 24 hours. The provision for reducing the fast, cold starts would also apply. The reduction of the periodic testing and type of start of the diesel generator during the period of time when an offsite circuit is not operable (up to 72 hours) is justified on the basis that the operability of both diesel generators is assured because the

diesel generators were tested during the previous 24 hours, and, if not, they will be tested to demonstrate operability within 24 hours of declaring the offsite circuit inoperable. In addition, one offsite circuit would be operable. The net effect of the change is to reduce the diesel generator testing frequency and type of start (fast, cold start) such that there is still a high degree of assurance that they would operate, if called upon, when one offsite circuit is inoperable. The reduction of diesel generator testing frequency and type of start should increase the reliability of the machines because the engines will be properly conditioned before startup and the number of starts will be decreased to reduce wear and tear. Thus, the proposed action statement change discussed above (TS 3.8.1.1.a) is acceptable.

In regard to proposed Action Statement 3.8.1.1.b, inoperability of one diesel generator, the action statement will retain the same surveillance requirement for testing the offsite circuits and will also retain the requirement to return the inoperable diesel generator to operable status within 72 hours. The plant shutdown requirement will also remain if the inoperable diesel generator cannot be brought to operable status within 72 hours. The proposed change would reduce the frequency of the operable diesel generator starts and diesel engine fast, cold starts, in particular. The current frequency is to test the diesel generator within 1 hour and at least once per 8 hours thereafter using the fast, cold start approach. The licensee proposes to test the operable diesel generator within 24 hours, even if the inoperable diesel generator is restored to operability. The provisions for reducing the fast, cold starts would also apply. The reduction of the periodic testing of the operable diesel generator during the period of time when the other diesel generator is inoperable (up to 72 hours) is justifiable on the basis that both offsite power circuits are operable while one diesel generator is inoperable, and the other diesel generator will be tested to assure operability. The net effect of the change is to reduce the operable diesel generator testing frequency and type of start such that a high degree of assurance of available AC power remains because two offsite circuits are operable and one diesel generator is operable. The reduction of the diesel generator test frequency and type of starts should increase the reliability of the machines because the engine will be properly conditioned before start and the number of starts will be decreased to reduce wear and tear. Thus, the proposed action statement change discussed above (TS 3.8.1.1.b) is acceptable. In addition, deleting current Action Statement a. is acceptable because the requirements are now contained in proposed Action Statements a. and b.

Proposed Action Statement 3.8.1.1.c will address the inoperability of one offsite circuit and one diesel generator. The present Action Statement 3.8.1.1.b covers this case and it will be deleted. The proposed action statement will retain the same surveillance requirement for testing the operable offsite circuit and will also retain the requirement to return one of the inoperable power sources to operable status within 12 hours or shut down the plant as required in the specification. It will also retain the requirement to make the other inoperable power source operable during the prescribed time. In particular, the proposed change would reduce the frequency of the operable diesel generator starts and diesel engine fast, cold starts. The specification will

be similar to new action 3.8.1.1.b, but the diesel engines will have to be started within 8 hours, instead of 24 hours. The new 8-hour start requirement is commensurate with two power sources being inoperable per this specification. For this reason the staff finds this change acceptable.

Present statement 3.8.1.1.c requires additional action when a diesel generator is inoperable. All required systems, subsystems, trains, components, and devices that depend on the remaining operable diesel operator as a source of emergency power must also be operable; the steam-driven auxiliary feedwater pump must also be operable. Plant shutdown requirements are specified if these added conditions are not met. The licensee proposes to make this action statement part of new Action Statements b. and c., and delete present Action Statement c. This change is administrative in nature and is acceptable.

Proposed Action Statement d. will replace present Action Statement d. This statement deals with the case of two inoperable offsite circuits. It retains the requirement to bring both offsite circuits back to operability status or shut down the plant. The proposed change is similar to the proposed change in Action Statement b. above. Instead of testing the diesel engines within 1 hour and then once per 8 hours thereafter, the licensee proposes testing both diesels within 8 hours. The proposed change is essentially what was recommended in Generic Letter 84-15, and is acceptable.

Proposed Action Statement e. will replace present Action Statement e. This statement deals with the case of two inoperable diesel generators. It retains the requirement to test the offsite circuits and to restart one inoperable diesel within 2 hours or shut down the plant. Instead of specifying the time required to make the second diesel generator operable, it specifies use of proposed Action Statement b., which is essentially the same requirement. The proposed change is essentially what was recommended in Generic Letter 84-15, and is acceptable.

#### Evaluation-Surveillance Requirements Other Than Fuel Oil

The licensee proposed a number of changes to the diesel generator surveillance requirements. The objective of the changes is to reduce the number of fast, cold starts. Engine preconditioning is proposed to be allowed. The diesel generators must be tested for operability on a monthly basis at least, even if the LCO's (two offsite circuits and two diesel generators operable) are met. As failures occur, an accelerated testing frequency is currently required. This can lead to testing the engines at least once per 3 days. The licensee is also proposing to reduce the accelerated testing frequency.

The licensee proposed changing the diesel generator test schedule specified in Table 4.8-1 (TS 4.8.1.1.2a). The present test schedule specifies four testing frequencies (31 days, 14 days, 7 days, and 3 days) based upon the number of failed diesel generator starts over the last 100 attempts. The licensee proposed the same test schedule as contained in Table 4.8-1 of Generic Letter 84-15. However, the licensee did not propose Generic Letter 84-15 Table 4.8.2, which calls for additional reliability actions based upon the number of failures in the last 20 and 100 valid tests.

Specifically, the licensee proposed a test frequency of once per 31 days for less than or equal to one failure in the last 20 valid tests and a test frequency of at least once per 7 days for two or more failures in the last 20 valid tests. This is acceptable since it is consistent with the staff guidance of Generic Letter 84-15.

The staff is concerned that the licensee did not propose any test schedule based upon the last 100 starts in order to assure long-term diesel generator reliability. This was discussed with the licensee. In order to address long-term reliability, the staff and licensee agreed to modify proposed Table 4.8-1 to also include a minimum of 7 day testing if the number of failures in the last 100 valid tests exceeds five. Thus, proposed Table 4.8-1, as modified, is acceptable.

The licensee proposed changing the diesel start requirement (TS 4.8.1.1.2.a.4) in two ways. The licensee proposed to accelerate the engines to approximately 900 rpm versus at least 900 rpm. The licensee stated that this change is necessary in order to be consistent with another part of the specification, a generator frequency of  $60 \pm 1.2$  hertz. This is acceptable on the basis that the design speed will be maintained and the chance of overspeed with subsequent trip is lowered. A footnote will be placed on this surveillance requirement, which will, in effect, reduce the number of fast, cold starts and permit engine preconditioning. The staff amended the warmup part of the footnote to make it clearer that warmup is allowed in order to minimize stress and wear on the diesel generator. This was discussed with and agreed to by the licensee. The footnote is consistent with the staff guidance of Generic Letter 84-15, and is acceptable.

The licensee proposed changing the generator loading and load run requirements TS (4.8.1.1.2.a.5). The licensee proposed to load the generator to 3685 kw but delete the 60-second requirement. In addition, once the generator is operating for this 60-minute test run, a load band of 3450 kw to 3685 kw would be specified, instead of the present requirement of maintaining a load of greater than or equal to 3685 kw. A footnote will be added to specify that the timing for the test shall start with the closing of the breaker and loading will be consistent with manufacturer's recommendations. The staff clarified the footnote so that the generator would be loaded within 60 seconds at least once every 184 days. This was discussed with and agreed to by the licensee. The licensee's proposed specification is similar to the wording that was approved in the North Anna TS. The open-ended language "greater than or equal to" has the potential for routine overloading of the generators when operated for appreciable periods of time. Specifying an upper limit when the generator will be continuously run for more than a few minutes would eliminate this potential. The proposed load band for the diesel generators is a plant-specific value and is reasonable (roughly 200 kw) for this engine size. Although the lower end of the loading band (3450 kw) is slightly less than the peak accident load (3506 kw), the peak accident load occurs over a short period of time and this difference should be inconsequential. Based upon the above discussion, the licensee's proposed surveillance requirement for the generator loading and load run is acceptable.

The licensee proposed to relocate the automatic load sequence timers surveillance requirement and change the test frequency from 12 months to 18 months. The present requirements are contained in TS 4.8.1.1.2.d. The automatic load sequence timers surveillance requirement will be renumbered as 4.8.1.1.2e.12 and placed under the 18-month test requirement. This part of the change is

administrative in nature, and is acceptable. The licensee's basis for the test frequency change is that the electropneumatic timing relays were replaced with Agastat DSC solid state devices, which are more accurate and reliable. The old relays required a 12-month test, whereas the new relays only require an 18-month test. This change is acceptable because the new timers are more accurate and reliable, and their need for testing is reduced. Since TS 4.8.1.1.2d will be addressed elsewhere in the TS, namely, new section 4.8.1.1.2e.12, its deletion is acceptable.

The licensee proposed adding a footnote to the various 18-month tests: loss of offsite power test, ESF actuation test signal test, and loss of offsite power test in conjunction with ESF actuation test signal test. These TS are 4.8.1.1.2e.4.b, 4.8.1.1.2e.5, and 4.8.1.1.2e.6.b. A footnote would also be added to the 10-year or post-modification test of TS 4.8.1.1.2.f. The footnote would state that the test may be conducted in accordance with the manufacturer's recommendation concerning engine prelubrication period and/or other warmup procedures. This is consistent with the intent of Generic Letter 84-15 and will reduce the number of fast, cold starts. However, the staff is concerned that none of these tests are required to be performed from ambient conditions, because for every test, prelubrication and warmup procedures could be used. This was discussed with the licensee and the licensee agreed to modify the footnote by deleting the warmup provision. The licensee also pointed out that TS 4.8.1.1.2a.4 also requires a diesel start from ambient conditions at least once per 184 days. Thus, the staff's concern is resolved. The proposed footnote, as amended, is acceptable.

The licensee proposed to change the 18-month test which requires operating the diesel generator for 24 hours (TS 4.8.1.1.2e.7). A load band of 3800 kw to 3985 kw instead of a minimum load of 3985 kw is proposed for the first 2 hours, and a load band of 3450 kw to 3685 kw, instead of 3685 kw, is proposed for the last 22 hours. A footnote will also be added to specify that the band is meant as guidance to avoid routine overloading of the engines. The licensee's proposed specification is similar to the wording that was approved in the North Anna TS. The licensee does not wish to overload the generator and the open-ended language "greater than or equal to" could lead to this. The proposed loading bands are plant-specific values and are reasonable (roughly 200 kw) for this engine size. The staff noted that the licensee did not request a footnote allowing engine prelubrication. This was discussed with the licensee and it was agreed that the same footnote discussed above (prelubrication footnote associated with 18-month test) would also be applicable in this case. Therefore, the licensee's proposed surveillance requirement changes are acceptable.

The licensee proposed to change the 2000-hour rating auto-connect load from 3985 kw to 3935 kw (TS 4.8.1.1.2.f). The licensee reviewed the vendor's technical manual and determined that the present value in the TS is incorrect. Since the licensee proposes the correct value in accordance with the vendor's technical manual, the change is acceptable.

The licensee proposed to make an editorial change to TS 4.8.1.2 (AC Sources - Shutdown - Surveillance Requirement). Presently, a diesel generator failure is required to be submitted under Surveillance Requirement 4.8.1.2. The licensee proposed to make this reporting requirement TS 4.8.1.2.2, using the same words as TS 4.8.1.1.3. Present TS 4.8.1.2 would also become TS 4.8.1.2.1. This editorial change is acceptable.

### Evaluation - Surveillance Requirements for Fuel Oil

The licensee proposed to delete existing TS Surveillance Requirements 4.8.1.1.2b and c, and substitute new Surveillance Requirements 4.8.1.1.2b, c and d. The licensee's proposal is identical, with one minor exception, to the diesel fuel oil surveillance program approved by the staff for McGuire Nuclear Station, Units 1 and 2. The exception is that the licensee has specified that testing in accordance with ASTM D-2276-78, Method A, or Annex A-2 would also be allowed. The end result of testing in accordance with Method A or Annex A-2 is identical, and the staff considers these two test procedures to be interchangeable. The licensee's exception is therefore acceptable.

With the above clarification, the licensee's proposal is identical to the McGuire program. In the Safety Evaluation Report (SER) for the McGuire fuel oil surveillance program, the staff concluded that the proposed program would "result in a more conservative approach to fuel oil surveillance" and, because of the added conservatism, "should increase diesel generator availability." Based on the above, the staff further concluded that the McGuire program was acceptable. Since the licensee's proposal for St. Lucie 2 is identical to the McGuire Program, the staff concludes that it is also acceptable. This fuel oil surveillance program is independent of plant-specific design and is generically applicable. A copy of the McGuire SER is attached for reference. (Note: For the purpose of this TS surveillance, the terms "day tank" and "engine-mounted fuel tank" are interchangeable).

For purposes of clarity, the staff has modified the licensee's proposed TS to reflect the current version of ASTM D-2276, i.e., the 1983 revision rather than the 1978 revision. The testing requirements of both versions are identical. Therefore, the licensee has agreed to use the 1983 version of ASTM D-2276.

### ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or a change to a surveillance requirement. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR §51.22 (c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

### CONCLUSION

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will

be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: February 7, 1989

Principal Contributors:

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E. Tourigny

Attachment

McGuire SER

SAFETY EVALUATION REPORT  
SURVEILLANCE REQUIREMENTS

FOR

DIESEL FUEL OIL

AT

MCGUIRE NUCLEAR STATION UNITS 1 & 2

DOCKET NO'S 50-369 AND 50-370

(TACS 53255 & 53256)

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PDR ADCK 05000389  
P PNU

By letter dated November 18, 1983, Duke Power Company proposed changes to the surveillance requirements for diesel fuel oil in Technical Specification 4.8.1.1.2 for McGuire Nuclear Station Units 1 and 2.

In general, the proposed changes involve replacing fuel oil tests presently required by the Technical Specifications with different tests which the licensee states are (1) more effective in detecting unsatisfactory fuel oil, (2) the tests can be performed onsite, and (3) they are simpler and less expensive to perform. Attachments 1 and 2 to this report are copies of the applicable Technical Specifications in present form and revised form, respectively. The following is the staff's evaluation of the proposed Technical Specification changes.

The most significant change is the deletion of requirements for testing stored fuel oil in accordance with ASTM D2274-70 every 92 days. In lieu of the test, the licensee proposes to test stored fuel oil for particulate concentrations every 31 days in accordance with ASTM D2276-78. The rationale for this change is that the proposed test address the actual condition of the fuel oil that will be pumped to the diesel generators in terms of particulate (solid) matter which could impair diesel generator operation or result in diesel generator unavailability. The current surveillance requirements (ASTM D2274-70) are oriented to predicting the tendency of fuel oil to oxidize and form particulates during long term storage, but do not address particulates that may already exist. In addition, ASTM D2274-70 test results may not

accurately correlate with actual fuel condition because test results tend to vary depending on factors such as storage conditions. Also, the proposed ASTM D2276-78 tests would be performed every 31 days as opposed to every 92 days for ASTM D2274-70. The more frequent testing for actual particulates in the stored fuel oil would provide better data on fuel condition at the time of test as well as the tendency for formation of particulates under site storage conditions. The proposed tests would, therefore, be more conservative in establishing adequacy of stored fuel than the present requirements. In its review of the licensee's justification, the staff discussed the comparability of ASTM D2274-70 and ASTM D2276-78 with the applicant and his consultant, with representatives of the U.S. Naval Research Laboratory and the U.S. Navy Petroleum Office. Based on the discussions, the staff agrees with the licensee that the proposal for testing per ASTM D2276-78 every 31 days in lieu of ASTM D2274-70 every 92 day is more conservative and is, therefore, acceptable.

Other proposed changes include (a) replacing the Water and Sediment test by centrifuge on new fuel per ASTM D1796 with the Clear and Bright test per ASTM D4176-82, (b) use of optional methods of verifying fuel gravity by testing and comparing with the supplier's certification, (c) allow sulfur analysis to be performed in accordance with ASTM D1552 or ASTM D2262, and (d) extend the time limit for obtaining ASTM D975 test results on new fuel from 14 days to 31 days. The staff has reviewed the Clear and Bright test (ASTM 4176-82), including a demonstration of the test principles at the Naval Fuel Laboratory, Norfolk, Virginia. Based on our review and the demonstration, the staff concurs with the licensee

and concludes that the Clear and Bright test is more sensitive in determining the presence of water and sediment in fuel oil than the Water and Sediment test by centrifuge (ASTM D1796), and the proposed change is, therefore, acceptable.

The use of optional methods of verify new fuel gravity prior to storing by testing and comparing with the suppliers certification is proposed by the licensee as a means of simplifying new fuel acceptance procedures. The justification for this change is that any contamination of fuel oil during transportation would be indicated by changes in flash point, gravity or viscosity, or appearance. Incorrect flash point will be detected by testing as discussed later in this report. Any contamination which will alter the fuel oil appearance will be detected by the Clear and Bright test discussed previously in this report. With tests for flash point and appearance as additional indicators, a verification of fuel oil gravity by testing and comparing to the supplier's certification will provide the necessary assurance that the new fuel is within specification limits. The staff concurs with the licensee's proposal and concludes that the verification of fuel oil gravity by optional methods is acceptable.

ASTM D975 requirements are such that testing new fuel oil for sulfur content may only be performed in accordance with ASTM D129. Federal diesel specification VV-F-800C and ASTM D396, Specification for Fuel Oil, however, allow the use of ASTM D1552 and ASTM D2262 tests for sulfur determination in No. 2 grade fuel oil. The staff recognizes both of the above fuel oil specifications and believes that obtaining test

results by their use will be equivalent to results obtained by use of ASTM D126 and, therefore, concludes that the proposed alternate methods of determining sulfur are acceptable.

At present, the Technical Specifications require new fuel oil to be testing for conformance to the limits of the respective fuel oil properties listed in Table 1 of ASTM D975, and the test results be available within 14 days following fuel oil delivery. Under the licensee's proposed surveillance program, the fuel oil properties which, if not in conformance with requirements, would have the most detrimental and immediate impact on diesel generator operation (flash point, viscosity or gravity, water and sediment) are checked for conformance to ASTM D975 limits immediately prior to accepting the new fuel. The remaining fuel oil properties are those which might impact diesel generator performance only on a long term basis. Therefore, the licensee's proposal to extend the time for obtaining test results for the remaining fuel oil properties from 14 days to 31 days would not adversely effect diesel generator reliability. The staff concurs with the licensee and concludes that this time extension is acceptable.

The proposed changes to the Technical Specifications include deleting the requirement for testing of fuel oil in accordance with ASTM D975 requirements on a 92 day basis. The licensee's rationale for this deletion is that the fuel oil properties which can effect diesel generator performance (flash point, cetane number, viscosity, cloud point) do not change during storage. If these properties are within specification when the fuel oil is placed in storage, they will remain

within specification unless other non-specification petroleum products are added to the storage tanks. The addition of non-specification petroleum products is precluded by the licensee's proposed new fuel surveillance program as detailed above. Over prolonged period stored fuel can oxidize and form particulates which, in significant concentrations, could impair diesel generator performance. Particulate concentrations and bacteria concentrations are the only things that will change in stored fuel oil. Particulate concentrations will be monitored every 31 days as discussed previously in this report. Bacteria growth will be prevented by periodic removal of water from the storage tanks as discussed later in this report. Considering that the fuel oil properties will not change in storage, and that fuel oil conditions which could effect diesel generator operation will be closely monitored (on a 31 day basis), further testing of stored fuel in accordance with ASTM D975 every 92 days will not provide any additional data nor improve diesel generator reliability and, therefore, can be deleted. The staff concurs with the licensee's justification and concludes that the proposed deletion is acceptable.

The licensee has also proposed two additions to the fuel oil surveillance Technical Specifications. These include (a) testing new fuel for flash point before acceptance, and (b) testing for and draining water from the fuel oil storage tanks every 31 days. The flash point test provides an additional indication that new fuel oil is within specification limits, thereby reducing the possibility of adding "bad fuel" to the fuel oil already in storage. The requirement to drain accumulated water from the storage tanks every 31 days will be of

considerable value in reducing the possibility of bacteria contamination of the stored fuel, in minimizing the formation of corrosion products on the bottom of the storage tank, and preventing water from contaminating the fuel oil transfer system and the diesel generators fuel systems. Both of the above additions represent a more conservative approach to maintaining quality diesel fuel and diesel generator reliability. The staff concurs with the licensee and, therefore, concludes the above additions are acceptable.

In conclusion, the staff finds that the changes to the present surveillance requirements for diesel fuel oil in Technical Specification 4.8.1.1.2 as proposed by the licensee for McGuire Nuclear Station Units 1 and 2 will result in a more conservative approach to fuel oil surveillance. The added conservatism coupled with the simplified testing of fuel oil will provide immediate assurance in acceptance of quality fuel oil on delivery and maintenance of high quality stored fuel; this should increase diesel generator availability. Therefore, the licensee's proposed Technical Specifications changes to the diesel fuel oil surveillance requirements, as detailed in the revised copy of the technical specifications Attachment 2 to this report, are acceptable.

## ELECTRICAL POWER SYSTEM

### SURVEILLANCE REQUIREMENTS (Continued)

- 4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:
- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:
    1. Verifying the fuel level in the engine-mounted fuel tank,
    2. Verifying the fuel level in the fuel storage tank,
    3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the engine-mounted tank,
    4. Verifying the diesel starts from ambient condition and accelerates to at least 900 rpm in less than or equal to 10 seconds. The generator voltage and frequency shall be  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the start signal. The diesel generator shall be started for this test by using one of the following signals:
      - a) Manual.
      - b) Simulated loss-of-offsite power by itself.
      - c) Simulated loss-of-offsite power in conjunction with an ESF actuation test signal.
      - d) An ESF actuation test signal by itself.
    5. Verifying the generator is synchronized, loaded to greater than or equal to 3685 kW in less than or equal to 60 seconds, and operates with a load greater than or equal to 3685 kW for at least an additional 60 minutes, and
    6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
  - ~~b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the engine-mounted fuel tanks.~~
  - ~~c. At least once per 92 days and from new fuel prior to addition to the storage tanks, by obtaining a sample of fuel oil in accordance with ASTM-D270-1975, and by verifying that the sample meets the following minimum requirements and is tested within the specified time limits:
    1. As soon as sample is taken or prior to adding new fuel to the storage tank verify in accordance with the test specified in ASTM-D975-77 that the sample has:~~

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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b. By removing accumulated water:

- 1) From the <sup>engine-mounted</sup> ~~day~~ <sup>fuel</sup> tank at least once per 31 days and after each occasion when the diesel is operated for greater than 1 hour, and
- 2) From the storage tank at least once per 31 days.

c. By sampling new fuel oil in accordance with ASTM D4057-81 prior to addition to the storage tanks and:

- 1) By verifying in accordance with the tests specified in ASTM D975-81 prior to addition to the storage tanks that the sample has:
  - a) An API Gravity of within 0.3 degrees at 60°F or a specific gravity of within 0.0016 at 60/60°F, when compared to the supplier's certificate or an absolute specific gravity at 60/60°F of greater than or equal to 0.83 but less than or equal to 0.89 or an API gravity at 60°F of greater than or equal to 27 degrees but less than or equal to 39 degrees.
  - b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes, if gravity was not determined by comparison with the supplier's certification,
  - c) A flash point equal to or greater than 125°F, and
  - d) A clear and bright appearance with proper color when tested in accordance with ASTM D4176-82.
- 2) By verifying within 31 days of obtaining the sample that the other properties specified in Table 1 of ASTM D975-81 are met when tested in accordance with ASTM D975-81 except that the analysis

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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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for sulfur may be performed in accordance with ASTM D1552-79  
or ASTM D2622-82.

- d. At least once every 31 days by obtaining a sample of fuel oil from  
the storage tanks in accordance with ASTM D2276-78, and verifying that  
total particulate contamination is less than 10 mg/liter when checked  
in accordance with ASTM D2276-80, Method A, ~~Annex A2~~  
-83 *or Annex A2*

*St. Louis - Unit 2*

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

- ~~a) A water and sediment content of less or equal to 0.05 volume percent.~~
  - ~~b) A kinematic viscosity @ 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes.~~
  - ~~c) A specific gravity as specified by the manufacturer @ 60/60°F of greater than or equal to 0.8 but less than or equal to 0.99 or an API gravity @ 60°F of greater than or equal to 11 degrees but less than or equal to 47 degrees.~~
2. Within 1 week after obtaining the sample, verify an impurity level of less than 2 mg of insolubles per 100 ml when tested in accordance with ASTM-D2274-70.
  3. Within 2 weeks of obtaining the sample verify that the other properties specified in Table 1 of ASTM-D975-77 and Regulatory Guide 1.137 Position 2.a are met when tested in accordance with ASTM-D975-77.

e ✕ At least once per 12 months by verifying that the automatic load sequence timers are OPERABLE with the interval between each load block within  $\pm 1$  second of its design interval.

- f ✕ At least once per 18 months during shutdown by:
1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
  2. Verifying the generator capability to reject a load of greater than or equal to 453 kW while maintaining voltage at  $4160 \pm 420$  volts and frequency at  $60 \pm 1.2$  Hz.
  3. Verifying the generator capability to reject a load of 3685 kW without tripping. The generator voltage shall not exceed 4784 volts during and following the load rejection.
  4. Simulating a loss-of-offsite power by itself, and:
    - a)- Verifying deenergization of the emergency busses and load shedding from the emergency busses.
    - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz during this test.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

8. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000-hour rating of 3985 kW.
9. Verifying the diesel generator's capability to:
  - a) Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power.
  - b) Transfer its loads to the offsite power source, and
  - c) Be restored to its standby status.
10. Verifying that with the diesel generator operating in a test mode (connected to its bus), a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizes the emergency loads with offsite power.
11. Verifying that the fuel transfer pump transfers fuel from each fuel storage tank to the engine-mounted tanks of each diesel via the installed cross connection lines.

*gk* At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to at least 900 rpm in less than or equal to 10 seconds.

*h* At least once per 10 years by:

1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution, and
2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110% of the system design pressure.

DATED: February 7, 1989

AMENDMENT NO. 39 TO FACILITY OPERATING LICENSE NO. NPF-16 - ST. LUCIE, UNIT 2

**Docket File**

NRC & Local PDRs  
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H. Berkow  
D. Miller  
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Wanda Jones, P-130A  
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cc: Plant Service list

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