Template - NRR-058

March 15, 2000

Mr. H. B. Barron
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Duke Energy Corporation
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SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 RE: ISSUANCE OF AMENDMENTS (TAC NOS. MA7004 AND MA7005)

Dear Mr. Barron:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 192 to Facility Operating License NPF-9 and Amendment No. 173 to Facility Operating License NPF-17 for the McGuire Nuclear Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated November 3, 1999, as supplemented by letters dated January 14 and February 17, 2000.

The amendments revise Surveillance Requirements (SR) 3.8.1.9, 3.8.1.10, and SR 3.8.1.14, and associated TS Bases for emergency diesel generators at McGuire Nuclear Station. The proposed TS amendment would (1) delete the ≤0.9 power factor requirement in SRs 3.8.1.9 and 3.8.1.14, and (2) allow performance of SR 3.8.1.9, SR 3.8.1.10 and SR 3.8.1.14 at any operational level.

A copy of the related safety evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/RA/

Frank Rinaldi, Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosures:
1. Amendment No. 192 to NPF-9
2. Amendment No. 173 to NPF-17
3. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 15, 2000

Mr. H. B. Barron
Vice President, McGuire Site
Duke Energy Corporation
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

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The amendments revise Surveillance Requirements (SR) 3.8.1.9, 3.8.1.10, and SR 3.8.1.14, and associated TS Bases for emergency diesel generators at McGuire Nuclear Station. The proposed TS amendment would (1) delete the $\leq$0.9 power factor requirement in SRs 3.8.1.9 and 3.8.1.14, and (2) allow performance of SR 3.8.1.9, SR 3.8.1.10 and SR 3.8.1.14 at any operational level.

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Sincerely,

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Frank Rinaldi, Project Manager, Section 1
Project Directorate II
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Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosures:
1. Amendment No. 192 to NPF-9
2. Amendment No. 173 to NPF-17
3. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DUKE ENERGY CORPORATION

DOCKET NO. 50-369

MCGUIRE NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 192
License No. NPF-9

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the McGuire Nuclear Station, Unit 1 (the facility) Facility Operating License No. NPF-9 filed by the Duke Energy Corporation (licensee), dated November 3, 1999, as supplemented by letters dated January 14 and February 17, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 set forth in 10 CFR Chapter I;

   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.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-9 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 192, which are attached hereto, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard L. Emch, Jr.

Richard L. Emch, Jr., Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: March 15, 2000

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DUKE ENERGY CORPORATION

DOCKET NO. 50-370

MCGUIRE NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 173
License No. NPF-17

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the McGuire Nuclear Station, Unit 2 (the facility) Facility Operating License No. NPF-17 filed by the Duke Energy Corporation (licensee), dated November 3, 1999, as supplemented by letters dated January 14 and February 17, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as 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 set forth in 10 CFR Chapter I;

   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.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-52 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 173 , which are attached hereto, are hereby incorporated into this license. Duke Energy Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard L. Emch, Jr.

Richard L. Emch, Jr., Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: March 15, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 192

FACILITY OPERATING LICENSE NO. NPF-9

DOCKET NO. 50-369

AND

LICENSE AMENDMENT NO. 173

FACILITY OPERATING LICENSE NO. NPF-17

DOCKET NO. 50-370

Replace the following pages of the Appendix A Technical Specifications and associated Bases with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3.8.1-8	3.8.1-8
3.8.1-11	3.8.1-11
B3.8.1-17	B3.8.1-17
B3.8.1-18	B3.8.1-18
B3.8.1-19	B3.8.1-19
B3.8.1-20	B3.8.1-20
B3.8.1-21	B3.8.1-21
B3.8.1-22	B3.8.1-22
B3.8.1-23	B3.8.1-23
B3.8.1-24	B3.8.1-24
B3.8.1-25	B3.8.1-25
B3.8.1-26	-----

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.9	Verify each DG, when connected to its bus in parallel with offsite power and operating with maximum kVAR loading that offsite power conditions permit, rejects a load greater than or equal to its associated single largest post-accident load, and: a. Following load rejection, the frequency is ≤ 63 Hz; b. Within 3 seconds following load rejection, the voltage is ≥ 3740 V and ≤ 4580 V; and c. Within 3 seconds following load rejection, the frequency is ≥ 58.8 Hz and ≤ 61.2 Hz.	18 months
SR 3.8.1.10	Verify each DG does not trip and voltage is maintained ≤ 4784 V during and following a load rejection of ≥ 3600 kW and ≤ 4000 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.13	Verify each DG's automatic trips are bypassed on actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal except: a. Engine overspeed; b. Generator differential current; c. Low lube oil pressure; and d. Generator voltage - controlled overcurrent.	18 months
SR 3.8.1.14	----------NOTES---------- 1. Momentary transients outside the load range do not invalidate this test. 2. DG loadings may include gradual loading as recommended by the manufacturer. ---------- Verify each DG, when connected to its bus in parallel with offsite power and operating with maximum kVAR loading that offsite power conditions permit, operates for ≥ 24 hours: a. For ≥ 2 hours loaded ≥ 4200 kW and ≤ 4400 kW; and b. For the remaining hours of the test loaded ≥ 3600 kW and ≤ 4000 kW.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The 18 month Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency.

Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. For this unit, the single load for each DG and its kilowatt rating is as follows: Nuclear Service Water Pump which is a 576 kW motor. This Surveillance may be accomplished by:

a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or

b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by Regulatory Guide 1.9 (Ref. 3), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

BASES
SURVEILLANCE REQUIREMENTS (continued)

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3) Table 1.

This Surveillance is performed with the DG connected to its bus in parallel with offsite power supply. The DG is tested under maximum kVAR loading, which is defined as being as close to design basis conditions as practical subject to offsite power conditions. Design basis conditions have been calculated to be greater than 0.9 power factor. During DG testing, equipment ratings are not to be exceeded (i.e., without creating an overvoltage condition on the DG or 4 kV emergency buses, over-excitation in the generator, or overloading the DG emergency feeder while maintaining the power factor greater than or equal to 0.9).

This Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

Although not representative of the design basis inductive loading that the DG would experience, a power factor of approximately unity (1.0) is used for testing. This power factor is chosen in accordance with manufacturer's recommendations to minimize DG overvoltage during testing.

The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.9 (Ref. 3) and is intended to be consistent with expected fuel cycle lengths.

This Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

SR 3.8.1.11

As required by Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.4, this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG autostart time of 11 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of the emergency bus and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or residual heat removal (RHR) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG systems to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3) Table 1, takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SURVEILLANCE REQUIREMENTS (continued)

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.12

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time (11 seconds) from the design basis actuation signal (LOCA signal) and operates for $\geq$ 5 minutes. The 5 minute period provides sufficient time to demonstrate stability. SR 3.8.1.12.d ensures that the emergency bus remains energized from the offsite electrical power system on an ESF signal without loss of offsite power.

The Frequency of 18 months is consistent with Regulatory Guide 1.9 (Ref. 3) Table 1 and takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint. This SR is modified by a Note. The reason for the Note is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal, and critical protective functions (engine overspeed, generator differential current, low lube oil pressure, generator voltage-controlled overcurrent) trip the DG to avert substantial damage to the DG unit. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

BASES
SURVEILLANCE REQUIREMENTS (continued)

The 18 month Frequency is consistent with Regulatory Guide 1.9 (Ref. 3) Table 1, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is not normally performed in MODE 1 or 2, but it may be performed in conjunction with periodic preplanned preventative maintenance activity that causes the DG to be inoperable. This is acceptable provided that performance of the SR does not increase the time the DG would be inoperable for the preplanned preventative maintenance activity.

SR 3.8.1.14

Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.9, requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, $\geq$ 2 hours of which is at a load equivalent from 105% to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

This Surveillance is performed with the DG connected to its bus in parallel with offsite power supply. The DG is tested under maximum kVAR loading, which is defined as being as close to design basis conditions as practical subject to offsite power conditions. Design basis conditions have been calculated to be greater than 0.9 power factor. During DG testing, equipment ratings are not to be exceeded (i.e., without creating an overvoltage condition on the DG or 4 kV emergency buses, over-excitation in the generator, or overloading the DG emergency feeder while maintaining the power factor greater than or equal to 0.9). The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3) Table 1, takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

BASES

SURVEILLANCE REQUIREMENTS (continued)

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Note 2 allows gradual loading of the DG in accordance with recommendation from the manufacturer.

This Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

SR 3.8.1.15

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 11 seconds. The 11 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3) Table 1.

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16

As required by Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.11, this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to standby operation when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in standby operation when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3) Table 1, and takes into consideration unit

BASES
SURVEILLANCE REQUIREMENTS (continued)

conditions required to perform the Surveillance. This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to standby operation if a LOCA actuation signal is received during operation in the test mode. Standby operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by Regulatory Guide 1.9 (Ref. 3), paragraph 2.2.13. The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12. The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3) Table 1, takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The load sequence time interval tolerance in Table 8-1 of Reference 2 ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Table 8-1 of Reference 2 provides a summary of the automatic loading of ESF buses.

BASES
SURVEILLANCE REQUIREMENTS (continued)

Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the

Frequency was concluded to be acceptable from a reliability standpoint. This takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SR 3.8.1.19

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of 18 months is consistent with Regulatory Guide 1.9 (Ref. 3) Table 1.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations for DGs. The reason for Note 2 is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 3) Table 1.

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs

BASES

SURVEILLANCE REQUIREMENTS (continued)

must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 3, July 1993.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. Regulatory Guide 1.93, Rev. 0, December 1974.
8. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
9. 10 CFR 50, Appendix A, GDC 18.
10. Regulatory Guide 1.137, Rev. 1, October 1979.
11. IEEE Standard 308-1971.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 192 TO FACILITY OPERATING LICENSE NPF-9

AND AMENDMENT NO. 173 TO FACILITY OPERATING LICENSE NPF-17

DUKE ENERGY CORPORATION

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letter dated November 3, 1999, as supplemented by letters dated January 14 and February 17, 2000, Duke Energy Corporation (DEC, the licensee), submitted a request for changes to the McGuire Nuclear Station, Units 1 and 2, Technical Specifications (TS). The requested changes would modify the Surveillance Requirements (SR) for the emergency diesel generators (DG). Specifically, the licensee has proposed to (1) delete the $\leq$0.9 power factor requirement in SR 3.8.1.9 and SR 3.8.1.14, and (2) perform SR 3.8.1.9, SR 3.8.1.10 and SR 3.8.1.14 in any operational mode. On January 6, 2000, the staff held a telephone conference call with representatives of DEC regarding the amendment request. The licensee's letters of January 14 and February 17, 2000, provided additional clarifications in response to the staff's questions of January 6, 2000, but they did not change the scope of the previous no significant hazards consideration determination.

2.0 BACKGROUND

The onsite standby power source for each 4.16 kV Engineered Safety Features (ESF) bus at McGuire Nuclear Station, Units 1 and 2 is a dedicated DG. McGuire station has two independent and redundant 4.16 kV buses. In the event of the loss of the normal offsite power source, the safety loads are automatically connected to the DGs in sufficient time to ensure safe shutdown and mitigation of the consequences of a design basis accident.

3.0 EVALUATION

3.1 SR 3.8.1.9

SR 3.8.1.9 for McGuire Nuclear Station, Units 1 and 2, currently requires verification that each DG rejects a load greater than or equal to its associated single largest post-accident load and that the test be conducted at a power factor of $\leq$0.9, if it is conducted with the DG synchronized with offsite power. This value of power factor is indicative of the actual design basis inductive

loading that each DG would experience in an accident situation. This SR also includes a note that states that this surveillance shall not be performed in Modes 1 or 2. The basis for this SR note is to prevent unnecessary perturbation to the electrical distribution systems, which could challenge steady state operation if the reactor is in Mode 1 or 2. The licensee has proposed to perform this SR at a power factor of unity or at a lagging power factor within the DG unit capability, instead of performing it at a power factor of ≤ 0.9. The licensee has also proposed to perform this SR in any operational mode. The licensee states that performing this surveillance during power operation will result in greater flexibility to schedule other critical outage-related work and allow this surveillance to be scheduled during periods when fewer activities are occurring.

In order to perform this SR, the DG has to be synchronized and paralleled to offsite power via the respective 4.16 kV ESF bus. These buses typically operate at a much higher voltage than the nominal value of 4160 V. In order to parallel the DG to the bus, DG voltage has to be raised to a value slightly higher than bus voltage before synchronizing. If this SR is performed during an outage or during evenings, the affected bus will be lightly loaded, causing voltage to be higher. The DG and voltage-regulator are rated at a nominal value of 4160 V. In order to achieve a power factor of ≤ 0.9, when the voltage is already high on the bus, the high limit on the voltage-regulator is reached before the DG can achieve this power factor. The licensee has stated that operation at this power factor can also result in operating the DG at a voltage beyond its rated design value. The DG is rated at 4160 V and the highest allowable voltage for the DG is 4368 V, which should not be exceeded. Because of the high voltage levels observed on the bus, this SR cannot be performed without operating the DGs outside of their recommended limit. In a design basis accident, this is not a concern, because the DGs carry the loads on an isolated bus with the voltage-regulator set for a pre-position of 4160 V.

In our RAI of December 17, 1999, we informed the licensee that the proposed request to perform SR 3.8.1.9 at a unity power factor was not adequate. We recognize that offsite power conditions affect the voltage on the ESF buses. If the bus voltage during testing is already high, due to high grid voltage, increasing the DG VAR output may cause the bus voltage to exceed allowable limits. On the other hand, the testing at unity power factor will not detect incipient failures or weaknesses, due to the reactive loading in the generator and the voltage regulator components. Therefore, the testing performed under inductive load conditions that are as close as possible to design-basis conditions, subject to offsite power conditions, and without operating the DGs outside of their recommended limit, should be adequate.

DEC, in a letter dated February 17, 2000, has revised SR 3.8.1.9 to clarify that the test will be performed under the maximum kVAR loading that offsite power conditions permit. The related Bases (Section 3.8.1.9) has also been revised to define maximum loading as being as close to design basis conditions as practical, subject to offsite power conditions. Based on the above, the staff concludes that the revised SR 3.8.1.9 and the associated Bases satisfy the staff's concern, and that the proposed changes are acceptable to the staff.

With regard to performing this surveillance during power operation, the staff expressed concern that rejecting the single largest load during power operation could create a perturbation on the electrical distribution system, which could impact the operation of the normally connected loads. The staff asked the licensee if DEC had analyzed the effects of this testing on the electrical

distribution system's voltages, and if this surveillance is allowed to be conducted during power operation. As discussed in Section 3.3 of this safety evaluation, the licensee stated that DEC has evaluated the response of the emergency busses during performance of the full load rejection tests, following maintenance activities involving work on the DG governor and/or voltage-regulator. The test results indicated that voltage changes caused by the full load rejection test were not significant. Also, the licensee indicated that no perturbations were observed during any of the tests and that the voltage and frequency response were as expected.

Based on the results of the full load rejection test, the staff concludes that, since the full load rejection test does not cause any perturbation to the electrical distribution system during power operation, the largest single load rejection test will also not create any perturbation on the safety buses, if conducted during power operation. Therefore, the proposed change is acceptable to the staff.

3.2 SR 3.8.1.10

SR 3.8.1.10 currently requires verification that each DG does not trip and that voltage is maintained at $\leq$4784 V during and following a load rejection of $\geq$3600 kW and $\leq$4000kW. A note states that this surveillance shall not be performed in Modes 1 or 2. The basis for this SR-note is to prevent unnecessary perturbation to the electrical distribution systems, which could challenge steady- state operation if the reactor is in Mode 1 or 2. The licensee has proposed conducting this surveillance in any operational mode. DEC states that performing this surveillance during power operation will provide greater flexibility to schedule other critical outage-related work and allow the licensee to schedule this survellance during less active periods.

The staff expressed concern about performing the full load rejection test during power operation conditions, which could create a perturbation on the electrical distribution system and affect the operation of the normally connected loads. The staff asked the licensee if DEC had analyzed the effects of this testing on the electrical distribution system voltages when this surveillance is conducted during power operation. The licensee stated that DEC has evaluated the response of the emergency busses during performance of the full load rejection tests, following maintenance activities that required work on the DG's governor and/or voltage-regulator. The licensee stated that this test has been performed nine times following DG governor/or voltage-regulator maintenance or replacement (one time with the unit on line and eight times with the unit off). The results of the above tests indicated that voltage changes caused by the full-load rejection test were not significant. Also, DEC stated that there were no perturbations observed during any of the tests and that the voltage and frequency response were as expected.

Based on the above discussion, the staff concludes that the licensee has adequately addressed the above concern and that DEC has provided assurance that performing the full load rejection test while at power will not cause perturbation to the electrical distribution systems that could challenge steady state operation in Mode 1 or 2. Therefore, the proposed change is acceptable to the staff.

3.3 SR 3.8.1.14

SR 3.8.1.14 currently requires verification that each DG operating at a power factor of ≤0.9 operates for ≥24 hours at specified loads. Each DG must operate for ≥2 hours loaded ≥4200 kW and ≤4400 kW, and for the remaining hours of the test loaded ≥3600 kW and ≤4000 kW. SR 3.8.1.14 includes a note that states that this surveillance shall not be performed in Modes 1 or 2. The basis for this SR-note is to prevent unnecessary perturbation to the electrical distribution systems, which could challenge steady state operation if the reactor is in Mode 1 or 2. The licensee has proposed to perform this surveillance during power operation and delete the ≤0.9 power factor requirement. DEC has stated that performing this surveillance during power operation will provide greater flexibility to schedule other critical outage-related work and in scheduling this surveillanceduring periods when fewer activities are occurring.

The staff expressed concern regarding performance of the 24-hour DG endurance test with the unit at power. When the DG is operated connected to offsite power, the emergency power system (DG) is not independent of disturbances on the offsite power systems that can adversely affect emergency power availability. In this condition, a disturbance in the non-emergency power system (offsite power system) could result in loss of offsite power and in the disabling of the emergency power source. Further, if a fault develops while the DG is connected to non-emergency buses, DG availability for subsequent emergency demands may be affected. In some design configurations, the DG would trip as a result of overcurrent or reverse power, actuate a lockout device, and require local operator actions to reset the lockout. In such cases, the DG is recoverable, but the timeliness of its availability is not comparable to that of having the DG in its normal standby.

The licensee has stated that, at the McGuire station, the design of the DG incorporates features that enable the DG to automatically switch from the test mode to the emergency mode. As such, if a DG is running in the test mode and a LOCA signal was to occur, the LOCA signal would override the test mode of the DG, the DG would be returned to standby operation, and the emergency loads would be automatically energized from the offsite power source. Thus, the performance of this surveillance, while at power, has minimal effect on the availability of the DG.
Also, the licensee has indicated that, if a loss of offsite power were to occur while in a surveillance mode, the tested DG will remain available. Specifically, if the DG is being tested and a loss of offsite power should occur, the DG will attempt to pick up the load until the DG instantaneous overcurrent-relay trips the DG breaker. In this scenario, the DG output breaker is not locked-out, the DG will continue to run in a standby mode, the load sequencer will initiate load shedding, and appropriate loads will automatically be sequenced on the safety bus. Additionally, during this test, the other train's DG will be fully operable. Further, when the DG is being tested, its support systems remain available during the 24-hour test. Even when this surveillance is conducted with the reactor critical, the capability to mitigate the consequences of any design basis accident, assuming a single failure, is retained.

The staff inquired if the licensee has in place any administrative controls to: (1) preclude performing this surveillance during unstable grid conditions, or during other maintenance and test conditions that could have adverse effects on the offsite power system; and (2) restrict additional maintenance and testing of required safety systems that depend on the remaining

diesel generator as the source of emergency power. In response, the licensee has stated that normal risk management practices would ensure that this surveillance would not be scheduled during severe weather conditions. Controls are in place to avoid high-risk situations for equipment that is being taken out of service at the same time. Also, the overall PRA analysis results for McGuire are not sensitive to whether this surveillance is performed during power operations.

Based on the above, the staff has concluded that the licensee has adequately addressed our concerns and has provided assurance that performing the 24-hour test while at power will not adversely impact the availability of DG when it is most needed. Therefore, the staff finds that the proposed change to perform this SR at power and the deletion of the associated note is acceptable. With regard to the $\leq$0.9 power factor testing requirement, the licensee has revised SR 3.8.1.14 and the associated bases to clarify that the test will be performed under the maximum kVAR loading that offsite power conditions permit. Based on the above, the staff concludes that the revised SR 3.8.1.14 satisfies the staff's concern, and that the proposed change is found acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the North Carolina State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change surveillance requirements. The NRC staff has determined that the amendments involve 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 issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (64 FR 67333). Accordingly, the amendments meet 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 amendments.

6.0 CONCLUSION

The Commission has 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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