

DUKE POWER COMPANY  
P.O. BOX 33189  
CHARLOTTE, N.C. 28242

HAL B. TUCKER  
VICE PRESIDENT  
NUCLEAR PRODUCTION

TELEPHONE  
(704) 373-4531

April 15, 1986

✓ Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attention: Mr. B.J. Youngblood, Director  
PWR Project Directorate No. 4

Subject: McGuire Nuclear Station  
Docket Nos. 50-369 and 50-370  
Diesel Generator Reliability, Testing, and Surveillance;  
Supplemental Response

Dear Mr. Denton:

By letter of July 10, 1985 (Attachment I), Duke Power Company submitted proposed changes to the Technical Specifications for its McGuire Nuclear Station. By letter of December 1, 1985, the NRC Staff requested additional information relative to the determination that the changes would not involve a Significant Hazards Consideration, as defined in 10 CFR 50.91. Attachment II itemizes the changes and provides the basis for the NSHC determination. Note that as a result of discussions with the NRC staff in the intervening period of time, two items have been slightly revised with respect to the July 10 submittal. First, references to the description of the Additional Reliability Program (Table 4.8-2) have been deleted. This program may be subject to revision, as necessary, to reflect increased experience and data base with respect to the diesels. The ARP is essentially a maintenance function that need not be controlled by Tech Specs.

Second, Surveillance requirement 4.8.1.1.2.e.7) has been rewritten to require a restart and load-energizing test within 5 minutes, rather than while within an operating temperature band. Thus, the test is virtually identical to the existing requirements, except that the test need not be performed following the 24-hour run.

The above changes, and the concomitant changes to the Technical Justification, are included in Attachment I.

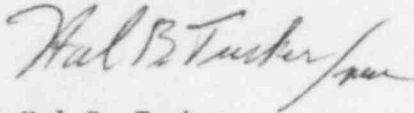
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Harold R. Denton  
April 15, 1986  
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This letter supplements a previous License Amendment request; therefore, no additional fees are required.

Very truly yours,



Hal B. Tucker

SAG/jgm

Attachment

xc: Dr. J. Nelson Grace, Regional Administrator  
U.S. Nuclear Regulatory Commission - Region II  
101 Marietta Street, Suite 2900  
Atlanta, Georgia 30323

Mr. W.T. Orders  
Senior Resident Inspector  
McGuire Nuclear Station

Mr. Dayne Brown, Chief  
Radiation Protection Branch  
Division of Facility Services  
Department of Human Resources  
P.O. Box 12200  
Raleigh, NC 27605

Harold R. Denton  
April 15, 1986  
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bxc: N.A. Rutherford  
R.L. Gill  
R.O. Sharpe  
J.B. Day  
G.W. Hallman  
T.A. Ledford  
Joe Lukowski  
T.L. McConnell  
E.O. McCraw  
MC-813.20

# ATTACHMENT I

DUKE POWER COMPANY  
P.O. BOX 33189  
CHARLOTTE, N.C. 28242

HAL B. TUCKER  
VICE PRESIDENT  
NUCLEAR PRODUCTION

TELEPHONE  
(704) 373-4531

July 10, 1985

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief  
Licensing Branch No. 4

Subject: McGuire Nuclear Station  
Docket Number 50-369/370  
Diesel Generator Reliability, Testing, and  
Surveillance

Dear Mr. Denton:

Attached are proposed license amendments for McGuire Nuclear Station Facility Operating Licenses NPF-9 (Unit 1) and NPF-17 (Unit 2).

The proposed changes to the Technical Specifications concern diesel generator testing and surveillance, and are presented in five areas: A change to separate the required 24-hour run of the Diesel Generator from an immediate test of the Engineered Safeguards Features; changes to Action Statements to be followed in the event of electrical power supplies being inoperable, pursuant to Generic Letter 84-15; Reduction of Required Testing, also pursuant to Generic Letter 84-15; Deletion of an Excessive Surveillance Requirement, pursuant to Generic Letter 83-30; and addition of Alternate Fuel Oil Testing Criteria.

Attachment I contains the proposed Technical Specification changes. Attachment II provides a technical Justification and Safety Analysis in support of the proposed changes. Attachment III provides an analysis conforming to the standards contained in 10CFR50.92 as required by 10CFR50.91. This analysis concludes that the proposed amendments would not have adverse safety or environmental impact.

This request involves one application for amendment to the McGuire's Technical Specifications. Accordingly, pursuant to 10CFR170.21, a check for \$150.00 is enclosed.

Please feel free to contact us if you require any additional information.

Very truly yours,

s/Hal B. Tucker  
Hal B. Tucker

SAG/mjf

Attachments

~~8547170055~~

5pp.

ATT. I

Mr. Harold R. Denton, Director  
July 10, 1985  
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cc: Dr. J. Nelson Grace, Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30323

W. T. Orders  
Senior Resident Inspector  
McGuire Nuclear Station

Mr. Dayne Brown, Chief  
Radiation Protection Branch  
Division of Facility Services  
Department of Human Resources  
P. O. Box 12200  
Raleigh, North Carolina 27605

Mr. Harold R. Denton, Director

July 10, 1985

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HAL B. TUCKER, being duly sworn, states that he is Vice President of Duke Power Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this revision to the McGuire Nuclear Station License Nos. NPF-9 and NPF-17 and that all statements and matters set forth therein are true and correct to the best of his knowledge.

s/Hal B. Tucker

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Hal B. Tucker, Vice President

Subscribed and sworn to before me this 10th day of July, 1985.

s/Sue C. Sherrill

\_\_\_\_\_  
Notary Public

My Commission Expires:

September 20, 1989

ATT, I

Mr. Harold R. Denton, Director  
July 10, 1985  
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bcc: K. S. Canady  
N. A. Rutherford  
R. L. Gill  
P. B. Nardoci  
W. H. McDowell  
J. B. Day  
R. W. Ouellette  
E. O. McCraw (MNS)  
P. M. Abraham  
M. D. McIntosh  
T. L. McConnell (MNS)  
D. H. Gabriel  
G. W. Hallman

ATT. I

ATTACHMENTS:

- I. The Proposed Changes to Technical Specifications
- II. Justification and Safety Evaluation
- III. Analysis of Significant Hazards Consideration



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 Essential Auxiliary Power System, and
- b. Two separate and independent diesel generators, each with:
  - 1) A separate day tank containing a minimum volume of 120 gallons of fuel,
  - 2) A separate Fuel Storage System containing a minimum volume of 28,000 gallons of fuel, and
  - 3) A separate fuel transfer pump.

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

ACTION:

- a. With an offsite circuit of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. sources by performing surveillance requirement 4.8.1.1.1a. within 1 hour and at least once per 8 hours thereafter; demonstrate the operability of two diesel generators by performing surveillance requirement 4.8.1.1.2.a.4 within 24 hours unless this surveillance was performed within the previous 24 hours, or unless the diesel is operating; restore at least two offsite circuits and two diesel generators to OPERABLE status within 72 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 offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable\*, demonstrate the OPERABILITY of the remaining offsite A.C. sources by performing surveillance requirement 4.8.1.1.1a. within 1 hour and at least once per 8 hours thereafter; demonstrate the operability of the remaining diesel generator by performing surveillance requirement 4.8.1.1.2a.4 within 8 hours unless this surveillance was performed within the previous 24 hours, or unless the diesel is operating; 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

\*A diesel generator shall be considered to be inoperable from the time of failure until it satisfies the requirements of Surveillance Requirement 4.8.1.1.2a.4 ELECTRIC POWER SYSTEMS.

ELECTRICAL POWER SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)ACTION: (Continued)

COLD SHUTDOWN within the following 30 hours; with the diesel generator restored to OPERABLE status, follow action statement A; with the offsite circuit restored to OPERABLE, follow action statement C.

- c. With a diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the A.C. offsite sources by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter; and unless the inoperability of the diesel was due to preplanned testing or maintenance, demonstrate the operability of the remaining diesel generator by performing Surveillance Requirement 4.8.1.1.2a.4 within 24 hours; restore diesel generators to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. ~~At the number of failures for the inoperable diesel indicated in Table 4.8-2 perform the Additional Reliability Actions prescribed in Table 4.8-2 and its attachments.~~

With one diesel generator inoperable verify in addition to ACTION a. or b. above, 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 with a steam pressure greater than 900 psig, the steam-driven auxiliary feedwater pump is OPERABLE.

If these conditions are not satisfied within 2 hours be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

- d. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by performing surveillance requirement 4.8.1.1.2a.4) within 8 hours, unless the diesel generators are already operating; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and in cold shutdown within the following, 30 hours. With only one offsite source restored, follow action statement a.
- e. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1a. within 1 hour and at least once per 8 hours thereafter; restore at least 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. With one diesel generator restored, follow action statement c.

ELECTRICAL POWER SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

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4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Essential Auxiliary Power 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 during shutdown 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:
  - 1) Verifying the fuel level in the day tank,
  - 2) Verifying the fuel level in the fuel storage tank,
  - 3) Verifying the fuel transfer pump starts and transfers fuel from the storage system to the day tank,
  - 4) Verifying the diesel starts from ambient condition and accelerates to at least 488 rpm in less than or equal to 11 seconds\*. The generator voltage and frequency shall be at least 4160 volts and 57 Hz within 11 seconds after the start signal. The diesel generator shall be started for this test by using one of the following signals:
    - a) Manual, or
    - b) Simulated loss-of-offsite power by itself, or
    - c) Simulated loss-of-offsite power in conjunction with an ESF Actuation test signal, or
    - d) An ESF Actuation test signal by itself.
  - 5) Verifying the generator is synchronized, loaded to greater than or equal to 3000 kW in less than or equal to 60 seconds, and to 4000 kW within 10 minutes and operates for at least 60 minutes, and

\*The diesel generator start (11 sec) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

ELECTRICAL POWER SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

- 6) Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. By removing accumulated water:
    - 1) From the fuel oil day 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 fuel oil 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, (alternatively, Saybolt viscosity, SUS at 100°F of greater than or equal to 32.6, but less than or equal to 40.1), 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 D2276-78, and verifying that total particulate contamination is less than 10 mg/liter when checked in accordance with ASTM D2276-78, Method A.
  - e. At least once per 18 months, during shutdown, by:

ELECTRICAL POWER SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

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- 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 576 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 4000 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, and
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 11 seconds, energizes the auto-connected blackout loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the blackout 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 tests 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 generator voltage and frequency shall be at least 4160 volts and 57 Hz within 11 seconds after the auto-start signal; the steady-state generator voltage and frequency shall be maintained within  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz 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 11 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; and

## ATTACHMENT I

ELECTRICAL POWER SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

- c) Verifying that all automatic diesel generator trips, except engine overspeed, lube oil pressure, and generator differential are automatically bypassed upon loss of voltage on the emergency bus concurrent with a safety Injection Actuation signal. Additionally, all diesel generator breaker trips, except generator time overcurrent, are verified to be automatically bypassed upon concurrent loss of voltage on the emergency bus and a Safety Injection Actuation signal.
- 7) ~~The diesel will be operated until temperature stabilization is achieved. While the diesel is within  $\pm 10^{\circ}\text{F}$  of normal operating temperature, restart and perform specification 4.8.1.1.2e.6)b).~~ <sup>OPERATING</sup> ~~5 MINUTES~~ <sup>WITHIN</sup>
- 8) Verifying the diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 4400 kw and during the remaining 22 hours of this test, the diesel generator shall be loaded to greater than or equal to 4000 kw. The generator voltage and frequency shall be at least 4160 volts and 57 Hz within 11 seconds after the start signal. The steady-state generator voltage and frequency shall be maintained within  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz during this test. -
- 9) Verifying that the auto-connected loads to each diesel generator do not exceed the 2-hour rating of 4400 kw;
- 10) Verifying the diesel generator's capability to:
- Synchronize with the offsite power source while the generator is loaded with its emergency loads upon a simulated restoration of offsite power.
  - Transfer its loads to the offsite power source, and
  - Be restored to its standby status.
- 11) 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 energizing the emergency loads with offsite power;

ELECTRICAL POWER SYSTEMSSURVEILLANCE REQUIREMENTS (Continued)

- 12) Verifying that the fuel transfer pump transfers fuel from each fuel storage tank to the day tank of each diesel via the installed cross-connection lines;
  - 13) Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within the tolerances shown in Table 4.8-~~2~~<sub>2</sub>;
  - 14) Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:
    - a) Turning gear engaged, and
    - b) Emergency stop.
  - 15) Verifying that with all diesel generator air start receivers pressurized to less than or equal to 220 psig and the compressors secured, the diesel generator starts at least 2 time from ambient conditions and accelerates to at least 488 rpm in less than or equal to 11 seconds.
- f. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting both diesel generators simultaneously, during shutdown, and verifying that both diesel generators accelerate to at least 488 rpm in less than or equal to 11 seconds; and
- 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.

4.8.1.1.4 Diesel Generator Batteries - Each diesel generator 125-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
- 1) The electrolyte level of each battery is above the plates, and

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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- 2) The overall battery voltage is greater than or equal to 125 volts under a float charge.
- b. At least once per 18 months by verifying that:
- 1) The batteries, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration;
  - 2) The battery-to-battery and terminal connections are clear, tight, free of corrosion and coated with anti-corrosion material; and
  - 3) The battery capacity is adequate to supply and maintain in OPERABLE status its emergency loads when subjected to a battery service test.



TABLE 4.8-1

DIESEL GENERATOR TEST SCHEDULE

<u>NUMBER OF FAILURES IN LAST 20 VALID TESTS*</u>	<u>TEST FREQUENCY</u>
<u>≤1</u>	At least once per 31 days
<u>≥2</u>	At least once per 7 days**

\* 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, except the last 20 tests are determined on a per Diesel Generator basis. For the purposes of this test schedule, only valid tests conducted after the OL issuance date shall be included in the computation of the "last 20 valid tests." Entry into this test schedule shall be made at the 31 day test frequency. Any successful demonstration of 4.8.1.1.2e.4a and b or 4.8.1.1.2e.6a and b whether simulated or actual will be classified as a valid successful test.

\*\* 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.

TABLE 4.8-2

ADDITIONAL RELIABILITY ACTIONS

<u>No. of failures in last 20 valid tests or 100 valid tests</u>	<u>Action</u>
3	Within 14 days prepare and maintain a report for NRC audit describing the diesel generator reliability improvement program implemented at the site. Minimum requirements for the report are indicated in Attachment 1 to this table.
5	11
	Declare the diesel generator inoperable. Perform a requalification test program to the affected diesel generator. Requalification test program requirements are indicated in Attachment 2 to this table.

THIS TABLE, AND ITS ATTACHMENTS, WILL NOT BE INCLUDED IN THE TECH SPECS.

ATTACHMENT 1 TO TABLE 4.8-2REPORTING REQUIREMENTS

As a minimum the Reliability Improvement Program report for NRC audit shall include:

- a) a summary of all tests (valid and invalid) that occurred within the time period over which the last 20/100 valid tests were performed
- b) analysis of failures and determination of root causes of failures
- c) evaluation of each of the recommendations of NUREG/CR-0660, "Enhancement of Onsite Emergency Diesel Generator Reliability in Operating Reactors," with respect to their application to the Plant
- d) identification of all actions taken or to be taken to 1) correct the root causes of failures defined in b) above and 2) achieve a general improvement of diesel generator reliability
- e) the schedule for implementation of each action from d) above
- f) an assessment of the existing reliability of electric power to engineered-safety-feature equipment,

Once a licensee has prepared and maintained an initial report detailing the diesel generator reliability improvement program at his site, as defined above, the licensee need prepare only a supplemental report within 14 days after each failure during a valid demand for so long as the affected diesel generator unit continues to violate the criteria (3/20 or 6/100) for the reliability improvement program remedial action. The supplemental report need only update the failure/demand history for the affected diesel generator unit since the last report for that diesel generator. The supplement report shall also present an analysis of the failure(s) with a root cause determination, if possible, and shall delineate any further procedural, hardware or operational changes to be incorporated into the site diesel generator improvement program and the schedule for implementation of those changes.

In addition to the above, submit a yearly data report on the diesel generator reliability if the reliability improvement program has been initiated.

ATTACHMENT 2 TO TABLE 4.8-2

DIESEL GENERATOR REQUALIFICATION PROGRAM

- (1) Perform seven consecutive successful demands without a failure within 30 days of the diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of the diesel generator being restored to operable status.
- (2) If a failure occurs during the first seven tests in the requalification test program, perform seven successful demands without an additional failure within 30 days of the diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of being restored to operable status.
- (3) If a failure occurs during the second seven tests (tests 8 through 14) of (1) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.
- (4) Following the second failure during the requalification test program, be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.
- (5) During requalification testing the diesel generator should not be tested more frequently than at 24-hour intervals.

After a diesel generator has been successfully requalified, subsequent repeated requalification tests will not be required for that diesel generator under the following conditions:

- (a) The number of failures in the last 20 valid demands is less than 5.
- (b) The number of failures in the last 100 valid demands is less than 11.
- (c) In the event that following successful requalification of a diesel generator, the number of failures is still in excess of the remedial action criteria (a and/or b above) the following exception will be allowed until the diesel generator is no longer in violation of the remedial action criteria (a and/or b above).

Requalification testing will not be required provided that after each valid demand the number of failures in the last 20 and/or 100 valid demands has not increased. Once the diesel generator is no longer in violation of the remedial action criteria above the provisions of those criteria alone will prevail.

TABLE 4.8-~~1~~<sup>2</sup>LOAD SEQUENCING TIMES

<u>LOAD GROUP NUMBER</u>	<u>SEQUENCE TIME (Seconds)</u>
Initiate Timer ( $T_0$ )	$9.7 \pm 0.3$
1 ( $T_1$ )	$T_0 + 0.9 \pm 0.1$
2 ( $T_2$ )	$T_0 + 5.6 \pm 0.4$
3 ( $T_3$ )	$T_0 + 9.4 \pm 0.6$
4 ( $T_4$ )	$T_0 + 14.1 \pm 0.9$
5 ( $T_5$ )	$T_0 + 18.4 \pm 1.2$
6 ( $T_6$ )	$T_0 + 23.1 \pm 1.4$
7 ( $T_7$ )	$T_0 + 28.3 \pm 1.7$
8 ( $T_8$ )	$T_0 + 530.0 \pm 60.0$
9 ( $T_9$ )	$T_8 + 56.0 \pm 4.0$
10 ( $T_{10}$ )	$T_8 + 112.3 \pm 7.0$

3/4.8 ELECTRICAL POWER SYSTEMSBASES3/4.8.1, 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 ACTION requirements for diesel generator testing in the event of the inoperability of other electric power sources also reflect the potential for degradation of the diesel generator due to excessive testing. This concern has developed, concurrently with increased industry experience with diesel generators, and has been acknowledged by the NRC staff in Generic Letter 84-15.

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, 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1,

ELECTRIC POWER SYSTEMSBASESA.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

August 1977, and 1.137, "Fuel-Oil Systems for Standby Diesel Generators," Revision 1, October 1979; also, Generic Letter 84-15, which modified the testing frequencies specified in Regulatory Guide 1.108.

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 onfloat 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 0.015 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 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 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 0.020 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 0.040 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.

## ATTACHMENT II

JUSTIFICATION AND SAFETY ANALYSIS

## A. SEPARATION OF 24-HOUR RUN AND ESF TEST

The current Technical Specification 4.8.1.1.2.e.8, concerning the periodic testing of the diesel generators, calls for performing a 24 hour or longer test run to be followed by a "Hot Restart" within 5 minutes of the previous test. The "Hot Restart" test is to be conducted in accordance with Specification 4.8.1.1.2.e.7)b. ~~The McGuire procedures for shutdown of the diesel generators involve load reduction to 1000 kw for 3 minutes, unloading, generator breaker trip, idling until all cylinder exhaust temperatures are less than 400°F, and finally the engine trip. It has been problematic to perform the "Hot Restart" test within 5 minutes after the diesel generator trip, it has been necessary to shutdown the diesel generator faster than recommended by the diesel generator shut down procedure to perform the "Hot Restart" test within 5 minutes of the 24 hour test run. Another potentially more severe problem with performing these tests in quick succession is their potential for causing the "critical path" complications and delays during an outage. The 24 hour test run for the diesel generators by itself can be performed even during the "on line" operation of the power plant. However, the "Hot Restart" test involving a simulated loss-of-offsite power in conjunction with the ESF actuation test-signal can only be performed during outages. It is that requirement, that both these tests be performed in quick succession, (Tech. Spec. 4.8.1.1.2.e.8) causes the difficulties mentioned above.~~

It is the intention of Duke Power Company to demonstrate that the 24 hour test run and the "Hot Restart" tests can be performed separately and independently without any adverse implications for safety or the reliability of the diesel generators.

The Principle Design Criteria for the diesel generators as described in the IEEE standard 387-1977 includes a requirement that the diesel generator be capable of a restart with an initial temperature equal to the continuous rating full load engine temperature (IEEE 387-1977, 5.1.2). In actual practice the testing is done at equilibrium temperature which is defined as within  $\pm 10^{\circ}\text{F}$  of the normal operating temperature (IEEE 387-1977, 6.3.1.(1)).

The purpose of "Hot Restart" testing is to verify that the diesel generator does not have, in anyway, impaired performance following operation at full load or equilibrium temperature. Failure to "Hot Restart" or extended delay in restarting is typically only experienced with small diesel engines which upon being tripped undergo a temperature rise transient. This temperature rise transient is experienced in small diesel engines which have engine driven forced air cooling. Large diesel generators at McGuire are water cooled and these diesel generators do not experience any significant temperature rise transients during operation or upon its termination. The McGuire diesel generators are normally maintained at "Hot Standby" conditions. The normal standby temperature of diesel lube oil and cooling water is  $\sim 155^{\circ}\text{F}$  whereas the normal operating temperature for lube oil and cooling water is  $\sim 166-173^{\circ}\text{F}$ . According to IEEE 387-1977, Section 6.3.1.1, the equilibrium engine temperature



is defined as jacket water and lube oil temperatures within  $\pm 10^{\circ}\text{F}$  of the normal operating temperatures at full load. The McGuire diesel units are maintained close to equilibrium temperatures even during standby conditions and consequently are not subject to unreliability traceable to internal temperature transients. Since the diesel generator equilibrium operating conditions are the same as the conditions following a 24 hour full load run, Duke Power Company submits that the "Hot Restart" testing may be done following a separate diesel generator run after the diesel generator has attained equilibrium temperature. It should be pointed out that starting the diesel generators from normal shutdown conditions and accepting the ESF loads would be more a demanding test.

The proposed amendments of the technical specifications would permit a separate 24 hour or more test run and a Hot Restart with full ESF load acceptance test. The proposed Hot Restart testing is to be carried out under equilibrium operating conditions for the diesel generators and these do not differ from the conditions of current Hot Restart testing, therefore there are no adverse safety implications that can be attributed to the proposed changes.

#### B. CHANGES PURSUANT TO GENERIC LETTER 84-15

The changes included under this part were initiated by the NRC staff as part of Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability." The changes are intended to minimize cold fast starts and surveillance testing. The staff has recognized that these items contribute to premature diesel degradation, and has recommended that licensees revise their Technical Specifications accordingly. Included in the generic letter were sample Tech. Spec. revisions to assist in the accomplishment of that end.

In addition, many of the changes which have been incorporated pursuant to generic letter 84-15 reflect similar changes already approved by the NRC staff for use by Virginia Electric & Power Co. (VEPCO) at North Anna Unit 2 (reference letter from Mr. L. B. Engle (NRC) to Mr. W. L. Stewart (VEPCO), April 25, 1985).

#### C. CHANGES PURSUANT TO GENERIC LETTER 83-30

This change involves the deletion of (previous) surveillance requirement 4.8.1.1.2e.6. The NRC staff has determined that this requirement is not consistent with Regulatory Guide 1.108, General Design Criterion 17, or the appropriate standard review plan.

The deleted Tech. Spec. required a test involving a simulated loss of the diesel generator with offsite power not available. The test is not contained in the Catawba Tech. Specs.

#### D. FUEL OIL TESTING

Page 3/4 8-3a, section C 1 b) of the Technical Specifications specifies "a kinematic viscosity at  $40^{\circ}\text{C}$  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." The basis of the specification

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is ASTM D975-81 . The Table 1 of ASTM D975 permits determination of viscosity by two equivalent alternate techniques, Kinematic Viscosity, cST at 40°C and Saybolt, SUS at 100°F. Inclusion of this alternate technique in the specification will provide flexibility to the stations.

## ATTACHMENT III

ANALYSIS OF SIGNIFICANT HAZARDS CONSIDERATIONS

Pursuant to requirements of 10CFR50.91, this analysis provides a determination that the proposed modifications of the Technical Specifications do not involve any significant hazards consideration, as defined by 10CFR50.92.

## A. SEPARATION OF 24-HOUR RUN AND ESF TEST

The proposed modification of the Technical Specifications would permit testing of the diesel generators for 24 hour (or more) test run and a Hot Restart with full ESF load acceptance separately and independently. Currently these tests are carried out in succession.

Separating these two required tests provides the plant operations added flexibility and prevents critical path complications during the outages. The proposed testing scheme divides the testing requirement 4.8.1.2.e.8 into two separate tests. Each test is carried out under conditions which are nearly identical to those prevailing for the current tests. The proposed testing scheme provides the same degree of assurance regarding the diesel generator readiness and reliability.

## B. CHANGES PURSUANT TO GENERIC LETTER 84-15

These changes recognize that overtesting can result in an overall reduction in safety, by causing premature degradation of the diesel generators. In addition, the changes provide for a reliability improvement program in the event that diesel generator failures become too frequent.

## C. CHANGE PURSUANT TO GENERIC LETTER 83-30

The proposed amendment of the McGuire Technical Specifications would delete the Surveillance Requirement 4.8.1.1.2e.6. In view of the rigorous testing program of the diesel generators and diesel generator redundancy this requirement has been determined to be unnecessary as well as in excess of the provisions of GDC17 by NRC.

## D. FUEL OIL TESTING

The proposed change provides for an alternative (equivalent) method of testing and will not reduce acceptance criteria.

The proposed amendments would not:

- 1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or
- 2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
- 3) Involve a significant reduction in a margin of safety.

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ATTACHMENT III (cont'd)

ANALYSIS OF SIGNIFICANT HAZARDS CONSIDERATIONS

Based upon the preceding analysis, Duke Power Company concludes that the proposed amendments do not involve a significant hazard consideration.

## ATTACHMENT II

### SUPPLEMENTAL SAFETY EVALUATION AND NO SIGNIFICANT HAZARDS ANALYSIS

The following identifies each of the changes made to Tech Spec 3/4.8.1 by paragraph and provides an analysis of possible significant hazards considerations.

#### ACTIONS

##### 1. New ACTION a

New ACTION a has been rewritten to eliminate consideration of inoperable diesel generators (D/Gs). Inoperable diesels are considered separately in new ACTION c. ACTION a also eliminates the need to start operable D/Gs every 8 hours while one off-site A.C. source is inoperable. This reduction in required D/G starts is expected to minimize degradation of the D/Gs and thus improve safety benefits associated with the diesels. This change is in keeping with the context and philosophy of Generic Letter 84-15. Due to the post-accident nature of the D/G function, there is no credible occurrence which can result from a reduction in D/G starts which will have a significant impact on the probability of any accident. No margin of safety will be significantly decreased, because the net overall effect of the change is expected to be an increased assurance that the D/Gs will start on demand, thus reducing the consequences of an accident and decreasing the probability of any effect on the health and safety of the public. ACTION a also changes (from 1 hour to 24 hours) the amount of time available, with one off-site A.C. source inoperable, to verify operability (i.e., start) of the diesels. This will provide more time to return the off-site source to operability, thus potentially eliminating a start of each of the two diesels. This is also consistent with GL-84-15, and does not present a SHC because the inoperability of an off-site source does not affect the probability that a diesel will be inoperable.

##### 2. New ACTION b

New ACTION b has also been rewritten to eliminate repetitive starts once the operability of the remaining diesel has been verified. The safety analysis and NSHC logic is the same as that for ACTION a above.

##### 3. New ACTION c

ACTION c represents the inoperable D/G part of what was previously ACTION a. The action, like that in ACTION a, consists of verifying the operability (i.e., starting) the remaining D/G one time within 24 hours. The safety analysis and NSHC logic are identical to that in ACTION a above. The new ACTION also recognizes that a D/G may be inoperable due to pre-planned testing or maintenance. In that event, the redundant D/G is not considered to be susceptible to a common-mode inoperability, and therefore is not required to be started. This does not introduce a SHC, because the planned testing and maintenance will not in any way affect the operability of the other A.C. sources. This item has been previously approved by the NRC staff for the North Anna and Perry facilities.

4. New ACTION d

ACTION d, like ACTIONS a, b, and c, reflects the intent of GL-84-15 with respect to the elimination of repetitive D/G starts. The safety analysis and NSHC logic has been discussed in the above paragraphs. The action taken with one off-site source restored references the appropriate ACTION (a) rather than repeating it. The requirements are unchanged.

5. ACTION e

ACTION e is unchanged, except that as in ACTION d the appropriate ACTION (c) is referenced when one D/G is restored to operability.

Surveillance Requirements

1. Surveillance 4.8.1.1.2C.1.b):

This surveillance is being expanded to allow an alternate, but equivalent, method of viscosity testing. The change is virtually administrative in nature; i.e., the oil itself is maintained within the same viscosity - only the measurement technique has changed. No Significant Hazards Considerations can exist, because the bottom-line product, the oil viscosity, is unchanged. The equivalent method has been approved for use at Catawba and is in use at Perry Nuclear Station.

2. Old Surveillance Requirement 4.8.1.1.2.e.6)

This surveillance has been deleted on the advice of the NRC staff in Generic Letter 83-30. According to the staff, the requirement to test for a loss of a D/G with off-site power not available is in excess of General Design Criteria (GDC 17) requirements, Regulatory Guide 1.108, and the Standard Review Plan (SRP 8.2 and 8.3.1). The change will not introduce a significant hazards consideration because: 1) The elimination of this overly conservative surveillance requirement will not adversely affect the probability that a diesel will become inoperable, nor will it significantly affect the probability that an inoperable D/G will go undetected; thus assuring that no significant increase in the consequences of any accident will occur; and 2) The inoperability of a D/G, for any credible reason, will not affect the probability of an accident. No margin of safety is affected because the change does not affect the redundancy or operability requirements of the D/Gs or other power sources. This requirement has been deleted from Standard Technical Specifications Draft Revision 5.

3. Surveillance Requirement 4.8.1.1.2.e.7

This surveillance requirement was originally part of an existing Tech Spec (4.8.1.1.2.e.8), which required that hot restart be performed within 5 minutes after a 24-hour diesel run. This change simply separates the tests, to minimize potential critical path delays in testing during outages. As a result of discussions with NRC staff subsequent to Duke's original July 10, 1985 submittal, the wording of this change has been revised somewhat, to include the 5-minute time limit on performance of the restart. NSHC are involved, because the testing requirements are virtually identical.