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March 13, 1987
LIC-87-126

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

Reference: 1. Docket No. 50-285
2. OPPD Application for Amendment of Operating License dated March 21, 1986

Gentlemen:

SUBJECT: Diesel Generator Technical Specifications

The Omaha Public Power District submitted, via Reference 2, an application to amend the Fort Calhoun Station Technical Specifications relative to testing of the emergency diesel generators. This application was intended to complete OPPD actions relative to Generic Letter 84-15. Several conference calls were held with the staff's reviewer to discuss questions. The reviewer's questions have been answered in the attached pages.

The changes have been reviewed by OPPD's Plant Review Committee and the offsite Safety Audit and Review Committee. The revised discussion elaborates on the changes made, and should facilitate your review. As OPPD understands it, this submittal is the final step in the review process, so amendment issuance can be made. OPPD respectfully requests 60 days from the date of amendment letter to allow for implementation.

Sincerely,

R. L. Andrews
Division Manager
Nuclear Production

RLA:rge

Attachment

c: LeBoeuf, Lamb, Leiby & MacRae
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Washington, DC 20036

Mr. A. C. Thadani, NRC Project Director
Mr. W. A. Paulson, NRC Project Manager (original attachment)
Mr. P. H. Harrell, NRC Senior Resident Inspector

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component cooling heat exchangers and shutdown heat exchangers. A full-capacity diesel-generator is connected to each of the two engineered safeguards 4.16-kV buses. Three engineered safeguards 480-Volt double-ended load centers are provided; of the six transformers, three are connected to each of the two 4.16-kV buses. Two load centers are operated as two-bus-section units; the third is provided with a center bus manually transferable to either associated end section. The center bus section supplies HPSI Pump SI-2C, CS Pump SI-3C and Charging Pump CH-1C any of which can thus be supplied from either 4.16-kV bus if required. Three component cooling heat exchangers have sufficient capacity (with ample reserve) to remove 420×10^6 BTU/hr following a loss-of-coolant accident.(1) The containment sprays initially take coolant from the safety injection and refueling water (SIRW) tank. Before this supply of water is exhausted (at least 24 minutes)(2) the spray system is transferred to the recirculation mode and the pumps take suction from the containment sump. One shutdown cooling heat exchanger is sufficient to satisfy the spray system requirements during the long-term containment cooling period.(3) In addition, in the unlikely event of the component cooling water supply being lost, raw water can be utilized for direct cooling of the shutdown heat exchangers and containment cooling coils.(4)

The containment spray system is redundant with the containment air recirculation, cooling and iodine removal system for the containment cooling function.(5) The spray system is sized such that two of the three spray pumps would limit the containment pressure to below the design value following a DBA without taking credit for the air coolers or the cooling capacity of the safety injection system.(6) Similarly, two cooling and filtering units or one cooling and filtering unit and both cooling units have the capability of limiting the containment pressure under the same conditions as two spray pumps.(7)

The redundant cooling equipment provided to limit the containment pressure following a DBA is divided between the independent power supply systems. The raw water and component cooling water pumps are similarly distributed on the 4.16-kV and 480 Volt buses to serve the above cooling groups. Each cooling group has a design capacity equal to that required to restrict the containment pressure to below the design value. In the event of a DBA, loss of normal power sources and failure of one diesel-generator to operate, better than one full group would be connected to the available diesel-generator, thus providing more than ample reserve. Any one unit removed from a given bus does not restrict the groups which can be connected to one diesel-generator from fulfilling their design function. The removal of two units from buses which can be connected to one diesel-generator could limit the capability of the associated cooling groups; therefore, to ensure availability of the power supply to the redundant equipment in the event of loss of normal power sources, the diesel-generator serving this redundant equipment is started to demonstrate operability. During

TABLE 3-2 (continued)

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TESTING OF ENGINEERED SAFETY FEATURES, INSTRUMENTATION AND CONTROLS

	Channel Description	Surveillance Function	Frequency	Surveillance Method
6.	(continued)	b. Calibrate	R	b. Exposure to known external radiation source.
		c. Test	M	c. Remote operated integral radiation check source used to verify instrumentation, one channel at a time, and isolation lockout relay functional check.
7.	Manual Safety Injection Initiation	a. Test	R	a. Manual initiation.
8.	Manual Containment Isolation Initiation	a. Test	R	a. Manual initiation.
		b. Check	R	b. Observe isolation valves closure.
9.	Manual Initiation Containment Spray	a. Test	R	a. Manual switch operation; pumps and valves tested separately.
10.	Automatic Load Sequencers	a. Test	Q	a. Proper operation will be verified during safety feature actuation test of Item 3(a) above.
• 11.	~~Diesel Start~~ DIESEL TESTING	~~a. Test~~ See Technical Specification 3.7	M	a. ~~Manual initiation followed by synchronizing and loading.~~

Amendment No. 54

TABLE 3-2 (continued)

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TESTING OF ENGINEERED SAFETY FEATURES, INSTRUMENTATION AND CONTROLS

	Channel Description	Surveillance Function	Frequency	Surveillance Method
~~11.~~	~~(continued)~~	~~b. Test~~	~~M~~	~~b. Diesels will be started during safety feature actuation test of 3(a) above.~~
		~~e. Test~~	~~R~~	~~e. Diesel start, load shed, synchronizing and loading will be verified during Item 3(b) above.~~
		~~d. Test~~	~~P~~	~~d. Diesel auto start initiating circuits.~~
12.	Diesel Fuel Transfer Pump	a. Test	M	a. Pump run to refill day tank.
13.	SIRW Tank Low Level Signal	a. Check	S	a. Verify level indication between independent channels.
		b. Test	M	b. A test pressure simulating the tank level is applied to each tank bubbler, one at a time.
		c. Calibrate	R	c. Known level signal applied to sensors and STLS logic verified.
14.	Safety Injection Tank Level and Pressure Instruments	a. Check	S	a. Verify that level and pressure indications are between independent high and low alarms for level and pressure.

3.0 SURVEILLANCE REQUIREMENTS

3.7 Emergency Power System Periodic Tests

Applicability

Applies to periodic testing and surveillance requirements of the emergency power system.

Objective

To verify that the emergency power system will respond promptly and properly when required.

Specifications

The following tests and surveillance shall be performed as stated:

(1) Diesel Generators

a. Each diesel engine shall be started once a month and demonstrated to be ready for loading within 10 seconds (i.e., the diesels shall be tested alternately at two week intervals, not both together). The signal initiated to start the diesel shall be varied from one test to another to verify all manual and auto start circuits. This test shall cover all local and remote controls for both normal and emergency manual conditions.(1)

b. Each diesel shall be manually started (normal start) with all protective devices operable, in preparation for loading onto the bus, once a month. With the diesel running at rated speed and voltage, the generator shall be synchronized with the 4.16 KV bus and the diesel breaker manually closed from the electrical control board. The generator shall then be loaded to nameplate rating and allowed to run for 15 minutes before being off-loaded and the diesel breaker tripped.

Replace with attached

c. Tests shall be conducted during each refueling outage to demonstrate the satisfactory overall automatic operation of each diesel system. This test shall be initiated by the simulated simultaneous loss of 4.16 KV supplies to bus 1A3 (1A4) and a simulated auto start signal. Proper operation will be verified by observation of (1) de-energization of bus 1A3 (1A4) and load shedding from bus (both 4160 V and 480 V), (2) diesel automatic start, energization of bus 1A3 (1A4), automatic sequence start of emergency load and operation for $\geq$ 5 minutes while its generator is loaded with the emergency loads. Manual control of diesel generators and breakers shall also be verified during refueling shutdowns.

d. Each diesel generator shall be given a thorough inspection at least annually following the manufacturer's recommendations for this class of standby service. The above tests will be

3.0 SURVEILLANCE REQUIREMENTS

3.7 Emergency Power System Periodic Tests (Continued)

considered satisfactory if all applicable equipment operates as designed. This will include calibration of monitoring instrumentation.

Replaced with attached

~~e. Diesel generator electric loads shall not be increased beyond the continuous rating of 2500 kw.~~

f. The fuel oil transfer pumps shall be verified to be operable each month.

(2) Station Batteries

a. Every month the voltage of each cell (to the nearest 0.01 volt), the specific gravity, and temperature of a pilot cell in each battery shall be measured and recorded.(3)(4)

b. Every three months the specific gravity of each cell, the temperature reading of every fifth cell, and the amount of water added shall be measured and recorded. During the first refueling outage and every third refueling outage thereafter the batteries shall be subjected to a rated load discharge test.

c. At monthly intervals the third battery charger, which is capable of being connected to either of the two D.C. distribution buses, shall be paralleled in turn to each D.C. bus. In each case, load shall be transferred to this reserve battery charger by switching out the normal charger. The reserve charger shall be run on load for 30 minutes on each bus and the system shall finally be returned to normal.

d. During refueling shutdowns the correct function of all D.C. emergency transfer switches shall be demonstrated by manual transfer of normal D.C. supply breakers at the 125 volt D.C. distribution panels.

(3) Emergency Lighting

The correct functioning of the emergency lighting system shall be verified at least once each year.

(4) 13.8 Kv Transmission Line

The 13.8 Kv transmission line will be energized and loaded to minimum shutdown requirements at each refueling outage following installation.

3.0 Surveillance Requirements
3.7 Emergency Power System Periodic Tests

[Replace 3.7 Specification with the following:]

SPECIFICATIONS

THE FOLLOWING TESTS AND SURVEILLANCE SHALL BE PERFORMED AS STATED:

(1) DIESEL GENERATORS

A. EACH DIESEL ENGINE SHALL BE STARTED AT LEAST ONCE PER 31 DAYS ON A STAGGERED BASIS. THE ENGINE SHALL BE RUN WITH ALL PROTECTIVE DEVICES OPERABLE. THE TEST SHALL VERIFY THAT:

i. THE DIESEL STARTS AND ACCELERATES TO RATED SPEED AND VOLTAGE IN LESS THAN OR EQUAL TO 10 SECONDS.

NORMALLY, FOR THE PURPOSE OF THIS SURVEILLANCE TESTING, THESE DIESEL GENERATOR STARTS MAY BE PRECEDED BY AN ENGINE PRELUBE PERIOD AND/OR OTHER WARM-UP PROCEDURES RECOMMENDED BY THE MANUFACTURER SO THAT MECHANICAL STRESS AND WEAR ON THE ENGINE IS MINIMIZED.

HOWEVER, AT LEAST ONCE PER 184 DAYS IN THESE SURVEILLANCE TESTS, THE 10 SECOND DIESEL GENERATOR START SHALL BE PERFORMED FROM AMBIENT CONDITIONS (COLD START).

THE SIGNAL INITIATED TO START THE DIESEL SHALL BE VARIED FROM ONE TEST TO ANOTHER TO VERIFY ALL MANUAL AND AUTO START CIRCUITS.

ii. WITH THE DIESEL RUNNING AT RATED SPEED AND VOLTAGE, THE GENERATOR SHALL BE SYNCHRONIZED WITH THE 4.16 KV BUS AND THE DIESEL BREAKER MANUALLY CLOSED FROM THE ELECTRICAL CONTROL BOARD. THE GENERATOR SHALL THEN BE LOADED TO AT LEAST THE CONTINUOUS(2) KW RATING AND RUN FOR AT LEAST 60 MINUTES BEFORE BEING OFF-LOADED AND THE DIESEL BREAKER TRIPPED.

B. THE AUTO-START INITIATING CIRCUIT FOR EACH DIESEL SHALL BE TESTED PRIOR TO EACH PLANT STARTUP IF NOT DONE DURING THE PREVIOUS WEEK.

C. TESTS SHALL BE CONDUCTED DURING EACH REFUELING OUTAGE TO DEMONSTRATE THE SATISFACTORY OVERALL AUTOMATIC OPERATION OF EACH DIESEL SYSTEM. THIS TEST SHALL BE CONDUCTED BY:

i. INITIATION OF A SIMULATED AUTO-START SIGNAL TO VERIFY THAT THE DIESEL STARTS, FOLLOWED BY,

ii. INITIATION OF A SIMULATED SIMULTANEOUS LOSS OF

4.16KV SUPPLIES TO BUS 1A3 (1A4). PROPER OPERATION WILL BE VERIFIED BY OBSERVATION OF:

(1) DE-ENERGIZATION OF BUS 1A3 (1A4).

(2) LOAD SHEDDING FROM BUS (BOTH 4160 V AND 480 V).

(3) ENERGIZATION OF BUS 1A3 (1A4) .

(4) AUTOMATIC SEQUENCE START OF EMERGENCY LOAD, AND

(5) OPERATION FOR $\geq$ 5 MINUTES WHILE ITS GENERATOR IS LOADED WITH THE EMERGENCY LOADS.

iii. VERIFICATION THAT EMERGENCY LOADS DO NOT EXCEED THE 2000-HR KW RATING OF THE ENGINE.(2)

D. MANUAL CONTROL OF DIESEL GENERATORS AND BREAKERS SHALL ALSO BE VERIFIED DURING REFUELING SHUTDOWNS.

E. EACH DIESEL GENERATOR SHALL BE GIVEN A THOROUGH INSPECTION ON A REFUELING (R) FREQUENCY IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR THIS CLASS OF STANDBY SERVICE.

F. THE FUEL OIL TRANSFER PUMPS SHALL BE VERIFIED TO BE OPERABLE EACH MONTH.

~~THE ABOVE TESTS WILL BE CONSIDERED SATISFACTORY IF ALL APPLICABLE EQUIPMENT OPERATES AS DESIGNED. THIS WILL INCLUDE CALIBRATION OF MONITORING INSTRUMENTATION.~~

3.0 SURVEILLANCE REQUIREMENTS
3.7 Emergency Power System Periodic Tests (Continued)

Basis

The emergency power system provides power requirements for the engineered safety features in the event of a DBA. Each of the two diesel generators is capable of supplying minimum required safety feature equipment from independent buses. This redundancy is a factor in establishing testing intervals. The monthly tests specified will demonstrate operability and load capacity of each diesel generator. The fuel supply and various controls are continuously monitored and alarmed for off-normal conditions. At approximately yearly intervals (during refueling shutdowns) automatic starting on loss of off-site power and automatic load shedding, diesel connection, and loading will be verified. At the same intervals, capability will be verified for manual emergency control of these functions from the diesel and switch-gear rooms.

Considering system redundancy, the specified testing intervals for the station batteries should be adequate to detect and correct any malfunction before it can result in system malfunction. Batteries will deteriorate with time, but precipitous failure is extremely unlikely. The surveillance specified is that which has been demonstrated over the years to provide an indication of a cell becoming unserviceable long before it fails.

References

~~(1) RSAR, Section 7.3.4.2~~ ok

(2) uFSAR, Section 8.4.1

(3) uFSAR, Section 8.3.4

(4) uFSAR, Section 8.4.2

These tests are conducted to meet the objectives of NRC Generic Letter 84-15 regarding the issue of reductions in cold fast starts. For this reason, the test verifying a 10 second start will be conducted from ambient conditions once per 184 days for each diesel. Other monthly tests will allow for manufacturer recommended warm-up to reduce the mechanical stress and wear on the diesel engines.

DISCUSSION, JUSTIFICATION, AND SIGNIFICANT HAZARDS CONSIDERATIONS

The NRC's Generic Letter 84-15, dated July 2, 1984, provided staff objectives with respect to the emergency diesel generators at nuclear power facilities. The first attachment to this letter addressed a staff objective of reducing the number of cold fast start surveillance tests for diesel generators which were deemed as resulting in premature diesel engine degradation. The Generic Letter requested a description of the current surveillance testing program, and a description of intended actions to reduce cold fast starts.

OPPD's response directly applicable to this item of the Generic Letter was provided in our letter LIC-84-413, dated December 28, 1984. In this letter, we described our cold fast start surveillance testing program, and stated that we would conduct a review of the Technical Specifications and surveillance testing in order to determine if any unnecessary testing could be eliminated. In a letter to the NRC (LIC-85-362) dated October 25, 1985, OPPD stated that our review indicated that certain changes to the Technical Specifications would be in order. We further noted that we expected to submit those changes in the form of an Application for Amendment approximately 30 days after full power operation following the 1985 refueling and maintenance outage. Accordingly, OPPD submitted an Application for Amendment in March, 1986, which proposed changes to the Technical Specifications to meet that objective.

Subsequent to our initial Application for Amendment of Operating License, several discussions concerning that Application have been held with the NRC reviewer. Several comments were raised which have been discussed with the plant staff and the reviewer. As was noted to the reviewer, the changes requested must be concurred with by both the Fort Calhoun Station Plant Review Committee, and the Omaha Public Power District offsite Safety Audit and Review Committee. The following discussion presents our revised changes to the Technical Specifications and amplified discussion of the justification for those changes.

Technical Specification 2.4, Limiting Condition for Operation of the Containment Cooling System, (2), Modification of Minimum Requirements.

Technical Specification 2.4 currently allows modification of the minimum requirements of the specification for the Containment Cooling System during power operation to allow a total of two of the components listed in Technical Specification 2.4 a. and b. to be inoperable at any one time (in addition to one raw water pump) provided that the emergency diesel generator connected to the other engineered safeguards 4.16 KV bus (1A4 or 1A3) is started to demonstrate operability.

The proposed Technical Specification removes the requirement for the emergency diesel to be started in order to modify the minimum requirements. This particular requirement imposes the stresses associated with cold fast starts on the diesel engines. Additionally, the requirement in the existing Technical Specifications is inconsistent with the Standard Technical Specifications, in that no such diesel start is imposed by the Standard Technical

Specifications in order to comply with the provisions of the Limiting Conditions for Operation for the Containment Cooling System. Therefore, OPPD believes that there exists adequate justification for deletion of the requirement to start the diesel engine, and has therefore proposed that the Limiting Condition for Operation be revised to remove that requirement. (This item remains as it was initially submitted in our March 21, 1986, submittal.) Additionally, the BASIS to Technical Specification 2.4 has been revised in order to provide consistency between specification and basis. (This item was overlooked in our initial application.)

Technical Specification 3.1, Instrumentation and Control.

This Technical Specification refers to the requirements for the surveillance testing in terms of checks, calibration, and testing of the Reactor Protective System (RPS) found in Table 3-1, Engineered Safety Features (ESF) found in Table 3-2, and other miscellaneous plant instrumentation and controls found in Table 3-3.

Table 3-2, Item 11 currently addresses several surveillance requirements associated with the diesel generators. Additionally, other testing requirements are specified in Technical Specification 3.7. The reasons for removing Item 11 from the Table were discussed with the reviewer. He believed it was appropriate to only maintain items in Table 3-2 which directly relate to diesel circuitry, but not the engine. The reviewer requested that the check of the diesel start circuit be retained in Table, while diesel starts be moved to Technical Specification 3.7. However, all tests presented in Table 3-2 Item 11, result in a diesel start, and, as such will be placed in Technical Specification 3.7. This information was verbally agreed to by the reviewer. This is consistent with Standard Technical Specifications. The following explains the rationale for each of the changes made to Table 3-2.

Item 11a of the existing Specifications contains requirements to perform monthly testing of the diesel by manual initiation of a starting signal. This requirement relates to more than the diesel circuitry, and has been moved to Specification 3.7. Additionally, the monthly testing of the diesel is specified in greater detail, including the necessary starting signals, and acceptance criteria, in Specification 3.7. Therefore, Item 11a has been moved to Specification 3.7 to avoid duplication.

Item 11b as it exists in Table 3-2 has been factored into Technical Specification 3.7(1)c, as was discussed with the reviewer. The start of the diesel engine upon a Safety Injection Signal will be reserved for the refueling test specified in Technical Specification 3.7(1)c and discussed below. This proposed change will reduce the potential for error during the conduct of surveillance by keeping the amount of activity associated with the Safety Injection Actuation Signal test to a minimum. Therefore, the requirements of item 11b have been revised and moved to 3.7(1)c.

The requirement of Table 3-2, Item 11c (to perform a test of the diesel during refueling shutdowns) is redundant to the tests which are specified in the proposed revision to 3.7(1)c. Therefore, the requirement of 11c has been removed from the table. The test is specified in greater detail, including initiating parameters and acceptance criteria, in Specification 3.7, and is better placed there. The requirement remains the same as is detailed below.

The requirements of Table 3-2, Item 11d (to test the diesel auto start initiating circuits prior to startup if not done during the previous week) have been moved to Specification 3.7(1)b. The test results in a diesel engine start and should be located with the other diesel tests in Specification 3.7.

Technical Specification 3.7, Emergency Power System Periodic Tests.

Technical Specification 3.7(1)a has been modified to allow for the diesel start (10 seconds) from ambient conditions to be performed at least once per 184 days. The other engine starts, conducted at least once per 31 days, in this Specification will be allowed to be preceded by an engine pre-lube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the engine is minimized. This is consistent with the changes recommended in Generic Letter 84-15. The format is slightly different. (That is, the 184 day Specification is not contained in a footnote; it has been included in the text of the Specification.)

As noted above, Table 3-2, Item 11d, has been moved to Item 3.7(1)b.

Specification 3.7(1)c has been reworded in order to increase its clarity. No major functional changes between testing currently conducted will result from this change. Technical Specification 3.7(1)e has been altered in wording somewhat and incorporated into Specification 3.7(1)c as a criteria of acceptance of the refueling frequency testing. The initial OPPD Application for Amendment of Operating License had proposed removing this particular Specification from the Technical Specifications. OPPD has modified 3.7(1)c to include a verification that the auto-connected loads do not exceed 2000 hour rating of the engine, consistent with Standard Technical Specifications. The loads which are auto-connected are currently monitored as a part of the refueling test, so it will not result in any additional requirements. The statement has been reworded to denote an action associated with surveillance rather than the current wording which connotates a design requirement. The design basis considerations of this requirement are found in USAR Section 8.4.1.2 and are footnoted as such.

The portion of current Technical Specification 3.7(1)c dealing with manual control of the diesel generators and breakers has been separated from the automatic operation portion. It has been designated as 3.7(1)d. Current Specification 3.7(1)f has been redesignated as 3.7(1)e. The frequency was changed from annual to Refueling. It is the intention of this change to no longer conduct the manufacturer's recommended overahaul (which requires removing the diesel from service) during power operation. This arrangement was

recommended by the Region IV office.

A note has been added to the Basis section 3.7 to specify that Generic Letter 84-15 recommendations to reduce cold fast starts have been incorporated into these Technical Specifications.

Justifications

This change to the Technical Specifications is proposed in response to the NRC recommendations of Generic Letter 84-15 and has been modified per conversations with the NRC technical reviewer. This change will reduce the number of unnecessary cold fast starts of the emergency diesel generators. These changes will bring applicable portions of the Fort Calhoun Station Technical Specifications into conformance with the recommended changes noted in the Attachment to Enclosure 1 of Generic Letter 84-15.

Significant Hazards Considerations

The proposed changes to the Technical Specifications have been assessed against the provisions of 10 CFR 50.92. This review resulted in the following conclusions:

The proposed changes will not involve a significant increase in the probability or consequences of an accident or malfunction of equipment previously evaluated in the Safety Analysis Report. These changes are intended to reduce degradation of the emergency diesel generators caused by cold fast starts. Thus, the probability of malfunction of equipment can be considered to have been lessened. Additionally, by not conducting the annual overhaul during power operation, the possibility of an occurrence at power with one engine tagged out for maintenance is virtually eliminated.

The changes will not involve a significant reduction in a margin of safety. The changes are intended to provide a less severe method of testing of the diesel generators, thus decreasing the likelihood of degradation and wear. By restricting the overhaul to refueling outages, the periods of time with one diesel tagged out for maintenance during normal operation will be limited to necessary maintenance concerns, instead of prevention maintenance.

The NRC has provided guidance concering the application of standards for determining whether a significant hazards consideration exists by providing certain examples of amendments that are not likely to involve significant hazards considerations (51 FR 7751). This application is deemed to be similar to example (i) in that it will achieve consistency throughout the

Technical Specifications by placing all diesel generator surveillance requirements in one location. This amendment is also somewhat similar to example (iv) where the relief based upon "acceptable operation" is in part based on NRC reassessment of the testing requirements imposed upon diesel generators. Based upon conclusions drawn from Generic Letter 84-15, the proposed changes are in keeping with the concept of increasing safety by precluding unnecessary wear on the emergency diesel engines. For these reasons, OPPD believes that these changes do not constitute a significant hazards consideration.