10CFR50.90

PHILADELPHIA ELECTRIC COMPANY
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January 31, 1992

NUCLEAR ENGINEERING & SERVICES DEPARTMENT

Docket Nos. 50-277
50-278
License Nos. DPR-44
DPR-56

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

Subject: Peach Bottom Atomic Power Station, Units 2 and 3
Technical Specifications Change Request 88-08

REFERENCES: (a) Letter, G. Beck (PECo) to U.S. Nuclear Regulatory Commission dated November 27, 1991

(b) Letter, D.R. Helwig (PECo) to U.S. Nuclear Regulatory Commission dated June 4, 1991

(c) Letter, D.R. Helwig (PECo) to U.S. Nuclear Regulatory Commission dated April 15, 1991

Gentlemen:

The Philadelphia Electric Company (PECo) hereby submits Technical Specifications Change Request (TSCR) No. 88-08, in accordance with 10 CFR 50.90, requesting a change to Appendix A of the Peach Bottom Facility Operating Licenses.

The proposed changes to the Technical Specifications incorporate enhancements to testing requirements for emergency diesel generators. Information needed to support your evaluation of the proposed changes and the revised Technical Specification pages are attached.

If you require any additional information, please contact us.

Very truly yours,

G. J. Beck, Manager
Licensing Section

Enclosures: Affidavit and Attachment

cc: T. T. Martin, Adminstrator, Region I, USNRC
J. J. Lyash, USNRC Senior Resident Inspector, PBAPS
T. M. Gerusky, Commonwealth of Pennsylvania

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COMMONWEALTH OF PENNSYLVANIA:

: ss.

COUNTY OF CHESTER :

D. R. Helwig, being first duly sworn, depores and says:

That he is Vice President of Philadelphia Electric Company; that he has read the attached Technical Specifications Change Request (Number 88-08) and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

D R Helwig

Vice President

Subscribed and sworn to
before me this 30th day
of January 1991.

Erica A. Santori

Notary Public

Notarial Seal
Erica A. Santori, Notary Public
Tredyffrin Twp., Chester County
My Commission Expires July 10, 1995

PEACH BOTTOM ATOMIC POWER STATION

UNITS 2 AND 3

Docket Nos. 50-277
50-278

License Nos. DPR-44
DPR-56

TECHNICAL SPECIFICATION CHANGE REQUEST
No. 88-08

Technical Specification 3.9, Auxiliary Electrical System

"Availability and Testing of
Emergency Diesel Generators and Offsite Circuits"

Supporting Information for Changes: 44 Pages and Attachments

Table of Contents

I. INTRODUCTION:

Philadelphia Electric Company, Licensee under Facility Operating Licenses DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS) Unit No. 2 and Unit No. 3, respectively, requests that the Technical Specifications contained in Appendix A to the Operating Licenses be amended. Proposed changes to the Technical Specifications are shown in Attachment 3 and Attachment 4 for Unit 2 and 3, respectively. For both Units, the proposed changes are:

Revisions to pages 67, 72, 132, 222, 223 and 224;

Replacement pages 217, 218, 218a, 218b, 218c, 219, 220, 220a; and,

Additional pages 218d, 218e, 218f, 218g, 218h, 218i, 218j and 220b.

The proposed changes are requested to become effective after July 31, 1992 to allow enough time to prepare the procedures and perform the training necessary to implement the proposed EDG testing and surveillance program.

II. REASONS FOR THE CHANGE:

The proposed changes improve the availability and reliability of the Emergency Diesel Generators and Offsite AC Sources by improved testing. The specific objectives of Technical Specification Changes are to:

A. Establish a more rigorous and comprehensive Surveillance Test Program for the Emergency Diesel Generators (EDGs) (Group A Changes) in accordance with the guidelines in:

> US NRC Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units Used as Onsite Electrical Power Systems at Nuclear Power Plants, dated August 1977; and,
>
> NUREG-0123, Standard Technical Specifications for General Electric Boiling Water Reactors, Revision 3.

B. Reduce wear and stress on the EDGs by modifications to the EDG testing methodology, testing schedule and the requirements for demonstrating EDG operability (Group B Changes) in accordance with the guidelines in US NRC Generic Letter 84-15, Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability;

C. Establish requirements consistent with NUREG 0123 for operability and for demonstrating operability of redundant systems and components when an Alternating Current (AC) source (Offsite or EDG) is not operable (Group C Changes); and,

D. Establish more specific requirements for minimum inventories of diesel fuel oil consistent with the guidelines in NRC Information Notice 89-50, Inadequate Emergency Diesel Generator Fuel Supply (Group D Changes).

III. LIST AND DESCRIPTION OF THE PROPOSED CHANGES TO THE TECHNICAL SPECIFICATIONS:

A detailed list and brief description of the proposed changes follows. References to existing Technical Specification numbers are enclosed in brackets [ ] and references to the proposed Technical Specification numbers are enclosed in parenthesis ( ). Attachment 2 is a list of proposed Technical Specification numbers and the corresponding existing Technical Specification numbers. Attachments 3 and 4 are copies of the proposed changes to the Technical Specifications for Units 2 and 3, respectively.

A. Description of Group A Changes:

The EDG Surveillance Test Program will be made more rigorous and comprehensive. Proposed additions to the PBAPS Technical Specifications include:

1. Verification every 18 months of EDG voltage and speed stability during a load rejection of the largest single load and the rated continuous load (4.9.A.1.2.f.2) and (4.9.A.1.2.f.3) [No existing requirement];

2. Verification every 18 months that each EDG's non critical automatic trips are overridden by an ECCS actuation signal (4.9.A.1.2.f.4) [No existing requirement];

3. Verification every 18 months that each EDG can operate satisfactorily in the 2000 hour load rating range (2800 to 3000 kW) for at least 2 hours and in the continuous load rating range (2400 to 2600 kW) for the following 22 hours (4.9.A.1.2.f.5) [No existing requirement];

4. Verification every 18 months that the EDG can be restarted while still hot following an EDG shutdown (4.9.A.1.2.f.6) [No existing requirement];

5. Simulation once per operating cycle of a loss of offsite power (LOOP) by itself in order to verify proper load shedding from the emergency busses and that the EDGs start and energize the permanent and auto-connected loads within the required time limits
(4.9.A.1.2.g.1) [No existing requirement];

6. Simulation once per operating cycle of an ECCS signal without loss of offsite power in order to verify that the EDGs start and operate without connecting to the emergency busses
(4.9.A.1.2.g.2) [No existing requirement];

7. Simulation once per operating cycle of an ECCS signal with a loss of offsite power (LOOP) in order to verify load shedding from the emergency busses and that the EDGs start and accept the permanent and auto connected loads
(4.9.A.1.2.g.3) which replaces [4.9.A.1.b];

8. Verification once per operating cycle that each EDG can be synchronized with and transfer electrical loads between the emergency busses and offsite circuits to demonstrate the ability to recover from a LOOP
(4.9.A.1.2.g.4) [No existing requirement];

9. Verification once per operating cycle that auto sequencing timers for the 480 Volt Emergency Load Centers operate at 3 +/- 0.5 seconds was added to the existing requirement to functionally test and calibrate timers for the Core Spray Pumps
(Table 3.2.B) as implemented in (Table 4.2.B) [No existing requirement];

10. Requirements to test every 18 months both manual and automatic transfer of the Off-site AC sources from the normal circuit to the alternate circuit
(4.9.A.1.1.b) [No existing requirement];

11. Requirements for starting all four EDGs simultaneously once every ten years or following any modifications which could affect EDG interdependence
(4.9.A.1.2.h) [No existing requirement]

12. Establishment of specific parameters and tolerances for EDG voltage and frequency response during EDG starting tests (4.9.A.1.2.a.3), (4.9.A.1.2.b), (4.9.A.1.2.f.2), (4.9.A.1.2.g.2) and (4.9.A.1.2.g.3.b) which replace [4.9.A.1.a] and [4.9.A.1.b];

13. Verification of correct offsite circuit breaker alignment and power availability: once per 7 days for scheduled testing, and; within 1 hour and every 8 hours whenever any of the offsite circuits or an EDG is determined to be inoperable
(4.9.A.1.1.a) and (4.9.1 1), (4.9.B.3), (4.9.B.4) and (3.9.B.7) which reference (4.9.A.1.1.a) [No existing requirement]

14. Verification during scheduled EDG testing that each EDG is properly aligned to provide standby power
(4.9.A.1.2.a.5.) [No existing requirement];

15. Verification every month that EDG starting air receivers contain the minimum pressure for operability versus verification that the air compressors operate
(4.9.A.1.2.a.6) which replaces [4.9.A.1.a];

16. Requirements for increasing the EDG surveillance testing frequency from once per month to once per 7 days if the number of start failures in the last 20 valid demands is greater than or equal to 2
(4.9.A.1.2.k.) [No existing requirement]; and,

17. Requirements for reporting all EDG failures to the Nuclear Regulatory Commission within 30 days
(4.9.A.1.2.1.) [No existing requirement].

B. Description of Group B Changes:

The EDG Testing Schedule, Testing Methodology and the Requirements for Demonstrating EDG Operability will be modified to reduce wear and stress on the EDGs. The proposed changes include:

1. Segmenting the routine EDGs Surveillance Test into three parts:

   a) "Slow starts" which are used to initiate the monthly EDG surveillance test and to demonstrate EDG operability whenever required
   (4.9.A.1.2.a.3) [No existing requirement];

   b) Synchronizing the EDG with an offsite circuit and operating just below the continuous load for a minimum of one hour for the monthly test
   (4.9.A.1.2.a.4) [No existing requirement]; and,

   c) "Fast starts" (with pre-lube) and rapid loading of the EDGs every 184 days
   (4.9.A.1.2.b.) which replaces [4.9.A.1.a].

   The existing surveillance test requires that all monthly testing and operability demonstrations use "fast starts" followed by synchronizing and operating one hour at the rated load
   [4.9.A.1.a];

2. Changes in the method for demonstrating EDG operability when an AC source becomes inoperable to permit a "slow start" of the EDGs and to avoid synchronizing the EDGs with the offsite circuits when less than the full complement of AC sources are available
   (3.9.B.1), (3.9.B.3) and (3.9.B.7) which replace [3.9.B.1], [3.9.B.3] and [3.9.B.4] which reference the requirements of [3.5.F] and [4.5.F];

3. Explicit recognition that all planned EDG starts are performed in accordance with the manufacturer's recommendations for pre-lubrication, warm-up, loading and shutdown
(Footnote associated with (4.9.A.1.2.a.3), (4.9.A.1.2.b), (4.9.A.1.2.f.5),(4.9.A.1.2.g.1.b), (4.9.A.1.2.g.2), and, (4.9.A.1.2.g.3.b) [No existing requirement]

4. Specific limits for EDG kW loading designed to prevent routine overloading of the EDG during Surveillance Testing and operability demonstrations
(4.9.A.1.2.a.4.), (4.9.A.1.2.b.) and (4.9.A.1.2.f.5.) including the reference to Footnote "b" which replace [4.9.A.1.1.a]

5. Deletion of the requirement to verify the operability of the operable EDGs if an EDG is declared inoperable for the performance of preplanned preventive maintenance or testing.
(3.9.B.3.) and (3.9.B.4.) which replace [3.9.B.3.] and [3.9.B.4] which reference the requirements of [3.5.F] and [4.5.F];

6. Reduction in the frequency for repeating EDG operability demonstrations from daily to once per 72 hours following the determination that an EDG, an offsite circuit or one of each is inoperable.
(3.9.B.3) and (3.9.B.4) which replace [3.9.B.3] and [3.9.B.4] that reference the requirements of [3.5.F] and [4.5.F] which will be deleted; and,

7. Requirements to demonstrate the operability (unless appropriate alternate testing is performed) of all EDGs if any EDG is declared inoperable for a cause which is potentially generic even if the affected EDG is restored to operable before testing of the redundant EDGs would be required

(Footnote associated with (3.9.B.3) and (3.9.B.4) [No existing requirement].

C. **Description of Group C Changes:**

Requirements for both the availability and the verification of availability of redundant systems and components when an offsite AC source or EDG is not operable will be made more stringent. Proposed changes to the PBAPS Technical Specifications include:

1. Requirements that upon the loss of an EDG that systems, subsystems, trains, components or devices required by Technical Specifications that depend on the remaining EDGs must be verified as operable within 2 hours (3.9.B.3) and (3.9.B.4). The existing requirement is to verify operability of the redundant low pressure core and containment cooling systems [3.5.F.1];

2. Requirement that upon loss of one EDG or associated emergency bus and one offsite circuit to return the offsite circuit to operable within 72 hours or initiate plant shutdown (3.9.B.4) replaces existing requirement which allows reactor operation as long as the requirements for Low Pressure Cooling and EDG availability in [3.5.F] and [4.5.F] are met;

3. Establishment of specific time limits for performing operability demonstration testing of EDGs when an EDG or offsite circuit is determined to be inoperable (initiate testing within 24 hours) and more restrictive limits (initiate testing within 8 hours) if both an EDG and offsite circuit are inoperable (3.9.B.1), (3.9.B.3), and, (3.9.B.4) which replace [4.5.F] which required the EDGs to be demonstrated operable immediately but which was interpreted to mean test within 24 hours;

4. Establishment of time limits consistent with NUREG 0123 for achieving Hot Shutdown and then Cold Shutdown if limiting conditions for operation or action statement requirements associated with an inoperable EDG or Offsite source cannot be achieved
(3.9.B.1.), (3.9.B.3.) and (3.9.B.4) which replace [3.5.F.]; and,

5. Establishment of a separate action statement and more restrictive requirements if one of the 4 KV emergency busses required by Technical Specification 3.9.A.3 is not energized since the existing Technical Specifications [3.9.B.3] and [3.9.B.4] do not differentiate between the inoperability of an EDG or an emergency bus
(3.9.B.7) which was previously covered by [3.9.B.3] and [3.9.B.4].

D. Description of Group D Changes:

These changes establish more specific requirements for minimum inventories of diesel fuel oil consistent with the guidelines in NRC Information Notice 89-50, Inadequate Emergency Diesel Generator Fuel Supply. Proposed changes to the PBAPS Technical Specifications include:

1. Establishment of minimum fuel oil availability requirements for each operable diesel (28,000 gallons) and increasing an existing requirement for the cumulative minimum volume of fuel on site from 104,000 to 108,000 gallons
(3.9.A.2), (3.9.A.2.a) and (3.9.A.2.b) which replace [3.9.A.2];

2. Elimination of an option allowing an EDG to be declared inoperable when the fuel oil in one of the diesel fuel storage tanks is not available by requiring that the EDG be supplied from one of the remaining storage tanks but increasing the time from 24 to 72 hours permitted to

establish the required inventory of 108,000 gallons of fuel in the other three storage tanks
(3.9.B.6.) [3.9.B.6.];

3. Verification every 18 months 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 (4.9.A.1.2.f.7) [No existing requirement]; and,

4. Elimination of prescriptive corrective maintenance requirements if water is suspected between the day tank and the EDG fuel injectors
[4.9.A.1.d] was deleted in part.

IV. SAFETY ASSESSMENT OF THE PROPOSED CHANGES TO THE TECHNICAL SPECIFICATIONS:

Discussion :

This Safety Assessment is intended to ensure that the proposed changes to the Technical Specifications do not increase the probability or consequences of design basis accidents or operational transients.

The Updated Final Safety Analysis Report (UFSAR) Section 8.5, Standby AC Power Supply and Distribution, contains a description of the design basis, inspection and testing and safety evaluation for the equipment discussed in this safety assessment. UFSAR Section 14.0, Plant Safety Analysis, describes the design basis accidents and operational transients and the methods for analyzing these events. UFSAR sections applicable to this Assessment include: 14.5.4.4, Loss of Auxiliary Power; 14.5.7, Other Events (including loss of offsite power); and 14.6.3, Design Basis Accidents. UFSAR Section 14.6.3 discusses the most limiting event which is a Loss of Offsite Power (LOOP) with a Loss of Coolant Accident (LOCA) on one unit and the requirement to perform a shutdown on the other unit.

A review of Updated Final Safety Analysis Report Section 14.0, Plant Safety Analysis, indicates that the proposed Technical Specification changes have the potential to increase the probability or the consequences of a design basis accident only to the extent that availability and/or reliability of the AC systems are affected. Therefore, this safety assessment will address how the proposed changes affect the availability and/or reliability of the AC power systems and, in particular, the EDGs.

All of the proposed Technical Specification changes improve the reliability and availability of the AC Sources and, in particular the EDGs. Therefore, these changes inherently improve plant

safety. These goals of improved reliability and availability are achieved by:

More rigorous and comprehensive EDG testing; and.

Improved testing methodology intended to reduce wear and stress on the EDGs;

Less frequent EDG starts for demonstrating EDG operability which is intended to reduce wear and stress on the EDGs;

Not requiring synchronizing AC sources when less than the full complement of AC sources are available; and,

More restrictive action requirements associated with the loss of a 4 kV emergency bus.

Although the cumulative effect of the proposed changes is increased reliability and availability of AC sources, the changes involve some tradeoffs. For example, increased EDG testing increases confidence in the EDG's capability to perform to the design specification. However, testing reduces availability, disturbs the system which increases the potential for unplanned transients, causes wear and stress on components, and increases the potential for errors in the system lineup during restoration. Similarly, demonstrating EDG operability by synchronizing AC sources at a time when less than the full complement of AC sources are available could reduce the EDG's reliability just when EDG reliability becomes most important. This safety assessment will identify the tradeoffs and demonstrate they represent improved reliability and availability based on the EDG manufacturer's recommendations and industry experience as documented in NRC Information Notices, Generic Letters and Regulatory Guides.

The safety assessment which follows consists of the following:

a. The plant design features pertinent to the safety assessment;

b. Definitions and clarifications of terms which are not currently used in the UFSAR;

c. Assumptions used in the Safety Assessment which must be considered commitments if the proposed changes are implemented; and,

d. A discussion of how each of the groups of changes (A through D) affects the availability and/or reliability of the AC power systems.

Plant Design Features:

The AC power system consists of two independent offsite power sources and an onsite power source consisting of four EDGs. This design provides independent and redundant AC sources which ensure power to the emergency systems assumed to be available in the Safety Analysis Report.

The design and operation of the Offsite AC power sources and electrical distribution are described in the Updated Final Safety Analysis Report (UFSAR) Section 8.4, Auxiliary Power Systems. The design and operation of the PBAPS Emergency Diesel Generators are described in UFSAR Section 8.5, Standby AC Power Supply and Distribution. The EDG load ratings and the design basis accident electrical load profiles for each EDG are specified in Reference 8 (Letter, D.R. Helwig (Philadelphia Electric Company) to US NRC, dated April 15, 1991).

The following list identifies features of the design and operation of EDGs and offsite sources which are relevant to this safety assessment:

1. Each reactor unit has four independent 4 kV emergency switchgear busses each of which is energized from one of the

two offsite AC sources at all times during normal operation. Upon loss of either offsite AC source, power to the 4 kV emergency busses automatically transfers to the second offsite source. If neither offsite source is available, each 4 kV emergency switchgear bus is supplied from an associated EDG. The design basis accident scenario assumes that three of the four 4 kV emergency busses will remain energized throughout the design basis event.

2. There are four emergency diesel generators (EDGs) which support the operation of both reactor units. Each EDG supplies two 4 kV emergency busses -- one associated with PBAPS Unit 2 and one associated with PBAPS Unit 3. Therefore, all four EDGs are required when either or both PBAPS Unit 2 and Unit 3 are operating. This configuration for Standby Emergency AC Power is unique to PBAPS.

3. The EDGs were manufactured by the Fairbanks-Morse Engine Division of Colt Industries. The diesels are vertical opposed-piston engines with turbocharged aspiration through unvalved ports in the upper and lower ends of the cylinder liners.

4. The EDGs are equipped with a lube oil keepwarm system and an engine jacket cooling water warming system. The circulating pump for the lube oil keepwarm system circulates oil through an electric heater and back to the sump. The lube oil keepwarm system does not circulate oil to the bearings in the engine.

5. The four EDGs are sufficient to provide power for the functioning of required safeguard systems for one reactor unit and the shutting down of the other unit, assuming the failure of one EDG and loss of all offsite power sources.

6. Each EDG can be started locally at the engine but can be electrically connected to its bus only from the main control

room (or automatically if the EDG is in standby) (EDGs E-2 and E-4 can be started from the Alternate Control Panels).

7. During the sequenced application of emergency loads, the EDG voltage may decrease to 59% of nominal when the 2000 HP RHR pump motor is started (SER Section 7.0, Page 82).

8. The design of the EDGs and the associated electrical distribution systems provides the capacity to test each EDG unit independently of redundant EDGs. Dual reactor unit outages are not assumed in the design; therefore, at least one reactor unit will be operating during all planned testing.

9. Existing PBAPS Technical Specifications do not identify any EDG performance testing other than the monthly fast start and one hour run at rated load and the accident simulation conducted once per operating cycle. However, tests similar in scope and duration to the tests proposed in TSCR 88-08 (except for the 24 hour load run proposed in 4.9.A.1.2.f.5 and the load rejection tests proposed in 4.9.A.1.2.f.2 and 4.9.A.1.2.f.3) are already performed every refueling outage as documented in the commitments listed in PBAPS Technical Specification Bases Section 3.9.

Definitions and Clarifications:

1. Slow Start:
   The term "slow start" is used to describe the Technical Specification requirement to "start and gradually accelerate to synchronous speed" (Proposed Technical Specification 4.9.A.1.2.a.3). A slow start will be performed by placing the governor in manual and adjusting it to the lowest setting (approximately 400 RPM). The speed will then be manually increased to 900 RPM over a period of one to two minutes. The test will typically continue at full speed but the EDG will not be loaded for several minutes to allow internal engine temperatures to stabilize. Engine operating data will be collected after the engine temperature stabilizes. The engine will then be shutdown if the start was conducted to demonstrate operability. If the start was conducted to satisfy a surveillance test, the EDG will be synchronized to the associated emergency bus and gradually loaded to the required load in approximately 10 minutes in accordance with the manufacturer's recommendations.

2. Fast Start:
   The term "fast start" refers to an EDG start and acceleration to rated speed (900 RPM) within the 10 second period specified in the UFSAR and the application of the rated electrical load at a rate which approximates the conditions imposed by a design basis accident with a loss of offsite power. The EDG's initial conditions for a fast start are those maintained by the lube oil and jacket coolant water warming systems. All planned starts, including fast starts, are preceded by a three minute prelubrication.

3. Demonstrate Operability:
   The term "demonstrate operability", as used in Technical Specification Section 3/4.9, means to perform the surveillance tests associated with the component. The

specific surveillance tests needed to satisfy the requirement to demonstrate operability are listed with the requirement that operability be demonstrated.

4. Verify Operability:
The term "verify operability", as used in Technical Specification Section 3/4.9, means to administratively check, by examining logs or other information, to determine if components are out of service for maintenance or other reasons. It does not require the performance of the surveillance tests needed to demonstrate the operability of the component.

5. Permanent and auto connected loads:
Those loads which remain connected to an emergency bus following a loss of voltage to the bus and those loads which are automatically and sequentially connected to the emergency busses following a loss of offsite power and an ECCS actuation signal. The expected values for these electrical loads are listed in Reference 8 (Letter, D.R. Helwig (Philadelphia Electric Company) to US NRC, dated April 15, 1991.

6. Required systems, trains, components or devices that depend on the remaining EDGs:
"Required" as used in Technical Specification Section 3/4.9, means required to be operable by Technical Specifications. This verification is intended to prompt the operators to check that all systems, trains, components or devices meet the definition of OPERABILITY (as modified by Technical Specification LCO 3.0.D) or implement the Action Statements for equipment which does not meet the definition of Operability. LCO 3.0.D. modifies the definition of OPERABILITY to allow a component to be OPERABLE even if its normal or emergency power supply is not Operable as long as the redundant component is Operable or likewise satisfies the requirements of LCO 3.0.D.

Assumptions and Commitments:

The following assumptions are used in the Safety Assessment for TSCR 88-08 and must be considered commitments once the Technical Specification Change is implemented.

1. Prior to the date on which the proposed Technical Specification changes become effective, a test procedure will be prepared and used to verify the acceptance criteria for each surveillance test which requires a new or substantially revised acceptance criteria.

2. Each Surveillance Test required by the proposed Technical Specifications will be conducted in accordance with procedures which are:

   a. Prepared and reviewed by qualified personnel;

   b. Subjected to a 10 CFR 50.59 Review which is specific for each test; and,

   c. Reviewed by the Plant Operations Review Committee and approved by the Plant Manager.

3. Each Surveillance test procedure will establish and ensure implementation of the following during the performance of each surveillance test:

   a. Proper initial conditions in both reactor units;

   b. Adequate availability and qualifications of personnel performing the tests; and,

   c. Verification following testing of proper restoration of equipment and system lineups including valves and switches manipulated during testing for which there is no indication in the control room of proper restoration.

4. An EDG is inoperable at the beginning of the Monthly Surveillance Test and EDG Operability Demonstration test because the generator exciter is turned off and the governor manual speed control setpoint is lowered. Inoperability associated with required testing will not be used in availability calculations; however, the following will apply:

   a. EDG inoperability during testing will be identified in the control room by an EDG trouble alarm (Not in Auto) in accordance with Regulatory Guide 1.47;

   b. EDG surveillance test procedures will contain directions to minimize the duration of the inoperability; and,

   c. EDG surveillance test procedures will contain directions to promptly restore EDG control to the control room and place the EDG in service in the event of a loss of offsite power or ECCS signal during the test.

5. Surveillance Test Procedures will incorporate the manufacturer's recommendations for starting and loading the EDGs.

6. Planned EDG starts performed for reasons other than testing will be "slow starts."

7. Prior to all planned starts of an EDG (including fast starts), the prelubrication oil pump will be started and operated for a period of approximately 3 minutes. The prelubrication duration is controlled by a timer when the EDG is manually started from the control room.

8. The proposed changes to the Technical Specifications neither require nor prohibit synchronizing an EDG to an offsite

source and operating for one hour in order to demonstrate EDG operability.

9. A standby heating system is used to maintain engine jacket cooling water and engine lube oil temperature at optimum standby starting conditions. An EDG will be declared inoperable if required temperatures cannot be maintained. The EDGs will not be operated for the sole purpose of maintaining engine temperatures.

10. Following an EDG failure, the remaining EDGs will be inspected prior to a test start to detect any external conditions that indicate starting the EDG might cause similar degradation or damage.

11. The tests required on a monthly and six month basis (and other tests as determined by the System Engineer) will include logging of engine performance data. The data will be compared with data collected for similar tests and trended, as necessary, to detect engine performance problems.

12. The minimum requirements for diesel fuel inventories specified in Technical Specification 3.9.A.2 do not include an allowance for measuring instrument accuracy. The acceptance criteria for the surveillance test procedure associated with measuring fuel inventories (4.9.A.1.2.a.1) will include an allowance for measurement accuracy.

13. The EDG load ratings and the design basis accident electrical load profiles for each EDG are specified in Reference 8 (Letter, D.R. Helwig (Philadelphia Electric Company) to US NRC, dated April 15, 1991). In accordance with Reference 8, the design basis accident electrical load profiles will be incorporated into UFSAR Table 8.5.2 in Revision 10. Future revisions to UFSAR Table 8.5.2, will

require a concurrent assessment of the calculation of the minimum fuel oil inventory (Reference 9).

A. Discussion (Group A Changes):

The Group A Changes are listed and described in Section III of this assessment. All of the changes in Group A constitute a comprehensive and rigorous test program for the EDGs and associated equipment. This test program is modeled on the test program recommended in NUREG-0123 (Reference 1) and US NRC Regulatory Guide 1.108 (Reference 6). Exceptions made to the test program described in the references are listed and discussed later in this section of the safety assessment.

Tests similar in scope and duration to the tests proposed in TSCR 88-08 (except for the 24 hour load run proposed in 4.9.A.1.2.f.5 and the load rejection tests proposed in 4.9.A.1.2.f.2 and 4.9.A.1.2.f.3) are already performed every refueling outage as documented in the commitments listed in PBAPS Technical Specification Bases Section 4.9. Additionally, no EDG or AC Source testing currently required by PBAPS Technical Specifications has been deleted or modified except as described in this safety assessment.

The cumulative effect of the Group A changes, more rigorous and comprehensive testing of EDGs, can be summarized as follows:

1. Reliability of the EDGs is increased by the periodic and systematic verification that EDGs and associated equipment function in accordance with design requirements and the assumptions used in FSAR Accident Analysis;

2. Reliability of the EDGs is increased by systematic accumulation and trending, as necessary, of performance data which can be analyzed to identify and correct incipient problems;

3. Availability of the EDGs is decreased in the operating Unit (one or both of the reactor units may be operating during testing) because of longer time in testing. (This concern is mitigated by the recognition that tests similar in scope and duration are already performed every refueling outage as indicated in the commitments listed in PBAPS Technical Specification Bases 4.9);

4. Reliability of the EDGs could be decreased because of the additional wear and stress on the EDGs resulting from more rigorous testing (This concern is mitigated by proposed Group B changes which improve test methodology and significantly decrease the frequency of EDG test starts required to demonstrate Operability. Additionally, similar tests are already performed although not mandated by Technical Specifications.);

5. Reliability of the EDGs is decreased because of the lineup changes associated with test setup and recovery (This concern is mitigated by administrative controls listed in Assumptions and Commitments, Items 1, 2, and 3); and,

6. Reliability of the plant electrical system is decreased because of the transients imposed while a reactor unit may be operating (This concern is mitigated by items previously discussed in Plant Design Features, Items 8 and 9, and by administrative controls listed in Assumptions and Commitments, Items 1, 2, and 3).

7. Reliability of the EDGs is increased by the proposed requirement for increasing EDG surveillance frequency from once per month to once per 7 days if the number of start failures in the last 20 valid demands is greater than or equal to 2. The failure rate which initiates accelerated testing is intended to demonstrate the target EDG reliability of greater than 0.95. The accelerated testing provides a faster accumulation of test data upon which to

judge the reliability of an EDG which is experiencing failures. The additional test data will enable the plant personnel to distinguish between failures which occur due to random chance and failures which are indicative of an abrupt decline in reliability. Either successful completion of accelerated testing requirements or an EDG overhaul with the specified post overhaul testing have been demonstrated to ensure EDG reliability of 0.95 as documented in Reference 3.

8. Reliability of the EDGs is increased by the additional requirements for administrative checks of system lineups and requirements for reporting EDG failures to the NRC. These changes increase the potential that errors or problems will be identified in a timely manner but involve no physical manipulation of equipment and, therefore, have no detrimental effect on reliability or availability.

NUREG-0123 identifies specific requirements for EDG tests, test methodology or test requirements which are not reflected in the proposed change to the PBAPS Technical Specifications. Significant exceptions include:

1. The proposed Technical Specifications differ from NUREG 0123 and Regulatory Guide 1.108 by differentiating between surveillance tests which affect only an EDG (performed every 18 months) and tests which affect both an EDG and equipment associated with a specific unit (performed once per operating cycle of the affected unit). This difference is necessary because of the unique design at PBAPS. At PBAPS, each EDG supplies two 4 kV emergency busses -- one associated with PBAPS Unit 2 and one associated with PBAPS Unit 3. Surveillance Tests affecting both an EDG and equipment associated with a specific unit must be performed while the affected unit is shutdown. Tests affecting only an EDG can be performed while the units are operating or shutdown.

2. RG 1.108 Section C.1.b.(3) requires that testing not interfere with the ability of the EDG to supply emergency power within the required time and recommends having an emergency override of the EDG test mode. NUREG 0123 requires testing this override capability. Capability to override the test mode if an actual signal occurs during testing is not available at PBAPS and thus not tested. However, procedural controls to minimize test duration and instructions for prompt restoration of the EDGs in the event of a demand signal will be included in the test procedures (See Assumptions and Commitments, Items 1, 2, and 3).

3. The NUREG 0123 requirement that monthly EDG testing alternate between different methods of starting the EDGs is not included in the proposed PBAPS Surveillance testing. The alternate starting methods in NUREG 0123 are not applicable to slow starts of the EDG. The comprehensive testing every 18 months will test the various starting methods.

4. Requirement that monthly EDG testing be performed on a Staggered Test Basis is not included in the proposed PBAPS Surveillance testing requirements. Not requiring staggered testing of the EDGs provides greater flexibility in scheduling EDG testing and allows for selection of optimum plant conditions for testing.

5. Requirement to test the EDG lockout features is intended for personnel safety only. Tests not directly affecting reactor safety may be required by administrative controls but are not included in the proposed Technical Specifications.

6. Requirement to verify once per operating cycle that the permanent and auto connected loads following an ECCS signal with a LOOP do not exceed the 2000 hour rating of each EDG is not included in the proposed PBAPS Surveillance testing requirements. Because of the unique design at PBAPS (See

Plant Design Features, Items 1 and 2), this verification is limited to an administrative review of Updated Safety Analysis Report Table 8.5.2 and is not performed by testing. Verification that EDG load ratings are not exceeded during an ECCS signal with a LOOP will be performed in accordance with commitments to the NRC specified in Reference 8 (Letter, D.R. Helwig (Philadelphia Electric Company) to US NRC, dated April 15, 1991).

7. The verification every 18 months of EDG voltage and speed stability during a load rejection of the rated continuous load differs from the requirements specified NUREG 0123, Standard Technical Specifications (Reference 1).

Standard Technical Specifications assume that voltage at the initiation of the load rejection test of the rated continuous load is 4160 volts and the specified upper limit for voltage fluctuation is 4784 volts (15%) during the rejection.

The continuous load rejection test at Peach Bottom will be initiated with the EDG paralleled with an offsite source which is maintained at approximately 4400 volts. Therefore, the criteria for demonstrating voltage stability during the load rejection test is that voltage must be maintained within 15% of the initial voltage during the rejection of the continuous load. This change is consistent with the requirements in IEEE 387 Section 6.3.4. The components which will be subjected to the potential higher voltage include the generator and voltage regulator, the cables and the EDG output breaker. All of these components have been subjected to Hi Potential testing to approximately twice the voltage expected during the load rejection transient.

The load rejection test of the largest single load will be conducted with the EDG governor in isochronous mode using

the Residual Heat Removal Pump in full flow test as the rejected load.

8. The proposed Technical Specifications differ from NUREG 0123 in that the Auto Sequencing Timers are already "functionally tested, calibrated and checked" to acceptance criteria in Section 3.2, Protective Instrumentation, Table 3.2.B. The system logic functional test for these timers will be performed in proposed Technical Specification 4.9.A.1.2.g.3. Because the Auto Sequencing Timers are already "functionally tested, calibrated and checked" in Technical Specification Section 4.2, the acceptance criteria for these timers will not be verified again in Section 4.9.

   This difference is necessary because Table 3.2.B already contains requirements that the Core Spray Pump Timers operate at 6 seconds plus or minus one second after the emergency bus is energized. This existing requirement is inconsistent with NUREG 0123 which indicates that auto sequencing timers be tested to plus or minus 10% of the design value. The proposed change to the Technical Specification will add to Table 3.2.B the requirement that timers associated with the 480 Volt Emergency Load Centers which are not tested under current Technical Specifications operate at 3 seconds plus or minus 0.5 seconds. These timers (Core Spray Pump and 480 Volt Emergency Load Center) will be tested once per operating cycle in accordance with the existing requirement for testing and calibration of auto sequencing timers (Table 4.2.B, Item 5). The testing frequency is consistent with NUREG 0123.

   The Technical Specification 3.2.B requirement that the "system logic be functionally tested" is satisfied for both the Core Spray Timers and the 480 Volt Emergency Load Centers timers by proposed Technical Specification 4.9.A.1.2.g.3. This Surveillance Requirement will demonstrate that on a simulated LOOP/LOCA event that the EDG

starts and re-energizes the emergency buss within 10 seconds and accepts the loads controlled by these timers.

Note: The discussion above does not address the auto load sequencing timers associated with the Residual Heat Removal Pumps (Low Pressure Coolant Injection) which also are listed in Table 3.2.B because there is no change to the way these timers are tested. These timers function only following an ECCS signal without a Loss of Offsite Power. If an ECCS signal occurs with a LOOP, RHR pumps start immediately when the EDGs re-energize the emergency busses.

As indicated above, the proposed Technical Specification adds a new requirement to functionally test and calibrate the timers associated with the 480 Volt Load Centers. The failure of a 480 Volt Emergency Load Center timer could result in the failure of the 480 Volt Emergency Load Center to re-energize following a loss of either or both of the Offsite sources. Therefore, a note attached to Table 3.2.B will require that the failure of the timer will be treated as if the 480 Volt Emergency Load Center were not energized. This will initiate proposed Action Statement 3.9.B.7 governing the loss of either a 4kV emergency bus or 480 Volt Emergency Load Center.

9. The proposed Technical Specifications initiate the hot restart capability verification test differently than specified in NUREG 0123 and Regulatory Guide 1.108. In the NUREG and Regulatory Guide, the verification that an EDG can be restarted while still hot following the 24 hour load run is initiated by simulating a loss of offsite power (LOOP) by itself. In the proposed Technical Specifications, a fast start and rapid loading of the EDG in accordance with proposed surveillance requirement (4.9.A.1.2.b) is performed within 5 minutes after completing the 24 hour load test. Surveillance requirement (4.9.A.1.2.b) is used to

demonstrate EDG operability while the plant is operating because the fast start and rapid loading conducted in this test mimic the EDG response during a LOOP/LOCA event but do not require deenergization of an emergency bus. Surveillance requirement (4.9.A.1.2.b) is proposed as the method of demonstrating hot restart capability for the same reasons. This difference in the method for initiating the hot restart test is required because the 24 hour load run (which tests the EDG by itself) is performed every 18 months while the LOOP by itself (which tests capabilities associated with only one reactor unit) is performed only while the affected reactor unit is shutdown.

A footnote in the proposed Technical Specifications will ensure that the hot restart verification test described above (4.9.A.1.2.f.6) will not be used to satisfy the requirement to verify fast start capability (4.9.A.1.2.b) which is initiated from ambient conditions.

In summary, the cumulative effect of the Group A changes is increased EDG reliability. This conclusion is supported by the US NRC Safety Evaluation for similar Technical Specifications at North Anna Power Station, Unit No. 2 (Reference 3) and US NRC Safety Evaluation for similar Technical Specifications at Limerick Generating Station (Reference 4). Additionally, the test program described by Group A changes is in close conformance to the Surveillance Test Program recommended in NUREG 0123 (Reference 1) and Regulatory Guide 1.108 (Reference 6).

B. Discussion (Group B Changes):

The Group B Changes are listed and described in Section III of this assessment. The changes in Group B incorporate recommendations in US NRC Generic Letter 84-15, Proposed Staff

Actions to Improve and Maintain Diesel Generator Reliability. In Generic Letter 84-15 the Commission Staff advised Licensees that:

> EDG testing should take into consideration the manufacturer's recommended actions such as prelubrication of all moving parts and warm-up procedures because fast starts subject the diesel to undue wear and stress; and,
>
> Excessive testing results in unnecessary degradation of diesel engines and that unnecessary testing should be deleted from the Technical Specifications.

Additionally, NRC Information Notice 84-69, Operation of Emergency Diesel Generators, warns against operating EDGs tied to offsite sources when those sources are abnormally degraded or threatened such as during inclement weather. Synchronizing an EDG to an offsite source is even less desirable if one of the offsite sources or an EDG is already not operable. Therefore, the Group B proposed changes which will neither require nor prohibit synchronizing an EDG to an offsite source and operating for one hour in order to demonstrate EDG operability as is currently required.

The cumulative effect of the Group B changes can be summarized as follows:

1. Reliability of the EDGs is increased by the use of slow starts (as described under definitions) for the monthly Surveillance Test and when EDG operability is demonstrated.

   Although slow starts do not mimic the conditions expected during a loss of offsite power, the use of slow starts and gradual loading of the EDGs reduces wear and stress on the engine and the generator. The slow start procedure has been verified not to cause excessive vibration at critical speeds below 900 RPM and the EDG will not be permitted to idle at critical speeds. The conclusion that the advantages of the

reduced wear and stress on the EDG outweigh the advantages of every EDG test duplicating the actual demands expected during a LOOP are documented in References 2, 3, and 4. Tests conducted every 184 days and every 18 months still require fast starts and rapid loading of the EDGs.

2. Reliability of the EDGs is increased by prelubrication prior to every planned start of an EDG.

   Prelubrication eliminates the delay during the starting sequence of supplying oil to all moving parts as the engine driven lube oil pump comes up to speed and fills voids in the system. Prelubrication significantly reduces wear and stress on the EDGs by reducing metal to metal contact on EDG bearings during the start sequence.

   Prelubrication periods are limited to approximately 3 minutes by administrative controls and the use of a timer. This period is sufficient to ensure proper lubrication of the upper crankshaft but is short enough to minimize the accumulation of lube oil in the cylinders or above the upper piston. Prelubrication is performed only during planned test starts so starting problems associated with excessive prelubrication would not prevent an EDG from starting in response to a LOOP or ECCS signal. Fires in the EDG exhaust system resulting from excessive prelubrication and/or the accumulation of unburned fuel oil in the exhaust system are minimized by operating the EDG at load for at least one hour following the monthly test starts. Starts conducted to demonstrate operability which are not required to be followed by loading the EDG and operating for at least one hour are discussed later.

   Requiring prelubrication for all planned starts is explicit recognition that the periodic occurrence of unplanned starts from loss of power situations or ECCS actuations are sufficient to demonstrate that an EDG will perform

adequately during starts which are not preceded by prelubrication. The conclusion that the advantages of prelubrication outweigh the advantages the routine verification that an EDG will start successfully without prelubrication are documented in References 2, 3, and 4.

3. Reliability of the EDGs is improved by specific limits for EDG loading during testing.

   The intent of this change is to avoid the less precise "at rated load" which could result in the operation of the EDG above the rated load to ensure compliance with the Technical Specification.

   The load range specified for the monthly test is 2400 to 2600 kW which is just below the EDG's continuous rating of 2600 kW. The purpose of the monthly test is satisfied by this load range because the purpose is to demonstrate the EDG starting and load handling capability and not to envelope the design basis accident conditions. Monthly testing in this range satisfies the EDG manufacturer's recommendations for routine testing.

   The load ranges specified for the 18 month 24 hour load run are 2800 - 3000 kW for the first 2 hours and 2400 to 2600 kW for the following 22 hours. The worst case EDG load profiles following an accident are documented in Reference 8. These load profiles were generated by considering each of the ten possible permutations of EDG loads following a LOOP with a LOCA on either unit coincident with any one EDG unavailable. As documented in Reference 8, the calculated loads during the first ten minutes of a design basis accident vary between 2840 kW for EDG 1 and 3059 kW for EDG 2. For the following 50 minutes of the accident, EDG loads are in the range of 2858 kW (highest) for EDG 2 and 2125 kW (lowest) for EDG 3. Therefore, the EDG test loads envelope the worst case post accidents loads with the exception of

the 3059 kW load that EDG 2 would experience for the first 10 minutes under the worst case scenario. However, all of the EDGs have previously demonstrated the ability to operate as high as 3250 kW for short periods of time. Therefore, the proposed load ranges demonstrate the ability of the EDGs to respond to the design basis accident and provide sufficient margin to prevent inadvertently exceeding the EDG 200 hour load limit of 3100 kW or the 30 minute load limit of 3250 kW.

4. Reliability and availability of the EDGs is increased by the elimination of excessive EDG Testing which removes an EDG from service for testing and imposes unnecessary wear and stress.

   The "excessive EDG testing" eliminated by the Group B Changes includes:

   Demonstrating EDG operability by starting the EDGs when another EDG is made inoperable for planned preventive maintenance; and,

   Repeating EDG operability verifications by starting the EDGs every 24 hours as long as an EDG, offsite source or any core or containment cooling system remains inoperable.

   The basis for eliminating "excessive EDG testing" is that none of the conditions which mandated EDG testing is an indicator of a potential EDG failure or that the normal Technical Specification surveillance Test schedule is not providing adequate assurance that the EDGs will be capable of performing their intended safety function.

5. Availability and reliability of the EDGs is increased by not requiring that an EDG be synchronized with an Offsite source and operated under load for at least one hour when demonstrating EDG operability is required.

The changes proposed in Group B neither require nor prohibit synchronizing an EDG to an offsite source and operating for one hour in order to demonstrate EDG operability. The purpose of this change is to avoid synchronizing an EDG to an offsite source if one of the offsite sources or an EDG is already not operable.

The most probable cause of an offsite AC source becoming inoperable is severe weather or an off normal grid condition. Testing an EDG by synchronizing it to an offsite source potentially subjects the EDG to the problems which affected the first source. NRC Information Notice 84-69, Operating Emergency Diesel Generators, warns against operating EDGs tied to offsite sources when those sources are abnormally degraded or threatened. Additionally, inoperability of an offsite source does not indicate a potential EDG failure or that the EDG's normal surveillance test program is not adequate assurance that the EDGs will be capable of performing their intended safety function.

Likewise, if an EDG is declared inoperable, connecting the remaining EDGs to an offsite source reduces their reliability and availability for one hour when the reactor unit is already operating with less than the full complement of AC sources. Problems similar to the problem which made the first EDG inoperable would, in most cases, be identified by starting the EDG as is required by the Group B Changes.

Conversely, lube oil and unburned fuel are deposited in the exhaust system during the EDG start sequence. The potential for exhaust system fires is increased because accumulated combustibles are removed by heating the exhaust system to operating temperatures. The removal of these accumulated combustibles is more effective if the higher exhaust temperatures which occur at higher loads are established and maintained for some period of time. Not operating the EDGs under load for at least one hour following an EDG start

could increase the potential that lube oil and unburned fuel oil will accumulate in the exhaust system manifolds and cause fires in the exhaust system following an engine shutdown.

This concern about accumulation of oil in the exhaust system is mitigated by the fact that the EDGs are operated for one hour at rated load at least once per month and that the number of EDG starts conducted without the load run between this monthly test will be reduced by at least a factor of three by the other changes being made to the Technical Specifications.

If the reduction in the number of EDG starts for demonstrating operability is determined not to be sufficient to offset the effects of not operating the EDGs under load after each start, the Technical Specifications do not prohibit synchronizing and loading the EDGs during the demonstrations of operability or when the full complement of AC sources is available and secure.

In summary, the cumulative effect of the Group B changes is increased EDG reliability and availability. This conclusion is supported by the US NRC Safety Evaluation for similar Technical Specifications at North Anna Power Station, Unit No. 2 (Reference 3) and US NRC Safety Evaluation for similar Technical Specifications at Limerick Generating Station (Reference 4). Additionally, the changes proposed conforms to the recommendations in Generic Letter 84-15 (Reference 2).

C. Discussion (Group C Changes):

The Group C Changes are listed and described in Section III of this assessment. The changes in Group C create more stringent requirements for the verification of operability of redundant

systems and components when an AC source (EDG or Offsite) becomes inoperable. These changes are based on the approach used in NUREG 0123 (Reference 1) and Regulatory Guide 1.93 (Reference 5).

The Action Statement time limits specified in the existing Technical Specifications for restoration of a single inoperable EDG or offsite source have not been changed even though these time limits are not in agreement with References 1 and 5. The PBAPS Technical Specification requirements were established in August 1972 which was prior to the issuance of References 1 and 5. The PBAPS time limits for restoration of a single inoperable EDG or offsite source reflect the unique design of PBAPS as previously described in Design Features, Items 1 and 2.

1. Reliability of the EDGs is increased by the proposed requirements that upon the loss of an EDG that systems, subsystems, trains, components or devices required by Technical Specifications that depend on the remaining EDGs must be verified as operable within 2 hours. The existing requirement is to verify operability of the redundant low pressure core and containment cooling systems only.

   This change is a more explicit statement of the implicit requirement for operators to verify that all systems, trains, components or devices meet the definition of OPERABILITY (as modified by Technical Specification LCO 3.0.D) or implement the Action Statements for equipment which does not meet the definition of Operability. LCO 3.0.D. modifies the definition of OPERABILITY to allow a component to be OPERABLE even if its normal or emergency power supply is not Operable as long as the redundant component is Operable or likewise satisfies the requirements of LCO 3.0.D.

   The term "verify operability" means to administratively check, by examining logs or other information, to determine if components are out of service for maintenance or other

reasons. It does not require the performance of the surveillance tests needed to demonstrate the operability of the component.

This more explicit statement of an existing requirement increases reliability by increasing the assurance that the requirement is properly implemented.

2. The Group C changes propose a requirement that upon loss of one EDG and one offsite circuit to return the offsite circuit to operable within 72 hours or initiate plant shutdown. The existing requirement allows reactor operation as long as the requirements for Low Pressure Cooling and EDG availability are met. This change increases the availability and reliability of the AC sources by requiring more rapid restoration from a degraded condition.

3. Reliability and availability of EDGs is not affected by the establishment of specific time limits for performing operability demonstration testing of EDGs when an EDG or offsite circuit is determined to be inoperable (initiate testing within 24 hours) and more restrictive limits (initiate testing within 8 hours) if both an EDG and offsite circuit are inoperable. The existing requirement is that the EDGs be demonstrated operable immediately.

   This proposed change establishes explicit time limits for the verification of the availability of redundant AC sources. These time limits recognize that a greater degree of degradation requires more rapid verification of the redundant systems. The time limits used in the Group C changes are consistent with the approach in NUREG 0123 (Reference 1) and Regulatory Guide 1.93 (Reference 5).

4. Reliability and availability of EDGs is not affected by establishment of time limits consistent with NUREG 0123 for achieving Hot Shutdown (within 12 hours) and then Cold

Shutdown (within the following 24 hours) if limiting conditions for operation or action statement requirements cannot be achieved. The existing Technical Specifications specify only that Cold Shutdown be achieved within 24 hours. The change is intended to allow maximum flexibility in selecting the optimum time to initiate the plant shutdown transient and is consistent with the guidelines in NUREG 0123 (Reference 1) and Regulatory Guide 1.93 (Reference 5).

5. Availability and reliability of AC power sources is increased by the establishment of a separate action statement and more restrictive requirements if one of the 4 kV emergency busses required by Technical Specification 3.9.A.3 is not energized. The existing Technical Specifications do not differentiate between the inoperability of an EDG or an emergency bus and allows continued plant operation for up to seven days if either condition exists. (However, LCO 3.0.D. could not be invoked on the loss of an emergency bus because both the normal and emergency power supply would be lost to the equipment powered from that bus.) The proposed change increases the availability and reliability of the AC sources by requiring more rapid restoration from a degraded condition.

In summary, the cumulative effect of the Group C changes is increased EDG reliability and the requirements established conform to recommendations in NUREG 0123 (Reference 1).

D. Discussion (Group D Changes):

The Group D Changes are listed and described in Section III of this assessment.

1. Reliability and availability of the EDGs are increased by more specific requirements for minimum inventories of diesel

fuel oil. Existing PBAPS Technical Specifications require maintaining a minimum of 104,000 gallons of diesel fuel on site while the reactor is critical. The Group D changes increase the minimum required inventory of diesel fuel oil on site from 104,000 to 108,000 gallons. Additionally, the Group D changes add the requirement that each of the four EDGs must maintain a minimum of 28,000 gallons of fuel in its associated storage tank.

The cumulative fuel inventory requirement (108,000 gallons) exceeds the fuel required based on time-dependent post accident load profiles (Reference 8). These load profiles were generated by considering each of the ten possible permutations of a LOOP with a LOCA on either unit coincident with any one EDG unavailable. Engineering calculation (PM-123, Revision 2 (Reference 9)) determined that approximately 105,000 gallons is sufficient to support operation of the EDGs for seven days using the load profile resulting in the largest fuel consumption. This fuel consumption results when all four EDGs are operable and respond as required to the LOOP/LOCA event. The greatest fuel consumption for a scenario when only 3 EDGs respond is approximately 97,000 gallons.

The calculated fuel consumption of approximately 105,000 is conservative for the following reason: some discretionary loads are included in the EDG load profiles (Reference 8); the post accident EDG load profiles assume that the EDG load one hour after the accident continues for the following seven days even though it is expected to decrease; and, no credit is taken for operator actions to secure nonessential loads or balance the electrical loads between the EDGs.

In accordance with Reference 8, the design basis accident electrical load profiles will be incorporated into UFSAR Table 8.5.2 in Revision 10. Future revisions to UFSAR Table

8.5.2, will require a concurrent assessment of the calculation of the minimum fuel oil inventory (Reference 9).

The proposed Technical Specifications increases the minimum inventory of fuel oil onsite from the existing 104,000 gallons to 108,000 gallons. The 108,000 gallon volume was selected because it is the largest inventory that can be routinely stored when only 3 of the 4 storage tanks are available (36,000 gallons per tank) and it exceeds the volume of fuel needed in the worst case post accident scenario. The difference between the 105,000 gallons actually required and the 108,000 gallons in the proposed Technical Specification will be available if necessary to accommodate additional loads to the EDGs.

The minimum requirements for diesel fuel inventories specified in Technical Specification 3.9.A.2 do not include an allowance measuring instrument accuracy. The acceptance criteria for the surveillance test procedure associated with measuring fuel inventories (4.9.A.1.2.a.1) will include an allowance for measurement accuracy.

The fuel storage requirements for the individual EDGs (28,000 gallons) is intended to address the possibility of unequal distribution of electrical load between EDGs following the LOOP/LOCA event. Without operator action to reduce non essential loads or balance loads between the EDGs, fuel consumption during the seven days following an accident could be as high as 31,366 gallons for EDG E-4 and as low as 26,830 gallons for EDG E-2. Actual fuel consumption for each EDG during an accident will vary between these limits depending on the availability and response of the EDGs at the start of the accident and subsequent operator action to reduce loads or balance the loads between the EDGs.

A minimum of 28,000 gallons in each EDG fuel storage tank provides adequate time (a minimum of 6.2 days) for operators to monitor actual fuel consumption and transfer fuel between tanks as necessary. Since transferring fuel may be required to support EDG operation, a surveillance test every 18 months will verify the ability to transfer fuel oil from each fuel storage tank to the day tank of each diesel as required by Regulatory Guide 1.108 Section C.2.a (7). Additionally, the plant is equipped with redundant fuel transfer pumps capable of transferring fuel between storage tanks.

If an EDG becomes inoperable, it will not be necessary to transfer fuel oil between tanks because credit can be taken for the fuel in the tank associated with the inoperable EDG to maintain the required minimum volume of fuel oil on site. Conversely, **if the fuel oil in one of the storage tanks is not available or is determined not in conformance with requirements**, existing Technical Specification 3.9.B.6 provides 24 hours to establish the minimum required fuel oil inventory of 108,000 gallons in the other 3 storage tanks before action must be initiated.

2. Reliability and availability of the EDGs is increased by eliminating an option allowing an EDG to be declared inoperable with no other required action when the fuel oil in one of the diesel fuel storage tanks is not available. This existing Technical Specification could render an EDG inoperable unnecessarily while the problem with unacceptable fuel in one of the storage tanks is resolved.

   The proposed change requires the use of an existing option allowing the EDG to be maintained operable by isolating the affected storage tank and lining up the associated EDG to one of the remaining storage tanks within 8 hours. Operation of an EDG with its associated fuel storage tank isolated was previously evaluated in the US NRC Safety

Evaluation supporting Amendment Nos. 131 and 134 the PBAPS Technical Specifications dated May 31, 1988 (Reference 10).

Both the existing and the proposed Technical Specifications require that the unacceptable fuel be replaced and the storage tank returned to service within 7 days. However, the existing Technical Specification would allow continued reactor operation during those seven days with only 3 of the 4 EDGs operable while the proposed Technical Specification would result in all 4 EDGs operable during the 7 days while the problem with unacceptable fuel is resolved.

In conjunction with eliminating the option of declaring an EDG inoperable, the proposed change increases the time from 24 to 72 hours permitted to establish the required inventory of 108,000 gallons of fuel in the other three storage tanks. Because proposed Technical Specification requires that each EDG maintain a minimum of 28,000 gallons of fuel in each storage tank, isolation of any one of the storage tanks would not reduce the inventory of fuel on site below 84,000 gallons. Additionally, fuel oil storage tanks are normally maintained well above minimum Technical Specification limits. Existing Technical Specifications, which do not require a minimum volume of fuel in each storage tank, do not provide any assurance that a minimum volume of fuel would be available if one of the tanks was isolated.

Based on the calculations in Reference 9, the maximum fuel oil consumption during the 7 days following a LOOP/LOCA event is 105,000 gallons if 4 EDGs are operable and 97,000 gallons if 3 EDGs are operable. As discussed earlier, these values for maximum fuel consumption are considered conservative. Therefore, even if one fuel storage tank must be isolated, sufficient fuel would be on site for 5.6 days of operation with 4 EDGs or 6 days of operation with 3 EDGs. Operator action could further extend these times by not operating the discretionary loads used in the fuel

consumption calculation. Based on the above, increasing the time from 24 to 72 hours permitted to establish the required inventory of 108,000 gallons of fuel on site increases the time that the EDGs do not have sufficient fuel to meet the design basis requirement of 7 days of post LOOP/LOCA operation. However, considering the short duration and the very low frequency in which this condition will exist, the minimum of 84,000 gallons of fuel in the other tanks provides sufficient time to obtain additional diesel fuel from off site sources.

3. Reliability of the EDGs is increased by the requirement to maintain a minimum of 200 gallons in each EDG day tank. This requirement provides sufficient fuel to operate the EDG at the continuous load for at least one hour if a fuel oil transfer capability is lost. This time is intended to allow operator action to restore transfer capability before the EDG is lost.

4. Reliability and availability of the EDGs is not affected by the elimination of the prescriptive corrective maintenance required if water is suspected between the day tank and the EDG fuel injectors. These maintenance requirements were eliminated because specific maintenance requirements may be counterproductive. Adherence to existing Technical Specifications requirements for operability and testing are sufficient to assure that water in the fuel will be detected and appropriate corrective actions taken in a timely manner.

In summary, the cumulative effect of the Group D changes is increased EDG reliability and the requirements established conform to recommendations in NUREG 0123 (Reference 1).

V. SIGNIFICANT HAZARDS CONSIDERATION:

Operational transients, design basis accidents, and other events such as floods, transients without scrams, toxic gas earthquakes, etc. are analyzed in the SAR to demonstrate that the plant can be operated without undue risk to the health and safety of the public. The initial conditions for the accidents and transients in the SAR usually include a simultaneous loss of offsite power and a single failure which results in the loss of one train of safety equipment. The single failure is assumed to directly or indirectly result in the loss of one EDG. Therefore, the design basis of the AC power systems is to provide sufficient capacity, capability, redundancy and reliability to ensure the availability of power to Engineered Safety Feature Systems so that the fuel, reactor pressure vessel and containment design limits are never exceeded.

The proposed changes to the Technical Specifications have been evaluated against the criteria in 10 CFR 50.92 and have been determined to involve no significant hazards considerations. Operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or,

(2) Create the possibility of a new or different type of accident from any accident previously evaluated; or,

(3) Involve a significant reduction in a margin of safety.

The basis for this conclusion is that the proposed changes affect the availability and reliability of AC power only. The failure of AC power sources of itself would not increase the probability of a reactor accident. Although the failure of AC power sources could increase the consequences of a reactor accident, the proposed Technical Specification changes have a cumulative effect of increasing both the availability and the reliability of the

EDGs and, therefore, would not increase the consequences of a reactor accident or result in a reduction in a margin of safety.

VI. ENVIRONMENTAL IMPACT ASSESSMENT:

An environmental impact assessment is not required for the changes proposed by this Application because the changes conform to the criteria for "actions eligible for categorical exclusion" as specified in 10 CFR 51.22 (c) (9). This Application involves no significant hazards as demonstrated in the preceding sections. The Application involves no significant change in the types or significant increase in the amount of any effluents that may be released offsite and there is no significant increase in individual or cumulative occupational exposure.

VII PORC AND NRB REVIEW

The Plant Operations Review Committee and the Nuclear Review Board have reviewed these proposed changes and have concluded that they do not involve an unreviewed safety question and are not a threat to the health and safety of the public.

ATTACHMENT 1 REFERENCES

1. NUREG-0123, Standard Technical Specifications for General Electric Boiling Water Reactors, Revision 3, Fall 1980.

2. US NRC Generic Letter 84-15, Proposed Actions to Improve and Maintain Diesel Generator Reliability, July 2, 1984

3. US NRC Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 48 to Facility Operating License No. NPF-7
Virginia Electric and Power Company
North Anna Power Station, Unit No. 2, Docket No. 50-339
Principal contributor: J. T. Beard
Dated: April 25, 1985

4. US NRC Safety Evaluation by the Office of Nuclear Reactor Regulation supporting Amendment No. 32 to Facility Operating License No. NPF-39, Philadelphia Electric Company
Limerick Generating Station, Unit 1
Docket No. 50-352
Principal contributors: Dick Clark, Om Chopra
Dated: September 28, 1989

5. US AEC Regulatory Guide 1.93, Availability of Electrical Power Sources, dated December 1974

6. US NRC Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units Used as Onsite electrical Power systems at Nuclear Power Plants, dated August 1977.

7. US NRC Information Notice No. 91-13, Inadequate Testing of Emergency Diesel Generators, March 4, 1991

8. Letter, D.R. Helwig (Philadelphia Electric Company) to US NRC, dated April 15, 1991, PBAPS, Units 2 and 3, Response to March 12, 1991 Meeting on Emergency Diesel Generators.

9. PECo Engineering Calculation PM-123, "Diesel Generator Fuel Oil Consumption for 7-Day Operation with LOCA Time Dependent Loads," Revision 2, November 4, 1991.

10. US NRC Safety Evaluation by the Office of Nuclear Reactor Regulation supporting Amendment Nos. 131 and 134 to Facility Operating License Nos. DPR-44 and 56
Peach Bottom Atomic Power Station, Unit Nos. 2 and 3
Docket Nos. 50-277 and 50-278
Principal contributor: T. Chandrasekaram
Dated: May 31, 1988

ATTACHMENT 2 **TECHNICAL SPECIFICATION NUMBERS:**

Proposed Tech. Spec.	Existing Tech. Spec.	Change
3.9.A	[3.9.A]	Heading
3.9.A.1	[3.9.A.1]	No Change
3.9.A.2	[3.9.A.2]	Change
3.9.A.2.a	[3.9.A.1]	Added Requirement
3.9.A.2.b	[3.9.A.2]	Change
3.9.A.2.c	[None]	Added Requirement
3.9.A.1.3	[3.9.A.3]	No Change
3.9.A.1.4	[3.9.A.4]	No Change
3.9.B	[3.9.B]	No Change
3.9.B.1	[3.9.B.1]	Change
3.9.B.2	[3.9.B.2]	No Change
3.9.B.3	[3.9.B.3] [3/4.5.F]	Change
3.9.B.4	[3.9.B.4] [3/4.5.F]	Change
3.9.B.5	[3.9.B.5]	No change
3.9.B.6	[3.9.B.6]	Change
	[3.9.B.6.1]	Deleted
3.9.B.6.	[3.9.B.6.2]	No change
3.9.B.6.a	[3.9.B.6.2.a]	No change
3.9.B.6.b	[3.9.B.6.2.b]	Change
3.9.B.6.c	[3.9.B.6.2.c]	No change
3.9.B.6.d	[3.9.B.6.2.d]	Change
3.9.B.7	[None]	Added Requirement
3.5.F	[3.5.F]	Heading
3.5.F.1 (deleted)	[3.5.F.1]	Relocation
4.9	[4.9]	Heading
4.9.A.1	[4.9.A.1]	Change
4.9.A.1.1	[None]	Added Requirement
4.9.A.1.1.a	[None]	Added Requirement
4.9.A.1.1.b	[None]	Added Requirement
4.9.A.1.2.a	[4.9.A.1.a]	Change
4.9.A.1.2.a.1	[4.9.A.1.c]	Change
4.9.A.1.2.a.2	[4.9.A.1.a]	Change
4.9.A.1.2.a.3	[4.9.A.1.a]	Change
4.9.A.1.2.a.4	[None]	Added Requirement
4.9.A.1.2.a.5	[None]	Added Requirement
4.9.A.1.2.a.6	[4.9.A.1.a]	Change

Attachment 2 Technical Specification Numbers:

Proposed Tech. Spec.	Existing Tech. Spec.	Change
4.9.A.1.2.b	[4.9.A.1]	Change
4.9.A.1.2.c	[4.9.A.1.d]	Change
4.9.A.1.2.c.1	[4.9.A.1.d.1)]	No Change
4.9.A.1.2.c.2	[4.9.A.1.d.1)]	No Change
4.9.A.1.2.d	[4.9.A.1.e]	No Change
4.9.A.1.2.d.1	[4.9.A.1.e.1)]	No Change
4.9.A.1.2.d.1.a)	[4.9.A.1.e.1) a)]	No Change
4.9.A.1.2.d.1.b)	[4.9.A.1.e.1) b)]	No Change
4.9.A.1.2.d.1.c)	[4.9.A.1.e.1) c)]	No Change
4.9.A.1.2.d.1.d)	[4.9.A.1.e.1) d)]	No Change
4.9.A.1.2.d.2	[4.9.A.1.e.2)]	No Change
4.9.A.1.2.e	[4.9.A.1.e]	Change
4.9.A.1.2.f	[None]	Added Requirement
4.9.A.1.2.f.1	[4.9.A.1.j]	No Change
4.9.A.1.2.f.2	[None]	Added Requirement
4.9.A.1.2.f.3	[None]	Added Requirement
4.9.A.1.2.f.4	[None]	Added Requirement
4.9.A.1.2.f.5	[None]	Added Requirement
4.9.A.1.2.f.6	[None]	Added Requirement
4.9.A.1.2.f.7	[None]	Added Requirement
4.9.A.1.2.g	[None]	Added Requirement
4.9.A.1.2.g.1	[None]	Added Requirement
4.9.A.1.2.g.1.a)	[None]	Added Requirement
4.9.A.1.2.g.1.b)	[None]	Added Requirement
4.9.A.1.2.g.2	[None]	Added Requirement
4.9.A.1.2.g.3	[4.9.A.1.b]	Change
4.9.A.1.2.g.3.a)	[4.9.A.1.b]	Change
4.9.A.1.2.g.3.b)	[4.9.A.1.b]	Change
4.9.A.1.2.g.4	[None]	Added Requirement
4.9.A.1.2.g.4.a)	[None]	Added Requirement
4.9.A.1.2.g.4.b)	[None]	Added Requirement
4.9.A.1.2.g.4.c)	[None]	Added Requirement
4.9.A.1.2.h	[None]	Added Requirement
4.9.A.1.2.i	[4.9.A.1.g]	No Change
4.9.A.1.2.j	[4.9.A.1.h]	No Change
4.9.A.1.2.j.1	[4.9.A.1.h.1)]	No Change
4.9.A.1.2.j.2	[4.9.A.1.h.2)]	No Change
4.9.A.1.2.k	[4.9.A.1]	Change
4.9.A.1.2.l	[None]	Added Requirement

Attachment 2 Technical Specification Numbers:

Proposed Tech. Spec.	Existing Tech. Spec.	Change
4.9.A.1.2	[4.9.A.2]	No Change
4.9.A.1.3	[4.9.A.3]	No Change
4.9.B.1	[3.9.B.1]	Change
4.9.B.2	[None]	No Change
4.9.B.3	[3.9.B.3 & 3.5.F]	Change
4.9.B.4	[3.9.B.4 & 3.5.F]	Change
4.9.B.5	[None]	No Change
4.9.B.6	[None]	No Change
4.9.B.7	[None]	No Change
4.5.F.1 (Deleted)	[4.5.F.1]	Relocation
Table 3.2.B	[Table 3.2.B]	Change
Notes Table 3.2.B	[Notes Table 3.2.B]	Change
Bases 3.9	[Bases 3.9]	Change
Bases 4.9	[Bases 4.9]	Change