

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :
PHILADELPHIA ELECTRIC COMPANY : Docket No. 50-352

APPLICATION FOR AMENDMENT
OF
FACILITY OPERATING LICENSE
NPF-39

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Philadelphia Electric Company, Licensee under Facility Operating License NPF-39, hereby requests that the Technical Specifications contained in Appendix A to the Operating License be amended as indicated by a bar in the margin of the attached pages 3/4 8-1, 3/4 8-1a, 3/4 8-2, 3/4 8-3, 3/4 8-4, 3/4 8-5, 3/4 8-6, 3/4 8-7, 3/4 8-7a, 3/4 8-8, 3/4 8-9, and B 3/4 8-1.

The proposed changes to the Technical Specifications are related to the onsite emergency diesel generators (EDGs). The proposed changes will improve the reliability of the emergency diesel generators and reduce the risk from possible station

blackout. They are in response to Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability" and are consistent with license changes previously approved for the North Anna Power Station, License No. NPP-7 in Amendment No. 48 issued on April 25, 1985 and vendor recommendations.

Discussion

The on-site electrical power systems for the Limerick Generating Station are described in Chapter 8 of the FSAR. The class 1E portion of the onsite power system for each unit consists of four redundant and independent 4.16-KV distribution systems, with their 440-V load centers and motor control centers, 208/120-V ac power system, 125-V dc system and the standby power supplies (diesel generator units). Each 4.16-KV bus is normally fed from either of two offsite power sources, designated as preferred and alternate, connected to the 220-KV and 500-KV substations through dedicated station auxiliary transformers. One of these two (safeguard) power supply systems is the preferred power source for channels A and C for Unit 1 and channels B and D for Unit 2. The other safeguard power supply is the preferred power source for channels B and D for Unit 1 and channels A and C for Unit 2. The normal preferred power source to each bus is electrically interlocked with the alternate power source so that the bus can only be connected to one (single) power source at any one time. In the event of loss of preferred power to an engineered safeguard bus, an undervoltage relay

initiates automatic transfer to the alternate power source and starts the diesel generator if the transfer fails. After transfer, if all offsite power sources remain unavailable, the onsite standby power system will power the safeguard buses.

Limerick Generating Station, Unit 1, has four electrical divisions. The emergency power supply for each of these divisions consists of one diesel generator set complete with all necessary auxiliary systems. Each diesel generator is connected to only one 4.16-KV class 1E bus. Each diesel generator set is operated independently and is normally disconnected from the offsite power system, except during testing. Each diesel generator is automatically started by either a LOCA signal or by an emergency bus undervoltage signal from its respective bus and is capable of attaining rated voltage and frequency within 10 seconds after receiving a starting signal. In the event of a LOCA, the electrical loads are automatically connected to their respective diesel generator, after rated voltage and frequency are attained by the diesel generators, with the loads being connected in a predetermined sequence over an approximate three minute period.

Some of the existing Surveillance testing requirements for the EDGs include demonstrating starting capabilities from ambient conditions without specifically designating pre-lubrication or prewarming prior to the test. Further, the existing Technical Specifications stipulate that the EDGs must

demonstrate the ability to connect and carry full electrical load while still cold.

It is this routine Surveillance Testing of the "cold fast start" capability of the diesel generators in 10 seconds without provisions for prelubrication or prewarming, along with the rapid three minute loading, which has caused serious problems in the reliability of diesel generators. The proposed changes described below are related to the "cold fast start" testing requirements and to the relationship between periodic testing and diesel generator reliability. Other proposed changes include provisions for completing the 18 month maintenance inspection while at power rather than when shutdown.

The Licensee does not propose any changes to the schedule or methods for offsite-to-onsite circuit verification or any changes to the periods allowed for recovery from degraded conditions in the Action Statements.

Generic Letter 84-15

The Commission staff, in Generic Letter, 84-15 discussed the need to assure that the reliability of diesel generators is maintained at an acceptable level, by reducing the number of cold fast starts for surveillance testing because the cold fast starts cause unnecessary premature diesel engine degradation. The staff determined that some testing techniques for diesel generators did not take into consideration those manufacturer-recommended preparatory actions such as prelubrication of moving parts and

warm-up procedures prior to starting diesel generators. The prelube/prewarm actions are necessary in order to reduce engine wear, extend diesel generator life, therefore increasing EDG availability. The existing surveillance requirements require fast diesel generator starts from ambient conditions. These "cold fast starts" subject the diesel generators to undue wear and stress on engine parts. The diesel generator vendor recommends gradually accelerating the diesel generators to synchronous speed during testing to prevent stresses resulting from rapid temperature changes during a fast start. Further, the present manner of electrical loading (and unloading) of the generator also has adverse effects on EDG reliability. Gradual electrical loading decreases the wear and stresses on the diesel engine and on the generator.

Proposed Routine EDG Test Method

The proposed routine EDG tests will require the engine to start and automatically accelerate to an initial setting (idle speed, 300 - 500 rpm). Engine speed will then be manually increased to synchronous speed over a period of 1 to 2 minutes. Loading of the EDG will be manually increased in a series of plateaus rather than a continuous ramp to the required load.

The EDG will be inoperable during the beginning of each routine test due to the generator excitation being turned off and the governor mechanical speed control setpoint being lowered. The de-energization of the diesel generator field excitation is annunciated locally with a common trouble alarm being annunciated

in the main control room to alert the operators to the diesel generator's inoperability, per Regulatory Guide 1.47. These periods of inoperability will be minimized by procedural controls. The periods of inoperability will not be used in the availability calculations since they are associated with tests performed in accordance with vendor's recommendations.

Limerick EDGs are equipped with lube oil and jacket water keepwarm systems which maintain the lube oil at approximately 125-130 degrees F and the jacket water at 110-115 degrees F. These systems operate whenever the engine is shutdown and are considered to be part of the diesel generator ambient conditions. It is Limerick policy to accept inoperability of an EDG when a keepwarm system does not operate properly and necessary temperatures cannot be maintained.

EDG Slow Start Test Results

A test of the slow start capabilities of the Limerick diesels was conducted on June 20, 1988. The D13 diesel generator was successfully manually started to reach an idle speed of 300 - 500 rpm per vendor recommendations. The engine speed was increased over a several minute period, to normal speed when the field was flashed. The engine was then loaded in steps of approximately 350 KW over a ten minute period to full load. The test proved the following:

- a) Engine control system allows slow starts without modification

- b) There are no critical engine speeds during the acceleration phase.

Categories of Proposed Changes

Changes to the Diesel Generator section of the Technical Specifications for the Limerick Generating Station, Facility Operating License NPF-39, are based on the Commission staff's "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability", Generic Letter 84-15 and "Recent Engine Failures of Emergency Diesel Generators", I.E. Information Notice, 85-32, North Anna Power Station license changes, and vendor recommendations.

The proposed changes in regard to the Limerick emergency diesel generators fall into several categories or types of changes:

- (1) Changes in the Technical Specifications to specify pre-lubrication and prewarming of diesel generators prior to starting for testing purposes.
Prelubrication/prewarming would decrease the wear and stress on the diesel generator and would increase reliability and availability (Category A).
- (2) Changes in the Technical Specifications to provide for gradual acceleration and gradual electrical load increases to an indicated load value (band) during diesel generator testing in order to decrease the

stresses inherent with rapid acceleration, sudden large electrical load changes and routine overloading in accordance with vendor recommendations. (Category B).

- (3) Revising the surveillance starting/testing frequency in order to limit the incremental wear and stress on the diesel generators (Category C).
- (4) Revising the accelerated starting test frequency program so that it will be based on the number of failures in the last 20 demands in lieu of the failures in the last 100 valid tests in order to maintain increased diesel generator reliability without excessive and damaging surveillance "cold fast starts" (Category D).
- (5) Changes in the Technical Specifications to allow diesel generator maintenance inspections (18 month tear down) while at power, rather than "during shutdown", in order to decrease outage time used for maintenance tear down and allow more time for inspection in lieu of the requirement for tear down inspections only under a limited outage schedule (Category E).
- (6) Incorporate the 184 day (paragraph 4.8.1.1.2.a.4) starting surveillance into paragraph 4.8.1.1.2.h., allowing in this new paragraph for prelubrication and prewarming of the EDGs with electrical loading to a band value within 200 seconds.

Also, the existing paragraph 4.8.1.1.2.a.4 and the single asterisk footnote at the bottom of page 3/4 8-3 would then be eliminated from Specification 4.8.1.1.2.a (tagged test basis) (Category F)

Discussion - Category A Changes

The proposed Category A type changes to the Technical Specifications would allow prelubrication and prewarming of Emergency Diesel Generators (EDG) prior to preplanned EDG starts. The NRC reported in Enclosure 1 to Generic Letter 84-15 that overall improvement in diesel engine reliability and availability can be gained by performing diesel generator starts using engine prelube to reduce engine stress and wear.

The proposed Category A changes listed below are similar in that these changes all relate to prelubrication and prewarming prior to preplanned EDG starts.

List of Category A Changes

Page 3/4 8-3

Changes are proposed which would revise paragraph 4.8.1.1.2.a.4 eliminating the cold fast starts from ambient conditions. The starting signals listed as a, b, c and d would be

moved to paragraph
4.8.1.1.2.h to be verified
every 184 days.

Page 3/4 8-3

The single asterisk
footnote would be revised
to require prewarming and
prelubrication of the EDGs
prior to testing in
paragraphs 4.8.1.1.2.a.4
and 4.8.1.1.2.a.5.

Page 3/4 8-5

A single asterisk footnote
would be added to require
prewarming and
prelubrication of the EDGs
prior to testing in
paragraph 4.8.1.1.2.e.4.b,
4.8.1.1.2.e.5 and
4.8.1.1.2.e.6.b.

Page 3/4 8-6

A single asterisk footnote
would be added to the page
to require prewarming and
prelubrication of the EDGs
prior to testing in
paragraph 4.8.1.1.2.e.8.

Page 3/4 8-7

Paragraph 4.8.1.1.3
Reports would be moved to

a new page 3/4 8-7a to enable insertion of a new paragraph "h".

Page 3/4 8-7

A single asterisk footnote would be added to the page to require prewarming and prelubrication of the EDGs prior to testing in paragraph 4.8.1.1.2.f.

Page 3/4 8-7a

A single asterisk footnote would be added to the page to require prewarming and prelubrication of the EDGs prior to testing in paragraph 4.8.1.1.2.h.

Safety Significance-Category A Changes

Some surveillance testing under the existing Technical Specifications requires EDG fast starts from ambient conditions. These tests subject the EDG to undue wear and stress on engine parts. The Commission staff in Generic Letter 84-15 concluded that the frequency of cold fast start tests from ambient conditions, without a prelube or prewarm period, should be reduced. The Commission staff concluded that allowing for prelubrication and prewarming, based on industry experience and manufacturer's recommendations, increases the margin of safety by

increasing the reliability/availability of the EDGs thereby decreasing the risk of station blackout.

Significant Hazards Consideration - Category A Changes

The allowance for prelubrication and prewarming of diesel generators does not involve Significant Hazards Considerations. In order to support a No Significant Hazards Consideration determination, necessary background supporting information is provided below, along with an evaluation of each of the three standards set forth in Title 10 CFR Section 50.92.

Operation of the plant under the proposed Technical Specifications in regard to allowing prelube and prewarming of the diesel generators prior to testing would not:

- 1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

Prelubrication and prewarming of the EDG engine prior to starting decreases the wear on the engine parts. Industry experience demonstrates these measures to extend the life and thereby the availability of EDGs. Testing EDGs from ambient conditions, without prelubrication/prewarming of the engine, has been shown to cause incremental damage to the engine parts while the "cold started" engine is reaching temperature equilibrium.

Industry experience has also shown that there are sufficient unplanned cold starts of the diesel generators because of various non-testing causes (such as off-site power losses) to demonstrate the "cold start" ability of the EDGs, without the need for also planning frequent periodic tests which are known to cause incremental damage to engine parts.

Therefore, the reduction in the number of "cold starts" of EDGs by specifying that all scheduled starts include prelubrication and prewarming, increases the availability of the onsite emergency power system and does not increase the probability or consequences of an accident previously evaluated.

- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

The operation and/or design of the onsite emergency power system is not being changed; only the surveillance methods and schedules. Therefore, based on the positive commission staff conclusions, along with industry experiences which have demonstrated the advantages of prelubrication and prewarming (EDG) starting procedures, the changes to the EDG testing methods do not create the possibility of a new or different kind of accident from any accident previously evaluated. The change in methods would continue to demonstrate the availability of EDGs as was previously evaluated, without the

incremental testing damage caused by test starts from ambient conditions. Unscheduled starts of the EDGs from ambient conditions are sufficiently frequent, to demonstrate their cold starting capability. The Safety Evaluation by the NRC Office of Nuclear Reactor Regulation related to Amendment No. 48 to License No. NPF-7, North Anna Power Station, Virginia Electric and Power Company, reported the experiences of the NRC in reviewing reactor operating events, stating that a number of actual EDG demands occur that are not planned, due to actual loss-of-power situations or to ESF actuations.

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

The prelubrication and prewarming sequence has been demonstrated by industry experience to increase the reliability and therefore the availability of the EDGs. Further, the Commission staff has concluded that all preplanned EDG starts should include a prewarming, prelubrication sequence. The proposed changes which would specify prewarming and prelubrication, therefore do not involve a significant reduction in a margin of safety.

Conclusion

Based on the three standards discussed above, the operation of the facility after making the proposed Category A

changes to the Technical Specifications, involves no Significant Hazards Considerations.

Discussion - Category B Changes

The proposed Category B type changes to the Technical Specifications would allow gradual acceleration and gradual electrical loading of the generator during the surveillance tests, rather than rapidly accelerating and switching large electrical loads to the generator in rapid incremental stages. The proposed changes would also allow electrical loading to a band value rather than a specific load value to decrease the possibility of routinely overloading the diesel generators.

The proposed Category B type changes listed below are similar in that the changes all relate to the manner by which the Emergency Diesel Generators are accelerated and electrically loaded during testing. Gradual acceleration and gradual electrical loading of the generator decreases the stresses on both the generator and engine and therefore would be operationally advantageous, avoid premature wear, and lead to greater EDG availability.

Listing of Category B Type Changes

Page 3/4 8-1

Page 3/4 8-1a

Page 3/4 8-2

Changes are proposed
to action statements
"a", "b", "c", "d", "f",

"g" and "h" to include loading the EDG after every start per vendor recommendations by performing surveillance requirement 4.8.1.1.2.a.5.

Page 3/4 8-3

Changes are proposed which would revise paragraph 4.8.1.1.2.a.4 to allow the EDG to be gradually accelerated to synchronous speed rather than rapidly accelerated within less than or equal to 10 seconds.

Page 3/4 8-3

Changes are proposed which would revise paragraph 4.8.1.1.2.a.5 to allow the EDG to be gradually loaded rather than loading the generator prior to establishing engine temperature equilibrium.

Page 3/4 8-3

A double asterisk footnote would be added to page 3/4 8-3 which would add further explanation to the

loading band value
indicated in paragraph
4.8.1.1.2.a.5.

Page 3/4 8-3
Page 3/4 8-5
Page 3/4 8-6
Page 3/4 8-7
Page 3/4 8-7a

The proposed single asterisk
footnote also includes direction
to perform surveillance test
in accordance with vendor
recommendations regarding
loading and shutdown.

Page 3/4 8-6

Changes are proposed which
would revise paragraph
4.8.1.1.2.e.8 to allow
gradual acceleration of
the diesel generator and
gradual electrical loading
to a band value.

Page 3/4 8-6

A double asterisk footnote
would be added to page 3/4
8-6 which would add
further explanation for
the loading band value
indicated in paragraph
4.8.1.1.2.3.8.

Page 3/4 8-7a

The signals for starting
the EDGs would be included

in a new proposed paragraph 4.8.1.1.2.h along with a fast start every six months after prewarming and prelubrication.

Page 3/4 8-7a

A double asterisk footnote would be added to page 3/4 8-7a, which would add further explanation for the loading band value indicated in paragraph 4.8.1.1.2.h.

Page 3/4 8-9

Proposed change to Surveillance Requirement 4.8.1.2 to delete exclusion of Surveillance Requirement 4.8.1.1.2.a...

Page B 3/4 8-1

Changes are proposed to indicate exception to Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electrical Power Systems at Nuclear Power Plants," Revision 1,

August 1977 to allow gradual loading of diesel generators during testing.

Safety Significance - Category B Changes

The existing Technical Specifications require rapid acceleration of the diesel generators to synchronous speed in less than or equal to 10 seconds (4.8.1.1.1.2.a.4 and 4.8.1.1.2.e.8) and rapid electrical loading to greater than or equal to 2850 kW (4.8.1.1.2.a.5 and 4.8.1.1.2.e.8).

The proposed changes to paragraphs 4.8.1.1.2.a.4 and 4.8.1.1.2.e.8 are to delete the requirement for acceleration to synchronous speed within 10 seconds to incorporate the vendor's recommendations to gradually accelerate to synchronous speed over a 1 to 2 minute period. Test procedures will be developed to require the engine to start and automatically accelerate to an initial setting (idle speed) followed by manual increase of the speed setting to synchronous speed over a period of 1 to 2 minutes.

The fast start of diesel generators has been identified as a contributing cause for diesel generator failures at the North Anna Power Station. Gradual acceleration during surveillance tests was approved by the NRC staff for the North Anna Technical Specifications in April 1985.

The proposed changes to allow gradual electrical loading of the EDG upon synchronization incorporates vendor recommendations into the surveillance testing requirements. Industry experience and Commission staff conclusions reported in Enclosure 1 of Generic Letter 84-15 support gradual electrical loading of the generators as a factor which leads to more reliability and availability of the EDGs. Increased reliability and availability of the EDGs decrease the possibility of a station blackout.

The proposed single asterisk on Pages 3/4 8-3, 3/4 8-5, 3/4 8-6, 3/4 8-7, and 3/4 8-7a includes direction to perform surveillance tests in accordance with vendor recommendations regarding loading and shutdown in addition to previously discussed prelubrication and prewarming. This proposed change will assure the EDGs are operated in accordance with vendor recommendations during all planned tests in order to extend diesel life and improve reliability.

The changes to action statements "a", "b", "c", "d", "f", "g" and "h" to require the performance of both Surveillance Requirements 4.8.1.1.2.a.4 and 4.8.1.1.2.a.5 rather than just 4.8.1.1.2.a.4 alone, are proposed to incorporate vendor recommendations regarding diesel operation. The vendor recommends that every planned EDG start be followed by a 60 minute loaded run at at least 60% continuous rating. The change to page 3/4 8-9 to delete the exclusion of surveillance requirement 4.8.1.1.2.a.5, requires the EDG to be loaded to demonstrate its operability. These changes would provide

assurance that every surveillance test-related EDG start is followed by a loaded run which will increase the reliability and availability of the EDGs.

The proposed changes also allow the EDGs to be loaded to a band of 2600-2700 kW rather than greater than or equal to 2850 kW to prevent routine overloading during the performance of the monthly surveillance tests. The load value of 3135 kW for the 2-hour portion of the 24-hour test of paragraph 4.8.1.1.2.e.8 would be changed to a band of 2800-2900 kW to prevent overloading the diesel generator to greater than 110% of its continuous rating.

The general requirements for periodic diesel generator surveillance testing are established by Regulatory Guide 1.108 and the Standard Technical Specifications. These specify that during the monthly test, the EDG is to be loaded to the continuous duty rating. Further, during the 24-hour load run conducted on a 18-month basis, the EDG is to be loaded to the 2-hour rating for the first 2 hours, followed by 22 hours at the continuous duty rating. The monthly test should exercise the EDG, confirm its operability, and detect degradation or a failure before a second EDG failure is likely to occur. During the 18-month testing, the proposed test load envelopes the calculated maximum accident loads. It is our position that it is not necessary or desirable to envelope the design basis accident loads by a test which is repeated 12 times a year. The potential to routinely overload the EDG is too great and the 18-month test adequately verifies the EDG's capability to supply the design basis accident loads. Gradually loading the EDG to 2600-2700 kW

during the monthly testing allows verification of the operability of the EDG at greater than 90% of its continuous duty rating of 2850 kW.

Loading the EDG to 2800-2900 kW during the 2-hour portion of the 24-hour test conducted every 18 months, confirms the EDG's capability to supply the maximum calculated design basis accident loads while providing enough margin to the 110% continuous duty rating value of 3135 kW to prevent overloading. The maximum design basis accident load of 2805 kW is presented in FSAR Table 8.3-2.

Significant Hazards Considerations - Category B Changes

Gradual acceleration and gradual electrical loading of the Emergency Diesel Generators decrease the stresses on the diesel engine and generator. Loading the EDGs to a band value would prevent potential routine overloading on a monthly basis and during the 18-month testing. The proposed changes to the Technical Specifications do not involve Significant Hazards Considerations. In order to support a No Significant Hazards Consideration determination, the supporting information in regard to Category B changes is provided below, along with an evaluation of each of the three standards set forth in Title 10 CFR Section 50.92.

Operation of the facility under the proposed Technical Specifications allowing gradual acceleration and gradual electrical loading of the generator during testing would not:

- (1) Involve a significant increase in the possibility or consequences of an accident previously evaluated.

Licensee proposes to change the surveillance test requirement (4.8.1.1.2.a.4 and 4.8.1.1.2.e.8) "accelerate to synchronous speed (882 rpm) in less than or equal to 10 seconds" to "gradually accelerate to synchronous speed" in order to incorporate the vendor's recommendation to gradually accelerate to synchronous speed over a 1 to 2 minute period. Existing Technical Specifications require monthly testing of each diesel generator, demonstrating that the diesel starts from ambient conditions and verifying synchronization and loading to greater than or equal to 2850 KW, then operating with this electrical load for at least 60 minutes. Licensee proposes to change the loading requirements to allow the diesel engine to first reach temperature equilibrium before gradually loading the generator to 2600-2700 KW, then operating for 60 minutes. Licensee also proposes to test the ENG to a load of 2800-2900 kW rather than 3135 kW during the 18 month test to reduce the possibility of overloading the diesel and continue to envelope the design basis accident loads presented in FSAR Table 3.3-2. By establishing temperature equilibrium prior to loading the generator, then gradually loading up to a band of 2600-2700 kW for the monthly tests and 2800-2900kW for the 18 month tests, the routine overloading and over-

stressing of the diesel engine would be avoided. Stress from cold fast starts and from sudden large electrical load swings on the generators has been reported by nuclear industry groups (INFO and American Nuclear Insurers) to affect the reliability and the availability of diesel generators because of incremental and premature engine wear. Gradual increases in electrical loading, along with prelubrication and prewarming, were reported to be a factor which would increase the availability of the EDGs.

In order to extend the life of the EDGs, testing the ability of the EDGs to synchronize and supply the design basis accident loads would be tested every 18 months in lieu of the existing 31 day cycle. The proposed testing requirements would still verify the ability of the EDGs to start, synchronize, and accept the rated loads required for safe shutdown. The proposed changes to allow gradual acceleration of the EDG to synchronous speed, gradual electrical loading to a band of 2600-2700 kW for the monthly tests and 2800-2900 for the 18 month tests, do not involve a significant increase in the possibility or consequences of an accident previously evaluated.

- (2) Create the possibility of a new and different kind of accident from any accident previously evaluated.

Changing the rate of acceleration and electrical loading of the diesel generators under test to allow gradual acceleration and gradual loading, rather than starting the EDGs, rapidly accelerating, synchronizing and rapidly loading to the rated continuous capacity of 2850 kW, does not change the operation or design of the EDGs, but merely decreases the harsh and stressful EDG testing requirements. The (starting) availability of the EDGs is still tested on a frequent (31 day) basis, while the capability to supply the design basis accident loads is tested on a less frequent, 18 month cycle.

Therefore, testing the availability (starting) of the EDGs on a frequent basis, while testing the capability (loading) of the EDGs on an 18 month cycle, does not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

The proposed changes to the acceleration and electrical loading of the diesel generators does not change the availability or capability of the EDGs. The availability of the EDG will be tested on a frequent monthly basis and the capability of the EDG to supply the design basis accident loads will be tested on an 18 month basis. The reduction of the load value for the 2 hour portion of the 24 hour test from 3135 kW to 2800-2900 kW does not reduce the effectiveness of the test.

because the maximum design basis accident load of 2805 kW is enveloped by the band of 2800-2900 kW.

Decreasing the harsh and damaging manner of testing would lead to greater availability of the EDGs and therefore the proposed Category B type changes do not involve a significant reduction in a margin of safety.

Conclusion

Based on the discussion above in regard to the three standards of Title 10 CFR Section 50.92, the proposed change in the sequence of electrical loading during EDG testing, involves no Significant Hazards Considerations.

Discussion - Category C Changes

The Category C type changes would revise the surveillance starting and testing frequency requirements for EDGs in order to limit the stress and wear on the EDGs.

The proposed type C changes listed below are all inter-related in that these Category C type changes all relate to the frequency at which the EDGs are tested for various reasons.

List of Category C Type Changes

Page 3/4 8-1

The proposed change to action statement "a" would

delete the requirement to immediately test the remaining EDGs if the reason for the one EDG being inoperable is preplanned preventative maintenance, modification, or testing.

Page 3/4 8-1

Proposed addition of an asterisk '*' to action statement "a" to require testing of the remaining EDGs if the reason for the EDG being inoperable is potentially generic for the remaining EDGs, regardless of when the inoperable EDG is restored to OPERABILITY.

Page 3/4 8-1

Proposed changes to action statement "b" would allow commencement of the initial EDG tests within 8 hours, rather than completion within 1 hour and delete the requirement

for repeat EDG testing every 8 hours.

Page 3/4 8-1a

Proposed changes to action statement "c" would allow commencement of the initial EDG tests within 1 hour and delete the requirement for repeat EDG testing every 8 hours.

Page 3/4 8-1a

Proposed changes to action statement "d" delete the requirement for testing the remaining EDGs if the reason for being inoperable is known and preplanned.

Page 3/4 8-1a

Proposed change to action statement "d" to increase the 1 hour action time for initial testing of EDGs to 8 hours and to delete the requirement for repeat EDG testing every 8 hours.

Page 3/4 8-1a

Proposed addition of an asterisk '*' to require testing of the remaining

EDGs if the reason for the EDG being inoperable is potentially generic for the remaining EDGs, regardless of when the inoperable EDG is restored to OPERABILITY.

Page 3/4 8-2

Proposed changes to action statement "f" would delete the requirement for repeat EDG testing every 8 hours.

Page 3/4 8-2

Proposed change to action statement "f" to increase the 1 hour action time for initial testing of EDGs to 24 hours.

Page 3/4 8-2

Proposed change to action statement "f" would allow credit for EDG tests completed within the preceding 24 hours.

Page 3/4 8-2

Proposed change to action statement "g" would allow commencement of the initial EDG tests within 8 hours, rather than

completion within 1 hour
and delete the requirement
for repeat EDG testing
every 8 hours.

Page 3/4 8-2

Proposed changes to action
statement "h" would allow
commencement of the
initial EDG tests within 8
hours, rather than
completion within 1 hour
and delete the requirement
for repeat EDG testing
every 8 hours.

Safety Significance - Category C Changes

The NRC staff concluded in Generic Letter, 84-15 that the frequency of starting tests of EDGs from ambient conditions should be reduced. The conclusion was based on industry experience with premature failure of EDGs due to stress and wear caused by excessive starts.

Licensee proposes changes to action statement paragraphs 'a' and 'd' to delete the requirement to immediately test the remaining EDGs if the reason for the one EDG being inoperable is preplanned preventative maintenance, modification, or testing. EDGs are surveillance tested in order to demonstrate operability. Whenever one (or more) of the EDGs becomes inoperable, the action

statement requires that the availability of the other EDGs is to be demonstrated, in order to assure that any unknown (or undiscovered) generic problem does not exist on the other EDGs. In those cases where the reason or cause of the one EDG being inoperable is known to be due to preventive maintenance, modification work or during testing, then surveillance testing of the remaining EDGs is not justified and adds incremental unnecessary engine wear due to starting stresses. Therefore, in those cases where the cause or reason for one of the EDGs becoming inoperable is known and preplanned, and not the result of a generic problem, Licensee proposes to delete the requirement of testing all of the remaining EDGs within 24 hours.

Licensee also proposes an addition of an asterisk to paragraphs 'a' and 'd' to require testing of the remaining EDGs when the reason for the one EDG being inoperable may be potentially generic to the remaining Unit 1 EDGs and appropriate alternative testing cannot be designed, regardless of when the EDG is restored to operability. Even if the inoperable EDG is restored to service prior to expiration of the required test period, it remains important to demonstrate the availability of the remaining EDGs to assure that any generic problem does not exist in the other EDGs. Although this restriction may increase the number of EDG starts, the verification of EDG availability would increase EDG reliability by decreasing the possibility for a generic problem to affect the other EDGs' operability.

Licensee proposes to change action statement paragraph 'f' to allow credit for successful EDG tests completed within 24 hours of the required action start time. This change is proposed in order to reduce the number of unnecessary diesel starts and therefore increase the reliability and lifespan of the EDGs. Reasonable assurance of starting capability having been demonstrated during the previous 24 hours would remain within the same timeframe as that required in the existing action statement, maintaining the safety margin in regard to possible station blackout. The EDGs which had been successfully tested during the previous 24 hours would then need only be tested again at least once every 7 days.

Changes are also proposed to paragraphs 'b', 'c', 'd', 'f', 'g' and 'h' to delete the requirement for repeat testing of the EDGs after the initial tests are performed. In the North Anna SER dated April 25, 1985, the NRC referenced a test interval of 3 days to be optimal for verification of EDG operability when a plant system is already degraded. For these paragraphs, a repeat EDG test interval of 3 days after the initial tests would not occur within the Action recovery time limit of 72 hours. Deleting the requirement for repeat EDG tests, where applicable, eliminates unnecessary and excessive testing of the EDGs.

To allow a more orderly demonstration of operability including prelubrication and prewarming of the EDG engine, along with gradual electrical loading of the generator, the Licensee proposes to change paragraphs "b", "c" and "g" to commence the demonstration of operability within 1 hour rather than complete

the test within 1 hour. Changes are proposed to increase the one hour action time for the initial test of the remaining EDGs in action statements "d" and "f" to 8 and 24 hours, respectively, to allow more time for the plant operators to respond to immediate accident conditions and plant abnormalities. The 8 and 24 hour periods reflect the degree of degradation of the A.C. electrical power supply. Eight hours would be allowed to begin testing EDGs in the event of one offsite circuit and one EDG are inoperable. Twenty-four hours would be provided to begin testing of EDGs when one offsite circuit is inoperable. The proposed more orderly demonstration of operability would decrease the stress on the EDG, result in greater EDG availability, and provide plant operators more time to respond to abnormal plant conditions.

The Licensee does not propose any changes to the schedule or methods for offsite-to-onsite circuit verification or any changes to the periods allowed for recovery from degraded conditions.

Significant Hazards Considerations - Category C Changes

The Category C type changes to the Technical Specifications pages 3/4 8-1, 3/4 8-1a and 3/4 8-2 paragraphs "a", "b", "c", "d", "f", "g" and "h" involve No Significant Hazards Considerations.

In support of this No Significant Hazards Consideration conclusion, the proposed Category C type changes are reviewed below using the three standards of Title 10 CFR Section 50.92:

- (1) Operation of the plant in accordance with the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

Revising the starting and testing frequency of the EDGs to take credit for previous successful tests, deleting unnecessary EDG starts when one of the EDGs becomes inoperable because of preventive maintenance, modification or during testing, and deleting unnecessary repeated testing of the EDGs after initial verification of availability will reduce the incremental wear and stresses resulting from excessive EDG starts. Further, the proposed changes would allow testing, when required, to commence within one hour, in lieu of the requirement for being complete within one hour. The changes also increase two action time limits to allow plant operators more time to respond to abnormal plant conditions. The increase in these times does not significantly affect EDG reliability or availability. The level of assurance that the EDGs will be available when needed will not be decreased by these changes and the proposed decrease in the number of test starts will increase the reliability and availability by reducing engine stress and wear. Therefore, the proposed Category C type changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

- (2) Operation of the plant in accordance with the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The operation and/or design of the onsite emergency power system is not being changed, only the frequency of the surveillance testing starts and the reasons for the tests. Assurances of EDG availability would be maintained by surveillance at a different frequency, with the proposed changes eliminating unnecessary EDG starts, which would increase EDG availability.

Therefore, the proposed type C changes, including taking credit for successful tests within the previous 24 hours along with eliminating unnecessary test starts on EDGs whenever one EDG is inoperable because of preventive maintenance, modifications or during testing, does not create the possibility of a new or different kind of accident from any accident previously evaluated.

- (3) Operation of the plant in accordance with the proposed amendments would not involve a significant reduction in a margin of safety.

The proposed Category C type changes to revise the EDG surveillance testing frequency would continue to assure the availability of the EDGs. The verification schedule and method for assuring offsite-to-onsite power circuits would remain without change, while unnecessary EDG test

starts would be decreased. Eliminating the present requirement for starting all the remaining EDGs whenever any one of the EDGs has been declared inoperable for preventive maintenance, modifications or testing and taking credit for tests successfully completed within previous 24 hours will increase the availability of the EDG. Eliminating EDG testing shown to be unnecessary without significantly decreasing the assurances of availability, does not involve a reduction in a margin of safety. Reduction in "testing starts" has been shown by industry experience to increase the reliability of the EDGs.

Conclusion

Taking credit for previous successful tests and eliminating unnecessary testing of the EDGs, has been shown by industry experience to decrease the wear and stress on EDGs. Based on the earlier discussion above, the proposed changes to pages 3/4 8-1, 3/4 8-1a, and 3/4 8-2 paragraphs "a", "b", "c", "d", "f", "g" and "h" involve No Significant Hazards Considerations.

Discussion - Category D Changes

The Category D type changes to the Technical Specifications would revise the accelerated testing frequency program in order to maintain increased diesel generator

reliability without unnecessary excessive and damaging surveillance tests.

All of the Category D type changes listed below can be grouped together because they involve the Emergency Diesel Generator accelerated testing program.

List of Category D Type Changes

Page 3/4 8-8

Proposed changes would be made to table 4.8.1.1.2-1 changing the test schedule.

Page 3/4 8-8

Proposed changes would be made to the single asterisk footnote to change the determination of failures from a "Unit basis" to a "per diesel generator basis" and delete reference to Operating License issuance date.

Page 3/4 8-8

A proposed double asterisk footnote would be added to page 3/4 8-8 which would allow testing the EDGs on a 31 day cycle after seven

consecutive failure free demands are accomplished.

Page 3/4 8-8

Proposed change to allow credit for a complete diesel engine overhaul to reduce the record of engine failures to zero (0).

Page B 3/4 8-1

Changes are proposed to indicate exception to Regulatory Guide 1.108, Revision 1, August 1977 to allow decreased frequencies for diesel generator surveillance testing.

Safety Significance - Category D Type Changes

The existing Technical Specifications require acceleration of the EDG surveillance frequency as the failure rate increases from "1 failure" to "greater than 4 failures" per 100 tests. When the failure rate increases beyond 4 failures, then the surveillance testing frequency increases from "at least once per 31 days" to "at least once per 3 days". At the 3 day accelerated testing frequency, the incremental damage caused by

the stress and wear on the engine from starting and stopping so frequently, causes rapid accelerated damage.

The Commission staff concluded in Generic Letter 84-15 that a more efficient method of testing the EDGs was needed to assure continued availability. Elimination of the unnecessary 3 day and 14 day accelerated testing frequency was therefore recommended as a means of decreasing the number of damaging EDG starts i.e., the accelerated testing frequency also accelerates the wear on the EDG, thus rapidly escalating damage until complete failure of the EDG occurs.

The guidance in the NRC Staff, Generic Letter, 84-15 included provisions for maintaining diesel generator reliability at or above specified levels, with 0.95 being stipulated as the minimum desired and acceptable reliability level. In order to assure that this level is maintained, an accelerated test program was still recommended, however the accelerated program would be based on the number of failures in the last 20 demands on a per diesel generator basis, in lieu of the existing program which is based on the number of failures in the last 100 tests. The 3 day and 14 day testing cycle would also be eliminated by the recommendations in Generic Letter 84-15.

The Category D type changes include an accelerated test program which would maintain the minimum desired level of reliability at or above 0.95, while changing the program basis from "failures per 100 valid tests" to "failures in the last 20 valid demands". This change in the program basis would be

advantageous, would follow the recommendations of Generic Letter 84-15 and would allow for fewer unnecessary testing demands on the EDGs, while maintaining assurances of availability which would continue to be provided by the existing specifications.

The 0.95/demand, minimum reliability goal would be demonstrated by accelerating the EDG testing to at least once per 7 days whenever there is more than one failure per 20 demands (per EDG) i.e., $1/20 = 5\%$ failure, 95% reliability.

Once the surveillance testing is accelerated because of a demand failure, a means is needed for returning the surveillance testing to normal following demonstration of acceptable operation. Based on Generic Letter 84-15, the Licensee proposes to add the double asterisk footnote allowing return to the 31 day surveillance testing once seven consecutive failure free demands have been performed and the number of failures in the last 20 valid demands have been reduced to one. The footnote would then allow the minimum reliability goal of 0.95 to be maintained.

Changing the testing frequency and changing the test pattern basis from "failures per 100 valid tests" to "failures per 20 valid demands" therefore does not significantly affect the margin of safety.

Licensee proposes an additional change to Table 4.8.1.1.2-1, "Diesel Generator Test Schedule", on page 3/4 8-8. The change would allow credit for a complete diesel engine overhaul to reduce the record of engine failures in the past 20

or 100 tests to 0. The change provides an incentive for the Licensee to perform a comprehensive overhaul to rebuild an engine to like-new conditions when an EDG is experiencing repeated failures. The overhaul would have to be approved by the EDG manufacturer and the EDG would become operable only after it successfully passes the appropriate tests. The EDG reliability would be demonstrated by successful completion of 14 consecutive tests: 10 tests would include gradual acceleration and loading to the monthly limit (2600-2700 kW) and 4 tests would include the six month test requirements of rapid acceleration and loading. This change will increase the reliability of the EDGs by providing an incentive to overhaul an EDG when it experiences repeated failures.

Significant Hazards Considerations - Category D Changes

Revising the accelerated testing frequency for EDGs based on the number of failures in the "last 20 valid demands" in lieu of the failures in the "last 100 valid tests" along with eliminating the unnecessary 3 day and 14 day accelerated testing cycle does not involve Significant Hazards Considerations.

In order to support this No Significant Hazards Consideration determination, necessary background supporting information is provided below, along with an evaluation of each of the three standards set forth in Title 10 CFR Section 50.92.

Operation of the plant under the proposed Technical Specifications in regard to revising the accelerated testing program would not:

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

The minimum reliability level of 0.95 for the EDGs is maintained by the proposed Category D type changes in the accelerated testing program, even though the unnecessary and damaging 14 and 3 day testing cycles would be eliminated. Operating the facility under the proposed Technical Specifications would increase the availability and lifespan of the EDGs and therefore would not increase the probability or consequences of an accident previously evaluated.

- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

The surveillance methods for demonstration of EDG operability would not be changed, nor would the minimum reliability level of 0.95 for EDGs. The surveillance schedule and frequency would be changed however, in order to decrease the harsh and damaging testing frequency of starting and stopping the EDGs. The changes to the accelerated testing frequency would increase the reliability of the EDGs and therefore the proposed Category D type changes do not create the

possibility of a new or different kind of accident from any accident previously evaluated.

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

The assurances of availability for the onsite emergency power system are derived from the verifications of the offsite-to-onsite circuits and the surveillances of the EDGs to demonstrate availability. The margin of safety includes the demonstration of a minimum 0.95 reliability for the EDGs by use of an accelerated testing program. The proposed Category D changes do not revise the frequency or methods of surveillance for the offsite-to-onsite power circuits, only the frequency at which the EDGs are tested after one or more of the EDGs has failed. The decrease in EDG testing frequency will not significantly affect the margin of safety and because of industry experience, it has been found that the decrease in testing frequency is a factor in increasing EDG availability.

Conclusion

Based on the discussions above, the Category D type changes do not involve Significant Hazards Considerations.

Discussion - Category E Changes

The proposed Category E type changes to the Technical Specifications would allow the 18 month maintenance (teardown) inspection and other surveillance tests to be accomplished while at power rather than only when shutdown.

The Category E changes all relate to allowing the maintenance tear down inspection while at power.

Safety Significance - Category E Changes

Existing Technical Specifications on page 3/4 8-4 paragraph 4.8.1.1.2.e stipulate that the diesel generator must have an inspection in accordance with the manufacturer's recommendations every 18 months "... during shutdown" Preplanning the teardown inspection so that the EDGs can be inspected (one at a time) on a staggered basis over the 18 month period would avoid the time constrained type maintenance inspection presently allowed only during outages while the unit is shutdown. The less time constrained tear down/inspection would allow opportunity for a more detailed tear down and inspection.

The existing Technical Specifications when vi. 3 in respect to Generic Letter 84-15 appear to reflect a typical BWR with only two EDGs for each unit. Limerick has four dedicated EDGs for each unit (eight for two units). Chapter 8 of the Final Safety Analysis Report evaluated the loading requirements for each EDG during a design basis accident. The evaluation

concludes that having one EDG out of service will not significantly impact the operation of the onsite emergency system. Three of the four EDGs are capable of emergency shutdown of the plant, following a design basis accident.

In addition, the requirement "during shutdown" is not necessary because the operational condition is governed by the operability of equipment already prescribed as necessary in Technical Specification 3.8.1.1. It is inappropriate to delineate the specific operational condition the plant must be placed into within the body of the Technical Specification surveillance test requirements. If a specific surveillance test requires that the plant enter a Limiting Condition for Operation (LCO), then the plant response is already defined in the Action Statements associated with that LCO.

An analogous change has been previously approved by the NRC staff in the Safety Evaluation Report for Susquehanna Unit 1 dated April 12, 1985.

Based on the existing Limiting Condition for Operation, the presence of four EDGs per unit in lieu of the typical BWR arrangement of two EDGs for each unit and the operational condition being governed by Technical Specification 3.8.1.1, the proposed change would not significantly affect the ability of the onsite emergency power system to shutdown the plant safely.

Significant Hazards Consideration - Category E Changes

Allowing the EDGs to be inspected one at a time while the unit is at power, rather than only while shutdown involves No Significant Hazards Considerations.

In order to support this No Significant Hazards Consideration determination, necessary background supporting information is provided below, along with an evaluation of each of the three standards set forth in Title 10 CFR Section 50.92.

Operation of the facility under the proposed Technical Specifications in regard to allowing the EDGs (one at time) to be inspected (tear down) while the unit is at power would not:

- (1) Involve a significant increase in the possibility or consequences of an accident previously evaluated.

The operational condition is governed by operability of the equipment prescribed as necessary in Technical Specification 3.8.1.1 and the action statements define the plant response.

The proposed Category E changes would require that the requisite number of diesel generators be in an operable condition, but would eliminate the restriction that the 18 month maintenance inspection and other surveillance tests be performed only while the unit is shutdown. Because all operational conditions and the associated actions are defined elsewhere in the Technical

Specifications, the removal of this restriction would not involve a significant increase in the probability or consequences of an accident previously evaluated.

- (2) Create the possibility of a new and different kind of accident from any accident previously evaluated.

The proposed Category E changes will not change the method in which any of the 4.8.1.1.2.e surveillance activities are to be performed, only the prescriptive operational condition is being removed. Since the operational conditions and associated actions are defined elsewhere in the Technical Specifications, the removal of this restriction will not create the possibility of a new and different kind of accident from any accident previously evaluated.

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

The margin of safety for the emergency power system depends on the proven, historical reliability of the EDGs and the surveillances verifying the power circuits between the offsite and the onsite power systems. The elimination of the restrictions for performance of the maintenance tear down inspection would remain within the existing action parameters of Technical Specification 3.8.1.1. Therefore the proposed change does not involve a significant reduction in a margin of safety.

Conclusion

Based on the discussion above in regard to removal of the restriction for completing the 18 month EDG maintenance inspection while at power involves No Significant Hazards Considerations.

Discussion - Category F Changes

The proposed Category F changes to the Technical Specifications would modify paragraph 4.8.1.1.2.a.4 along with the footnotes at the bottom of page 3/4 8-3 having a single asterisk and incorporates the 184 day EDG starting surveillance under a new paragraph "h" in specification 4.8.1.1.2.

All of the Category F type changes are grouped together since they involve maintenance of a provision for prewarmed and prelubed fast start testing of the EDGs.

Safety Significance - Category F Changes

The existing 184 day surveillance would require the EDGs to be started from ambient conditions, without prelubrication or prewarming. Based on a Commission staff Generic Letter 84-15, and on further industry experience described in I.E. Information Notice 85-32, Licensee proposes to reduce the unnecessary and damaging starts from ambient conditions by providing for fewer starts and by allowing for prewarming and prelubrication. Reduced stress and wear on the engine by prewarming and

prelubrication, has been found to be a factor which would contribute to a longer lifespan on the EDGs and would therefore decrease the risk of a station blackout.

Significant Hazards Considerations - Category F Changes

Modification of paragraph 4.8.1.1.2.a.4 while adding paragraph 4.8.1.1.2.h to the Technical Specifications would decrease the number of damaging cold fast starts. The Category F changes would not involve Significant Hazards Considerations.

In order to support a No Significant Hazards Consideration determination, necessary background supporting information is provided below, along with an evaluation of each of the three standards set forth in Title 10CFR Section 50.92.

Operation of the plant under the proposed Technical Specifications in regard to the 184 day surveillance requirements would not:

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

Industry experience has shown that there are sufficient unplanned cold starts of the diesel generators because of various non-testing causes such as off-site power losses, to demonstrate the "cold fast start" ability of the EDGs, without the need for also planning periodic tests which are known to cause incremental damage to

engine parts. Providing for the availability demonstration by surveillance "fast starts" at least every 184 days, while allowing prewarming and prelubrication would not involve a significant increase in the probability or consequences of an accident previously evaluated.

- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

The operation and design of the onsite emergency power system is not being changed; only the surveillance methods and schedules in regard to the EDGs. The change in surveillance methods and schedules for the EDGs would continue to demonstrate the availability of the EDGs as previously evaluated, without the incremental resting damage caused by test starts from ambient conditions. Unscheduled starts of the EDGs from ambient conditions are sufficiently frequent to demonstrate their cold starting capability which eliminates the need for scheduled cold damaging starts. Therefore, the proposed changes would not create the possibility of a new or different type of accident.

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

The prelubrication and prewarming sequence has been demonstrated by industry experience to increase the reliability and therefore the availability of the EDGs.

Further, the Commission staff has concluded that all preplanned EDG starts should include a prewarming, prelubrication sequence. The proposed changes which would specify prewarming and prelubrication, therefore do not involve a significant reduction in a margin of safety.

Conclusion

Based on the discussion above operation of the facility under the proposed Technical Specifications in regard to allowing prewarming and prelubrication prior to the 184 day surveillance does not involve a Significant Hazards Consideration.

Environmental Considerations

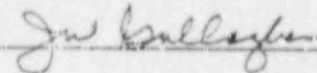
An environmental impact assessment is not required for the changes requested by this Application because the requested changes conform to the criteria for "action eligible for categorical exclusion" as specified in 10 CFR 51.22(c)(9). The requested changes will have no impact on the environment. The Application involves no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and there is no significant increase in individual or cumulative occupational radiation exposure. The Application involves no significant hazards consideration as demonstrated in the preceding section.

Conclusion

The Plant Operations Review Committee and the Nuclear Review Board have reviewed these proposed changes to the Technical Specifications and have concluded that they do not involve Significant Hazards Considerations and will not endanger the health and safety of the public.

Respectfully submitted,

PHILADELPHIA ELECTRIC COMPANY

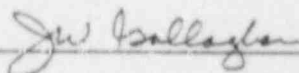


Vice President

COMMONWEALTH OF PENNSYLVANIA :
 : SS.
COUNTY OF PHILADELPHIA :

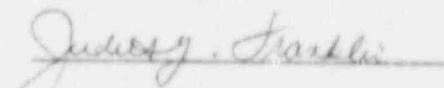
J. W. Gallagher, being first duly sworn, deposes and says:

That he is Vice President of Philadelphia Electric Company, the Applicant herein; that he has read the foregoing Application for Amendment of Facility Operating Licenses, 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.



Vice President

Subscribed and sworn to
before me this 9th day
of Sept, 1988.


Notary Public

JUDITH Y. FRANKLIN
Notary Public, Phila., Phila. Co.
July 28, 1991