

DEC 03 1985

Mr. Harold W. Keiser
Vice President
Nuclear Operations
Pennsylvania Power & Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Dear Mr. Keiser:

SUBJECT: ISSUANCE OF AN EXEMPTION FOR FACILITY OPERATING LICENSE NOS. NPF-14
AND NPF-22, SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

The U. S. Nuclear Regulatory Commission has issued the enclosed one time exemption from the requirements of Criterion 17, Appendix A, 10 CFR Part 50 for Facility Operating License Nos. NPF-14 and NPF-22 for the Susquehanna Steam Electric Station, Units 1 and 2 located in Luzerne County, Pennsylvania. This exemption deals with the single failure criteria for the onsite electric power supplies.

In its letter, dated September 23, 1985, PP&L requested this exemption. The staff has found that approval of the PP&L proposed LCO extension for the tie-in of the fifth diesel generator requires the granting of the above identified exemption. The related amendments to the Unit 1 and Unit 2 Technical Specifications are being issued separately.

A copy of the related safety evaluation supporting the exemption is enclosed. Also enclosed is a copy of a related notice of environmental assessment and finding of no significant impact which was published in the Federal Register.

A copy of the exemption is being filed with the Office of the Federal Register.

Sincerely,

Original signed by:

Anthony Bournia, Acting Director
of BWR Project Directorate No. 3
Division of BWR Licensing

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PDR ADOCK 05000387
P PDR

Enclosures:

1. Exemption
2. Safety Evaluation
3. Notice of Environmental Assessment

cc: See next page

*Previously concurred:

RCaruso for

LB#2/DL/PM

*MCampagnone:lb

11/05/85

LB#2/DL/LA

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11/ /85



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

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Docket Nos. 50-387/388

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Nuclear Operations
Pennsylvania Power & Light Company
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Mr. Harold W. Keiser
Pennsylvania Power & Light Company

Susquehanna Steam Electric Station
Units 1 & 2

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Susquehanna

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
PENNSYLVANIA POWER & LIGHT COMPANY

Susquehanna Steam Electric
Station Units 1 and 2

Docket Nos. 50-387
50-388

EXEMPTION

I.

The Pennsylvania Power and Light Co. (PP&L/the licensee) is the holder of Facility License Nos. NPF-14 and NPF-22 which authorize operation of the Susquehanna Steam Electric Station, Unit 1 (SSES-1) and Unit 2 (SSES-2) at power levels not in excess of 3293 megawatts thermal for each unit. The facilities are boiling water reactors located at the licensee's site in Luzerne County, Pennsylvania. The licenses provide, among other things, that the facilities are subject to all rules, regulations and Orders of the Commission now or hereafter in effect.

II.

Compliance with the single failure criterion for the onsite electric power supplies is required by 10 CFR 50, Appendix A, Criterion 17. In 10 CFR 50, Appendix A, "Criterion 17-Electrical Power Systems," paragraph 2 states that: "The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure."

The Pennsylvania Power and Light Company proposed an extension to the Limiting Conditions of Operation for Technical Specifications 3.8.1.1 and 3.7.1.2 for both Units 1 and 2, which would allow the existing diesel generators to be removed from service, one at a time, for a cumulative period of 60 days. The staff has found that approval of the proposed extension would conservatively

warrant the granting of this one-time exemption for each Unit so that PP&L may continue to operate the plants during the tie-in of the fifth diesel generator. This tie-in work requires the connection of control and power circuits from the existing diesel generators to transfer points in the new diesel generator building.

With one diesel generator removed from service, PP&L cannot meet the single failure criterion for onsite electrical power supplies as stated in 10 CFR 50 Appendix A, Criterion 17. Thus, approval of the proposed extension would conservatively warrant the granting of this exemption from Criterion 17 for both SSES-1 and SSES-2.

It should be noted that the NRC staff's decision to process an exemption from the requirements of GDC-17 was made so as to interpret the regulations in the most conservative manner. It has previously been the staff's practice to grant LCO extensions to the Technical Specification requirements for out of service equipment, which is required to be operable, as long as the extension does not pose undue risk to the health and safety of the public. These actions have previously been taken without requiring exemptions to the regulations. Nevertheless, the staff has decided to process this temporary exemption from GDC-17. This action should not be viewed as a precedent for use in future considerations.

The exemption is required so as to extend the allowed out of service time for the diesel generators, one at a time, without requiring a shutdown of both units. This exemption will allow both units to remain at power during the tie-in work for the fifth diesel generator.

We have completed our review of the "Probabilistic Evaluation of Temporarily Extending the Diesel Generator LCO's," submitted by PP&L. This submittal was in support of the licensee's proposed one-time change to the Technical Specifications and one-time exemption from GDC-17. The staff has conservatively estimated the probability for severe core damage at one unit to be 3×10^{-5} . Of this, there is a probability of about 2×10^{-5} that both units will experience severe core damage. The probability that Unit 1 will experience severe core damage, but not Unit 2, is about 1×10^{-5} with a similar value for Unit 2 experiencing severe core damage but not Unit 1.

The staff finds that the addition of the 5th diesel generator will likely reduce the probability of severe core damage due to loss of offsite power events for the remainder of the life of the plants.

III.

The NRC staff has evaluated the licensee's schedule for completing the fifth diesel generator tie-in relating to the temporary LCO extensions and finds that not granting this exemption could result in a forced two unit shutdown. Granting of this exemption would only slightly increase the probability of severe core damage due to a loss of offsite power event. The staff finds this temporary small increase in the probability of severe core damage during the proposed 60 days, coincident with a loss of offsite power event, is outweighed by the benefits of the improvement in safety over the remaining life of the plants due to the addition of this fifth diesel generator. For evaluating the changes to the Technical Specifications and the associated exemption, the staff reviewed the licensee's technical justifications for each change and the justifications based on the Probabilistic Risk Assessment (PRA) study on the subject. The staff

also reviewed the reliability of the Offsite Power System as the preferred source of power for the plant's safe shutdown systems and the reliability of the existing diesel generators to ascertain that, while one of them is taken out of service to complete the new diesel generator tie-in work, the remaining three will provide a reliable source of emergency power. The tie-in work, including applicable procedures, was reviewed to demonstrate that this work will not degrade the operability of the safe shutdown systems, including the remaining diesel generators, while the plants continue to operate. Included in this review was the adequacy of the post-modification testing for each diesel generator before one diesel is returned to service and another one is taken out of service for the tie-in work. The staff also reviewed the related plant Emergency Procedures and operator training and knowledge to verify that such procedures are adequate for a postulated emergency during the LCO extension and that the operator would properly respond to the emergency. The details of the above described review are discussed in the attached Safety Evaluation.

Based on the information provided by the licensee, the staff's evaluation of the licensee's submittal and the staff's on site review of the design change packages and procedures to be used for the fifth diesel generator tie-in, the NRC staff concludes that the licensee has used proper planning, has available the proper procedures and detailed design change packages necessary to accomplish the fifth diesel generator tie-in work. The NRC staff finds that operation of SSES-1 and SSES-2 during the proposed LCO extensions is acceptable and that the availability of a fifth diesel generator gives an overall long term improvement in safety for the remaining life of the plants. Therefore, the staff finds that the proposed temporary exemption from 10 CFR 50, Appendix A, Criterion 17 is acceptable.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not endanger life or property or the common defense and security and is otherwise in the public interest. Therefore, the Commission hereby grants the exemption as follows:

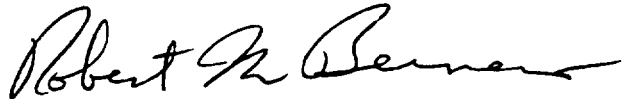
"An exemption is granted from the single failure criterion for onsite electric power supplies as stated in 10 CFR 50, Appendix A, Criterion 17. This exemption is granted for the period specified in the licensee's September 23, 1985, request for exemption (60 cumulative days in the LCO) and is only applicable to SSES-1 and SSES-2 when a diesel generator is out of service specifically for the performance of the fifth diesel generator tie-in work."

Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of the exemption will have no significant impact on the environment (49 FR 48625).

A copy of the Commission's Safety Evaluation dated December 3, 1985, related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, DC and at the Osterhout Free Library, Reference Department, 71 South Franklin Street, Wilkes-Barre, Pennsylvania 18101.

This Exemption is effective upon commencement of the fifth diesel generator tie-in work and is to expire upon completion of 60 cumulative diesel outage days related to the tie-in of the fifth diesel generator.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "Robert Bernero", is written over the typed name.

Robert Bernero, Director
Division of BWR Licensing

Dated at Bethesda, Maryland
this 3rd day of December 1985

This Exemption is effective upon commencement of the fifth diesel generator tie-in work and is to expire upon completion of 60 cumulative diesel outage days related to the tie-in of the fifth diesel generator.

FOR THE NUCLEAR REGULATORY COMMISSION

Original signed by:

Robert Bernero, Director
Division of BWR Licensing

Dated at Bethesda, Maryland
this 3rd day of 1985

*Previously concurred:

LB#2/DL/PM	LB#2/DL/LA	LB#2/DL/BC	OELD	AD/L/DL	D/DL <i>RB Bernero</i>
*MCampagnone:lb	*EHylton	*WButler	JGoldberg	TMNovak	HThompson-
11/ /85	11/05/85	11/07/85	11/12/85	11/ /85	11/26/85



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORT EXEMPTION FROM GDC-17
FACILITY OPERATING LICENSE NOS. NPF-14 AND NPF-22
PENNSYLVANIA POWER AND LIGHT COMPANY
LUZERNE COUNTY, PENNSYLVANIA
SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 AND 2 (SSES-1, SSES-2)
DOCKET NOS. 50-387, 50-388

Introduction

By letter dated December 21, 1984, the Pennsylvania Power and Light Company (the licensee) proposed changes to Technical Specifications 3.7.1.2 and 3.8.1.1. The changes were proposed on a one time basis to allow the licensee to remove the 4 existing diesel generators (DG-A,B,C and D) one at a time, from service for an accumulated time of 60 days, i.e., an average of 15 days per diesel generator, which is much more than the limit of 72 hours (3 days) permitted by the present Technical Specifications. The changes are needed in order to perform work on the connection of the power and control circuits to the new fifth diesel generator (DG-E) which is being installed at the Susquehanna Station. The change would allow the Units to operate while the fifth diesel generator tie-in work is being conducted. The staff has found that approval of the proposed change to the Technical Specifications would also require the granting of an Exemption from GDC-17 along with the issuance of the amendment request.

Meeting the single failure criteria for onsite electric power supplies is required by 10 CFR 50, Appendix A, Criterion 17 which states: "The onsite electric power supplies, including the batteries and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. "

The main purpose of the fifth diesel generator is to avoid a two unit shutdown, if one of the four existing diesel generator becomes inoperable. The SSES Technical Specifications require plant shutdown within 72 hours of declaring a diesel generator to be inoperable. The fifth emergency diesel generator will be used as a replacement and will have the capability of supplying the emergency loads of any one of the four existing diesel generators. As such, the main purpose of the fifth diesel generator is to allow maintenance to be performed on any one of the four existing diesel generators without the necessity for a two unit outage.

By letters dated July 1, 1985, August 7, 1985, August 23, 1985, and September 4, 1985 the licensee provided additional information in support of the proposed changes. By letter dated September 23, 1985, the licensee requested the related one time exemption from GDC-17.

For evaluating the changes to the Technical Specifications and the acceptability of this Exemption, the staff reviewed the licensee's technical justifications for each change and also their justifications based on a Probabilistic Risk Assessment (PRA) study on the subject. The staff also reviewed the reliability of the Offsite Power System as the preferred source of power to the plant safe shutdown systems; and the reliability of the existing diesel

generators to ascertain that, while one of them is taken out of service to complete the new diesel generator tie-in work under the extended Limiting Conditions for Operation (LCO), the remaining three will provide a reliable source of emergency power. The tie-in work itself, including applicable procedures, was reviewed to demonstrate that this work will not degrade the operability of the safe shutdown systems, including the remaining diesel generators, while the plant continues to operate. Included in this review was the adequacy of the post-modification testing for each diesel generator (i.e. testing before a diesel is returned to service and another one is taken out of service for the tie-in work). The staff also reviewed the related plant Emergency Procedures, and operator training and knowledge, to verify that such procedures are adequate in dealing with a postulated emergency while in the extended LCO and that the operator would properly respond to the emergency. The details of this review are discussed below.

Evaluation

A. Technical Specification Changes

In order to determine the acceptability of this Exemption and its overall safety implications, it is important to understand the Technical Specification changes being made. It is the change to the Technical Specifications (i.e. extending the diesel LCO for an INOPERABLE diesel) that has warranted this Exemption for SSES-1 and SSES-2. The changes to the Technical Specifications are described below.

Action a. of TS 3.8.1.1

1. The footnote associated with Action a. of TS 3.8.1.1 requires that prior to removing any diesel generator from service, in order to do work associated with tying-in the E diesel, Surveillance Requirement 4.8.1.1.2.a.4 will be performed during the previous 24 hours.
2. TS 4.8.1.1.2.a.4, is changed from testing 4 hours after the LCO, to testing 72 hours after one diesel is removed from service.
3. The subsequent testing frequency of 4.8.1.1.2.a.4 is changed from testing the diesels once every 8 hours to once every 72 hours.
4. Action a. of 3.8.1.1 is changed from requiring diesel generator operability within 72 hours of the LCO to a total time of 60 accumulated days for all four diesel generators.

Action b. of TS 3.8.1.1

5. The start of the first testing per TS 4.8.1.1.2.a.4 is changed from testing within 3 hours after the LCO to testing within 24 hours after the LCO.
6. Same change as described in item 3 of Action a. above.

Action c. TS 3.8.1.1

The words "except as noted in specification 3.7.1.2" have been added to alert the operators that the ESW pump associated with the inoperable diesel generator will not automatically start upon demand.

Action d. of TS 3.8.1.1

7. The present TS requirements will be applicable during the fifth diesel generator tie-in work. During a conference call on October 17, 1985 with the licensee it was determined that there was no basis to change the existing 3.8.1.1.d Technical Specification as it adequately covers the extended LCO conditions.

Action e. of TS 3.8.1.1

8. The present TS requires surveillance 4.8.1.1.2.a.4 to be performed within 2 hours and at least 8 hours thereafter; three of the diesels must be restored within 2 hours or be in Hot Shutdown (HS) within the next 12 hours. The changed TS requires surveillance 4.8.1.1.2.a.4 to be performed within 2 hours; at least three diesels must be operable within 2 hours or be in HS within the next 12 hours.
9. The present TS requires all four of the diesel generators to be restored to operable status within 72 hours. The changed TS requires three diesels to be operable before following Action a.

Action a. of TS 3.7.1.2

10. The footnote to TS 3.7.1.2 Action a.1. allows the Emergency Service Water (ESW) pump associated with the diesel taken out of service to remain inoperable until its associated diesel generator is returned to service.

The staff evaluation of the licensee's justification for the above changes is as follows:

1. When a diesel is taken out of service for the purpose of tying in the E diesel, the remaining three diesels will be tested for operability during the previous 24 hours. A certain fraction of a diesel generator's failure to start comes from failures to the diesel incurred while in standby status. By successfully testing the diesel before the demand is required, the reliability of successful starts is inherently increased by decreasing the time in standby status. This is also consistent with the operating practice which the licensee already employs.
2. The 72 hour testing frequency used when a diesel is taken out of service is based on Generic letter 84-15 (Reference 12) and on the present TS Table 4.8.1.1.2-1, Diesel Generator Test Schedule. Generic letter 84-15, Item 1, encourages a reduction in cold fast starts as a means of preventing premature diesel engine degradation. Table 4.8.1.1.2-1 prescribes the test frequency by the number of failures in the last 100 valid tests.

Under the worst case condition, the diesels would be required to be tested every 72 hours to prove operability. This change is consistent with the recommendations of Generic letter 84-15 and the TS diesel generator operability requirements.

3. Same justification and evaluation as item 2 above applies.
4. The TS change allows 60 days of accumulated diesel generator inoperability to accommodate tying in the E diesel. It was estimated that approximately 15 days per diesel would be required to make all power control circuit connections. The safety significance of having a diesel inoperable for 60 days was evaluated on a Probabilistic Risk Assessment (PRA) basis. For the technical adequacy of justification of the PRA, refer to Section F. under the evaluation section of this report.
5. Changing the start of first testing from within 3 hours after the LCO to within 24 hours is based on the fact that a diesel will not be taken out of service when an offsite circuit is already out of service. The last diesel test will be within the previous 72 hours and therefore testing the diesels within 24 hours adequately establishes reliability.
6. Same justification and evaluation as item 2 above applies.
7. No change in current technical specification.
8. The reduced testing (i.e., no testing every 8 hours thereafter) is consistent with the recommendations of Generic Letter 84-15. (see item 2. above). Furthermore, the diesels would have been tested prior to but within 24 hours of the LCO work and also tested every 72 hours after entering the LCO. The diesels would be tested again within 2 hours if two or more diesels become inoperable. Therefore, the reduced testing is acceptable.
9. The change in the present TS reflects the fact that it will be normal, during the temporary TS change, for a diesel to be out of service.
10. The licensee has stated that removing a diesel generator does not affect the automatic transfer from the A to the B train of the ESW system. The effect of the loss of the associated ESW pump on the associated systems is addressed by the PRA study. This change poses no significant decrease in plant safety or its core cooling capability and is therefore acceptable.

Based on the above, the staff concludes that these TS changes are based on conservative principles, conform to applicable guidance on the subject, and are therefore acceptable. In addition, the staff concludes that the licensee has taken appropriate measures to compensate for taking a diesel out of service beyond the presently allowable 3 days and that a temporary exemption from the requirement to comply with the single failure criteria for onsite electric power supplies as stated in 10 CFR 50, Appendix A, Criterion 17 is acceptable..

B. Reliability of Offsite Power System

The offsite power system is the preferred power source for the plant. The bulk power system (electrical grid) is the source of electrical energy for the offsite power system. The safety function of the offsite power system is to furnish electrical energy to assure that the specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary will not be exceeded as a result of anticipated operational occurrences and that core cooling, containment integrity, and other vital dependent offsite circuits of sufficient capacity and capability supply electrical power to the onsite distribution system for Susquehanna Units 1 and 2 to provide for the above safety function. In the unlikely event of a simultaneous loss of both offsite circuits, an onsite emergency power system, which is common and shared between Units 1 and 2, provides this function. The staff had previously reviewed the design of these systems and had concluded that the design meets the requirements of General Design Criteria 5, 17 and 18 and is acceptable (Reference 7).

The offsite power system is designed to provide a reliable source of power to the plant safe shutdown systems. The two separate sources of offsite power have sufficient separation and isolation so that no single event such as transformer failure or transmission line tower failure can cause simultaneous disruptions of both sources.

The licensee's plan for the bulk power system is in accordance with established bulk power planning criteria. These criteria are based on the Reliability Principles and Standards of the Mid-Atlantic Area Council which is a regional reliability council of the National Electric Reliability Council. Digital power flow and transient stability studies were conducted to demonstrate that the bulk power system is in compliance with these reliability criteria. The digital power flow studies include an evaluation of all practical single contingencies, including double circuit power line outage conditions and several abnormal system disturbance conditions. Transient stability studies show that, for various 230-kilovolt and 500-kilovolt system faults, system stability is maintained and satisfactory restoration of the system voltage occurs resulting in no interruptions of the offsite power supply system. The loss of either Susquehanna Unit 1 or Unit 2 represents the loss of the largest single supply to the grid. For the loss of either Susquehanna unit, grid stability and integrity are maintained (Reference 7).

Based on the results of the stability studies presented in the Final Safety Analysis Report, there is reasonable assurance that the ability of the Pennsylvania Power and Light Company grid to provide offsite power to the Susquehanna Steam Electric Station will not be impaired by the loss of the largest external single supply to the grid, the loss of the most critical transmission line, or the loss of a Susquehanna unit itself.

In the unlikely event of loss of offsite power (LOOP), i.e., simultaneous loss of both offsite sources, procedures are in place to restore offsite power to the plant. The restoration time depends upon the cause of the outage. If no damage exists, the offsite power can be restored within minutes by automatic or supervisory switching operations. In the event of a grid blackout, it is expected to restore the offsite power to the plant within 2 to 3 hours. Finally, in most cases, the restoration is expected within 6 hours (Reference 3 and 4).

In the unlikely event of a LOOP, the plant could still be safely shutdown using the onsite emergency power system and onsite batteries. Of the 4 existing diesel generators in the onsite emergency power system, one is sufficient to place both units in the cold shutdown condition. Three diesel generators provide sufficient power to place both units in cold shutdown conditions, following a simultaneous loss of offsite power and a design basis loss of coolant accident in one unit (Reference 4).

During the LCO work involving any of the 4 existing diesel generators, the licensee will take all precautions to maintain the high reliability of the two offsite power sources. Similarly, when a significant degradation of the reliability of the offsite power sources is expected, such as during severe weather conditions, the licensee will not undertake the tie-in work. If the tie-in work is already in progress under these conditions, the licensee will exit the LCO as expeditiously as practical (Reference 4). These precautions will ensure maintaining the reliability of the offsite power system during the tie-in work.

In the unlikely event of a station blackout (SBO), i.e., a simultaneous loss of both offsite and onsite alternating current power systems, the plant can sustain such an event for an estimated period of 24 hours using in place plant procedures (Reference 4 and 13).

Based on the above, the staff concludes the reliability of the offsite power system is adequate for allowing the licensee to extend the existing LCO for the onsite electrical power sources on a one time basis, and that sufficient redundant methods exist to safely shutdown the plant in the event of anticipated operational occurrences or postulated accidents during the extended LCO.

C. Reliability of Installed Diesel Generators

Reliability and capability of diesel generators for onsite Emergency Power Systems are required by 10 CFR 50, Appendix A, Criterion 17. The four installed diesels at Susquehanna demonstrated this reliability and capability by successfully completing the test requirements of IEEE Standard 387-1977 (Reference 15). Periodic on-going surveillance testing in accordance with Plant Technical Specifications will assure continued capability and reliability of the diesel generator systems.

During the first quarter of 1985, the NRC staff conducted a reliability evaluation of the Susquehanna diesel generators by reviewing the failure history of the diesels. Conclusions reached during this study are that the present 0.99 diesel generator reliability is adequate, based upon only one valid failure in the last 100 starts (Reference 14). Further review by the NRC Regional Office, of the subsequent operation and failure history of the diesels, confirms the reliability conclusions of this study. A review of failure causes by the licensee with the diesel generator manufacturer has led to several changes which should further assure a continued high level of reliability.

Based upon the above, the staff concludes that the three remaining OPERABLE Susquehanna diesel generators will provide a reliable source of onsite emergency power during the this 60 day period in which the tie-in work will be performed.

D. Work Performed Under the LCO

Sequentially, one at a time, the four diesel generators will be taken out of service to modify power, control, and instrumentation circuitry such that the new 5th diesel generator can function as a manual swing spare for any one of the four existing diesels.

Work to be performed during the Limiting Conditions for Operation will be performed in accordance with licensee plant modification procedures. The procedures include the following:

1. Modification of the diesel generators' 4 KV power cubicles split the power bus bars such that incoming power from each diesel generator is routed through a new dual circuit breaker cubicle and then to the safety related 4KV busses. The work consists of removing bolted sections of bus bars in the 4 KV power cubicles and terminating power cables to the dual circuit breaker cubicle.
2. Routing control, instrumentation and alarm circuits for each diesel generator such that they go through new switching cubicles which permit manual switching of these circuits such that the 5th diesel generator circuits assume the identity of any of the four existing diesels.

This work consists of determining circuits in each diesel generator motor control center, engine and generator control cubicles. Determinated cables will be pulled out of these cubicles and reterminated in new terminal boxes that are wired to the new switching cubicles. New cables will be pulled into the cubicles to make up circuits at terminal points where other wiring was determined earlier. Additional alarm and indication circuits will be installed for the diesel generators' circuit breakers and transfer switches alignment information.

3. All work performed will be inspected, tested, and verified in accordance with licensee procedures prior to declaring a modified diesel generator operable, and returning it to service for plant operation. Verification will include power, control, instrumentation and alarm circuits testing. Verification also includes start-up and operation of each diesel including synchronizing and loading onto the grid. The verification of operability must be completed prior to taking another diesel generator out of service for tie-in work.

The staff reviewed the modification packages and the applicable procedures and drawings, to verify that no adverse effects on the safety related systems will be caused by the LCO work. The staff concluded that the work to be performed during the tie-in of the 5th diesel generator does not cause degradation of, or adversely affect the ability of the other diesel generators or other safety related systems and equipment to perform their intended safety functions. All work performed during the extended LCO is performed on diesel generator equipment and circuits that are both physically and electrically isolated from other safety related circuits and equipment. This isolation assures no adverse effects on other plant safety related systems.

Based on the above, the staff concludes that the 5th diesel generator can be installed in accordance with the licensee's design modification packages and plant modification procedures without degrading other plant safety related systems.

E. Emergency Procedures and Operator Training

The licensee has developed sufficient emergency procedures to respond to a partial or complete loss of any or all sources of power to safe shutdown systems. This includes situations involving loss of offsite power sources, onsite power sources, and a simultaneous loss of offsite and onsite power sources (station blackout). In the event of a station blackout, the reactor core isolation cooling (RCIC) system, or high pressure coolant injection (HPCI) system can be used to provide make-up water to the reactor vessel for a period of 8 hours. It is estimated that the plant can sustain a station blackout for 24 hours using RCIC, HPCI, and the diesel driven fire pump. The staff has determined that the licensee has developed sufficient emergency procedures for these systems (Reference 4).

Additional emergency procedures did not have to be developed for the period of the LCO extension. The existing emergency procedures already encompass these operational conditions. The staff reviewed selected samples of the procedures, to ascertain the adequacy of these emergency procedures during the LCO extension. Operator training and knowledge related to these procedures was also reviewed. Each was found to be adequate.

F. PRA Evaluation

This portion of the staff's overall review gives the staff estimate of the increment in probability of severe core damage from this one-time Technical Specification change and related one-time exemption and gives the analysis in support of this estimate. In reference 1, PP&L estimated the increment in core melt probability from this one-time Technical Specification change and one-time exemption as 1.4×10^{-6} ; the analysis supporting this estimate is given more completely in reference 3.

The staff has obtained a conservative estimate of 3×10^{-5} (or about 20 times larger than the licensee's estimate) for the increment in core melt probability from this temporary Technical Specification change and temporary exemption from GPC-17. Of this, there is an estimated probability of about 2×10^{-5} that both units will experience severe core damage, and an estimated probability of 1×10^{-5} that unit 1 will experience severe core damage, but not unit 2, with the same probability for unit 2 experiencing severe core damage, but not unit 1.

Thus the probability that at least one of the units will experience severe core damage is increased by 4×10^{-5} , by the temporary Technical Specification change and one time exemption. This does not take into account the fact that, after the 5th diesel generator is connected, the frequency of severe core damage will be decreased so that the probability of severe core damage over the lifetime of the units would likely decrease.

The staff estimate of severe core damage is modeled on the analysis of loss of offsite power transients at the Shoreham Nuclear Power Station, as given in the BNL review of the Shoreham PRA (Reference 16). (The Shoreham plant and the Susquehanna plant are both BWR-4 plants.) In addition, information was obtained from the station blackout evaluation performed by PP&L for Susquehanna (Reference 17).

There are two major reasons for the difference in results in the staff analysis and the analysis given by the licensee in reference 3. The first is the frequency of extended losses of offsite power. The reference 3 analysis assumes that the frequency of losses of the offsite power exceeding 10 hours is 8×10^{-5} /yr. The staff, basing its analysis on NUREG-1032, draft for comment (Reference 18), obtaining a frequency of losses of offsite power exceeding 10 hours of 6×10^{-3} /yr, nearly two orders of magnitude higher. The second major reason for the difference in estimates of the probability of severe core damage for this requested exemption is the inclusion of an additional sequence. During station blackout the only reactor vessel water level indication available in the control room is narrow range indication.

These narrow range indicators will read higher than the true water level, because of flashing in the reference leg which occurs on the loss of drywell cooling. Therefore, there is the potential for human error in excessive throttling of HPCI or RCIC, and core uncover, or, conversely, in excessive water flow to the reactor resulting in a level 8 trip, with subsequent failure in restart of the high pressure coolant injection system or the reactor core isolation cooling system. The value for the human error was taken from the BNL analysis for Shoreham.

System Analysis

DC Systems

At Susquehanna, there are both 125 VDC batteries, required for operation of the safety/relief valves in the relief mode, and 250 VDC batteries, required for operation of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems.

According to the Station Blackout Analysis and Test Plan of the licensee (Reference 17), the 125 VDC system is expected to last a minimum of 6 hours. When these batteries are exhausted it will be impossible to maintain depressurization. According to the same document, the 250 VDC batteries, required for RCIC and HPCI operation, will last 24 hours. According to information obtained informally from the licensee, the RCIC and HPCI systems also require 125 VDC, because Bailey controllers in these systems are on 125 VDC buses. The Shoreham PRA made a similar statement for its battery lifetime, but BNL rejected the assumption, estimating the batteries would last only 10 hours, similar to the time batteries would last in other BWRs reviewed by BNL. The staff has made the same assumption of a 10 hour battery lifetime, for 250 VDC system. Reference 17 indicates that the 125 VDC lifetime can be extended by transferring some of the emergency lighting loads by center-tapping the 250 VDC batteries and running temporary cables. The staff has therefore assumed that the 125 VDC batteries will be available for 10 hours. In estimating the life of the 250 VDC batteries, the number of trips/restarts of the RCIC system must be taken into account. As mentioned above there is only narrow level indication of reactor vessel water level in the control room, so that minimization of the number of trips/restarts of the RCIC system may be difficult but must be taken into account. We note that because HPCI and RCIC are estimated to fail in a time frame on the order of 8 hours, according to the licensee, even if the 250 VDC batteries were to last longer, the estimated core melt probability (due to the one-time Technical Specification change and one-time exemption) would be essentially the same.

Diesel-driven Fire Pump

As long as the reactor is depressurized, and as long as HPIC or RCIC is available for the first hour, then, after this time, the diesel-driven fire pump could be used to maintain core cooling. However, the Shoreham PRA gave no credit for the use of the diesel-driven fire pump at Shoreham, because its use requires extensive operator action under high stress conditions. The staff will also not give any credit for the diesel-driven fire pump for this case. The staff notes, however, that the results are insensitive to the assumption that the diesel-driven fire pump will not be used successfully. The reason is that the use of the diesel-driven fire pump requires maintenance of depressurization, and this requires the 125 VDC batteries. As will be seen below, one of the most important sequences involves a station blackout in excess of 10 hours. Since the batteries are assumed to deplete in 10 hours, depressurization cannot be maintained in excess of 10 hours, and the diesel-driven fire pump cannot

be used to mitigate this sequence. Another important sequence involves prompt failure of HPCI and RCIC, under station blackout conditions. This sequence also cannot be mitigated by the diesel-driven fire pump.

Onsite AC System

The diesel generators depend on service water. It turns out that the emergency service water (ESW) system is configured such that the failure of or unavailability, of diesel generators A and B will fail fans which cool the service water pumps. The licensee has assumed that failure of these fans in effect will fail the service water pumps. The staff has made the same assumption. In addition, there are dependencies of certain valves in the service water system on diesel generators A and B. With service water failed, the other diesel generators are failed consequentially. It follows therefore that if diesel generator A is in maintenance and diesel B fails, or vice versa, then the other diesel generators will fail, according to the licensee's assumptions.

The licensee has, for simplicity, assumed in effect that the failure of or unavailability of any two diesel generators leads to station blackout. The staff has made the same assumption. In addition, we shall take .03 per demand as the failure-to-start probability for a diesel generator. This is a typical, industry average value, given, e.g., in the IREP Procedures Guide, NUREG/CR-2778. Such a value may be conservative, for the present case. The reason is that a certain fraction of the failures of diesel generators are related to the time in standby since the last test. During LCO extension the remaining three diesel generators will be tested 24 hours before each diesel generator is taken out of service. Thus the standby-related failures will be decreased. Although there is some uncertainty as to the relative importance of the standby-related failure, Mankamo and Pullekinen (Reference 19) state that the diesel generator failure probability is described mainly by the standby failure rate, and that the starting-stress-related failures are relatively small. If this is the case, the failure probability of a diesel generator is overestimated in our analysis. The possible conservatism in the staff analysis are probably greatest in the staff's treatment of the failure probability of the onsite power system. A nonconservatism in the staff's analysis is the neglect of sequences involving diesel generator failure to run.

Frequency of Losses of Offsite Power Exceeding a Specified Duration

The staff follows the procedure in NUREG-1032, draft for comment, Reference 19, in determining the frequency of loss of offsite power exceeding a specified duration. According to various characteristics of the plant and its grid, the procedure in NUREG-1032 assigns a plant to a cluster of plants, and then gives, for each cluster of plants, a frequency of losses of offsite power exceeding a specified duration. The various plant characteristics are switchyard design, grid reliability and recovery characteristics, severe weather characteristics, and extremely severe weather characteristics. The staff assumed that the plant is in the grouping with best switchyard design, and best grid reliability and recovery characteristics. This assumption does not play a paramount

role in the actual number because of the severe weather, and extremely severe weather characteristics of the plant. The following information, obtained from the Susquehanna FSAR (pages 2.3-3 to 2.3-6), was needed for the computation of the severe weather indices used in NUREG-1032, draft for comment:

- (1) There were 38 tornadoes within 50 miles of site, between 1950 and 1973.
- (2) The frequency of winds exceeding 74 miles per hour is .02/year.
- (3) There are between 40 and 50 inches of snow per year.

Therefore, the staff obtains the following weather hazards rates

$$\begin{aligned}h(\text{tornado}) &= 2.1 \times 10^{-4} \text{ mi}^2/\text{yr} \\h(\text{wind}) &= .02/\text{year} \\h(\text{snow/ice}) &= 45 \text{ inches/yr}\end{aligned}$$

The expected frequencies of loss of offsite power from each weather related cause is given by the formula listed below:

$$S = Ph,$$

where, from reference 18

$$\begin{aligned}P(\text{tornado}) &= 27 \text{ mi}^2 \\P(\text{wind}) &= .026/\text{incident} \\P(\text{snow/ice}) &= 1.8 \times 10^{-4}/\text{inch of snow fall}\end{aligned}$$

The staff obtains for the expected frequencies of losses of offsite power of each weather type,

$$\begin{aligned}S(\text{tornado}) &= .0057/\text{yr} \\S(\text{wind}) &= 5.2 \times 10^{-4}/\text{yr} \\S(\text{snow/ice}) &= .008/\text{yr}\end{aligned}$$

The sum of the categories of S is .0142, which places Susquehanna in severe weather category S3. The plant does not have the capability of recovering from a severe weather induced loss of offsite power within 2 hours. It is therefore in recovery class 2, which places it in severe weather/recovery class SR6. The tornado frequency places the plant in extremely severe weather category SS4. With this assignment of the plant to S3 and SS4, Table A.10 of NUREG-1032, (draft for comments) indicates that Susquehanna is in cluster 4. This assumes we are interested in an average, year-round, frequency of loss of offsite power. However, the actual outage will likely take place in the winter. In this case, the severe weather/recovery class will still be SR6. The frequency of losses of offsite power due to snow increases, and that due to high wind and tornadoes decreases. However, the chance of a loss of offsite power due to extremely severe weather conditions (winds in excess of 125 mph) decreases. Nevertheless, it is judged that even if one considered that the diesel generator outage will likely take place in the January/February time frame, that Susquehanna is still assigned to cluster 4.

Using the assignment of the plant to cluster 4, valid for an average year-round frequency of losses of offsite power, the following frequencies of losses of offsite power exceeding t hours is obtained from Figure A.14 of Reference 18:

<u>t</u>	<u>frequency</u>
1/2 hr	.045/yr
4 hrs	.011/yr
10 hrs	.006/yr

Sequences and Their Quantification

The staff has estimated the probability of severe core damage (due to the temporary Technical Specification change and one-time exemption from GDC-17) from the sequences judged most important. The selection of the most important sequences was determined from an examination of the BNL review (Reference 16) of the Shoreham PKA. The sequences we have selected contribute about 2/3 of the core melt frequency from the loss of offsite power initiator, in the BNL review of Shoreham. The neglect of the other sequences constitutes a non-conservative assumption. We will first estimate the probability per year of severe core damage from loss of offsite power transients under the condition that one diesel generator is out of service. Then, by multiplying by 60/365, we obtain the increase in core melt probability from the 60 day cumulative outage. As discussed earlier the staff assumed that the diesel generator that is out of service is either diesel generator A or B; if diesel generator A is out of service, and diesel generator B fails (or vice versa), then station blackout follows.

Sequences Involving Loss of Reactor Water Level Instrumentation

At Susquehanna, under station blackout conditions, there is a loss of all reactor water level instrumentation in the control room, except for narrow range water level indicators. Moreover, the reference leg of these narrow range water level indicators may flash, so that the reactor water level indication will be higher than the true water level. Under these circumstances, BNL estimated the conditional probability of core melt as .05, and the staff has used this value. If there is excessive throttling of the high pressure system, the core will uncover. If there is excessive flow to the reactor, there will be level 8 trips. Each restart of the high pressure system represents a battery drain, and a challenge to the high pressure system.

The sequence is therefore quantified as follows, assuming diesel generator A is out of service:

frequency of loss of offsite power exceeding 1/2 hour:	.045/yr
probability Diesel Generator B fails:	.03
probability of Human Error due to loss of wide range water level instrumentation in control room:	<u>.05</u>

Sequence frequency	$6.8 \times 10^{-5} / \text{yr}$
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The staff notes that wide range water level indication will still be available outside the control room, at a local reactor building instrument rack (see p. 2-5 of Reference 17). If communication could be set up between this local reactor building instrument rack and control room, and appropriate procedures followed, it would appear that the frequency of this sequence could be decreased.

Sequence Involving HPCI/RCIC Prompt Failures

The staff takes the probability of joint failure of HPCI and RCIC as .01, from the BNL review of Shoreham. This value applies to the 0-2 hr time frame after offsite power is lost. The quantification, again assuming that diesel generator A is out of service, is:

frequency of losses of offsite power exceeding 1/2 hr:	.045/yr
probability of Diesel Generator B failing to start:	.03
probability that HPCI and RCIC fail	<u>.01</u>
Sequence frequency	$1.4 \times 10^{-5}/\text{yr}$

Station Blackout for 10 Hours

As discussed, the staff has assumed a depletion time for the 125 VDC batteries and the 250 VDC batteries of 10 hours, but even if the 250 VDC batteries had a longer depletion time, the results would not be affected much, because of failure of HPCI/RCIC due to lack of room cooling. The quantification, again assuming that diesel generator A out of service:

frequency of loss of offsite power for greater than 10 hrs:	.006/yr
probability Diesel Generator B fails:	.03
failure to repair diesel generator in 10 hrs:	<u>.5</u>
Sequence frequency	$9 \times 10^{-5}/\text{yr}$

Sequence Involving Station Blackout for Between 4 and 10 Hours, with Failure of HPCI and RCIC in This Time Period.

BNL, in its review of the Shoreham PRA, estimates a probability of 0.13 for joint failure of HPCI and RCIC in the 4 to 10 hour time frame; the principal cause of this joint failure is premature battery failure. The quantification, again assuming diesel generator A is out of service is then:

frequency of losses of offsite power for between 4 and 10 hrs. =	
.0011-.006 = .005/yr	
probability that diesel generator B fails	= .03
probability that HPCI/RCIC fails	= .13
probability of nonrecovery of diesel generator	= .7
Sequence frequency	$1.4 \times 10^{-5}/\text{yr}$

Increase in Core Melt Probability from the 60 Day Cumulative Outage for the Diesel Generators.

As mentioned above, to determine this increase in core melt probability we must sum the above sequence frequencies and multiply by 60/365. The staff has obtained a probability of 3×10^{-5} . The last two sequences lead to a double core melt; hence the part of the 3×10^{-5} corresponding to a double core melt is 1.7×10^{-5} , and the probability that Unit 1 will have a core melt, but not Unit 2, during the outage period, is 1.3×10^{-5} .

Conclusion

Based on the above discussion in sections A-F, the NRC staff has concluded that the proposed temporary Exemption from 10 CFR 50, Appendix A, Criterion 17, is authorized by law, will not endanger life or property or the common defense and is otherwise in the public interest and should be granted.

Dated: DEC 03 1981

References

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2. Licensee letter PLA-2501, Additional Information on item 1 above, N.W. Curtis to W.R. Butler, July 1, 1985.
3. Licensee letter PLA-2514, Additional Information on item 1 above, N.W. Curtis to W.R. Butler, August 7, 1985.
4. Licensee letter PLA-2523, Additional Information on item 1 above, N.W. Curtis to W.R. Butler, August 23, 1985.
5. Licensee letter PLA-2524, Revision 1 to item 1 above, N.W. Curtis to W.R. Butler, August 23, 1985.
6. SSES Final Safety Analysis Report, Revision 35, July 1984, Section 8.0, Electric Power.
7. NUREG-0776, Safety Evaluation Report related to the operation of Susquehanna Steam Electric Station, Units 1 and 2, April 1982, and its supplements.
8. NUREG-0800, Standard Review Plan, Revision 2, July 1981.
9. NUREG/CR-0550, Enhancement of Onsite Emergency Diesel Reliability February 1979.
10. Regulatory Guide 1.93, Availability of Electric Power Sources, December 1974.
11. Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants, Revision 1, August 1977.
12. Generic Letter 84-15, from Director, Division of Licensing, to all Licensees, Proposed Staff Actions to Improve Diesel Generator Reliability, July 2, 1984.
13. Licensee letter PLA-1136, Station Blackout Safety Analysis and Test Plan, N.W. Curtis to A. Schwencer, June 15, 1982.
14. NRC Internal Memorandum, Evaluations of Susquehanna Diesel Generator Failures, L.S. Rubenstein to H.R. Denton, March 8, 1985.
15. Licensee letter PLA-958, Diesel Generator 300 Start Test, N.W. Curtis to A. Schwencer, January 18, 1982.

16. D. Ilberg, K. Shiu, N. Hanan, E. Anavini, "A Review of the Shoreham Nuclear Power Station Probabilistic Risk Assessment," NUREG/ACR-4050, final draft, June 1985.
17. Letter from N.W. Curtis, Pennsylvania Power and Light, to A. Schwencer, USNRC, June 15, 1982.
18. P.W. Baranowsky, "Evaluation of Station Blackout Accident at Nuclear Power Plants," NUREG-1032, draft for comment, May 1985.
19. T. Mankamo and U. Pulkinnen, Nuclear Safety 23, January - February 1982, p. 32.

[7590-01]

UNITED STATES NUCLEAR REGULATORY COMMISSION

PENNSYLVANIA POWER AND LIGHT COMPANY

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387/388

NOTICE OF ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U. S. Nuclear Regulatory Commission (the Commission) is considering issuance of an Exemption to 10 CFR 50, Appendix A, Criterion 17 for Facility Operating License Nos. NPF-14 and NPF-22, issued to the Pennsylvania Power and Light Company (the licensee), for operation of the Susquehanna Steam Electric Station, Unit 1 and Unit 2, located in Luzerne County, Pennsylvania.

ENVIRONMENTAL ASSESSMENT

Identification of Proposed Action: This Exemption would suspend the requirement to comply with the single failure criteria for onsite electric power supplies as stated in 10 CFR 50, Appendix A, Criterion 17 upon commencement of the fifth diesel generator tie-in work until completion of this work which is not to exceed 60 days in the Limiting Condition of Operation (LCO) extension.

The Need for the Proposed Action: The proposed Exemption from the regulation is required in order to connect control and power circuits from the existing diesel generators to transfer points in the new diesel generator building. This tie-in work requires removing from service the diesel generators, one at a time, for a cumulative period of 60 days. Without this Exemption, a forced dual unit shutdown would be required in order to perform the necessary tie-in work.

Environmental Impacts of the Proposed Action: There are no environmental impacts of the proposed action. During the extended LCO (a cumulative period of 60 days) the licensee will remove from service, one at a time, an existing diesel generator in order to connect control and power circuits from the existing diesel generators to transfer points in the new diesel generator building. This work will be performed on a diesel generator after the diesel generator has been taken out of service. This work will be completely isolated from the operating plants. The staff has reviewed the proposed design changes and procedures for the tie-in of the fifth diesel generator and finds that this tie-in work will not impact plant operation. No changes are being made in the allowable amounts and no significant changes in the types, of any effluents that may be released offsite, and there is no significant increase in the allowable individual or cumulative occupational radiation exposure. Should a release occur during the extended LCO it would not be greater than any release contemplated during the normal allowable LCO. Additionally, with one diesel out of service for tie-in work, the three remaining diesels are capable of shutting down both units in the event of a loss of offsite power coincident with a LOCA in one of the units. There is nothing in the proposed change that would suggest that the probability of release would be significantly increased. Further, the proposed change does not otherwise affect radiological plant effluents, nor any significant occupational exposures. Therefore, the Commission concludes that there are no significant radiological environmental impacts associated with this proposed Exemption.

Alternative to the Proposed Action: Since we have concluded that there is no measurable environmental impact associated with the granting of the proposed

Exemption, any alternative to this exemption will have the same or greater environmental impact.

The principal alternative would be to deny the Exemption which would prohibit operation of both units for a period of 60 days.

Alternative Use of Resources: This action does not involve the use of resources not previously considered in connection with the "Final Environmental Statement" related to the operation of Susquehanna Steam Electric Station, Units 1 and 2, dated June 1981.

Agencies and Persons Consulted: The NRC staff performed the entire review of the licensee's position and did not consult other agencies or persons.

FINDINGS OF NO SIGNIFICANT IMPACT

The Commission has determined not to prepare an environmental impact statement for the proposed Exemption.

Based upon the foregoing environmental assessment, we conclude that the proposed action will not have a significant effect on the quality of the human environment.

For further details with respect to this action see Amendment No. 51 to NPF-14 and Amendment No. 19 to NPF-22. These items will be available for public inspection at the Commission Document Room, 1717 H Street, N.W., Washington, D.C. 20555 and at the Osterhout Free Library, Reference Department, 71 South

Franklin Street, Wilkes-Barre, Pennsylvania 18701. A copy may be obtained on request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Walter R. Butler, (301) 492-7435.

Dated at Bethesda, Maryland this 22nd day of November 1985.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in dark ink, appearing to read 'T M Novak', is written over the typed name.

Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing
Office of Nuclear Reactor Regulation

Franklin Street, Wilkes-Barre, Pennsylvania 18701. A copy may be obtained on request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Walter R. Butler, (301) 492-7435.

Dated at Bethesda, Maryland this 22nd day of November 1985.

FOR THE NUCLEAR REGULATORY COMMISSION

~~Original signed by:~~

Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing
Office of Nuclear Reactor Regulation

*Previously concurred:

LB#2/DL	LB#2/DL	LB#2/DL	OELD	AD/L/DL
*MCampagnone:lb	*EHylton	*WButler	*JGoldberg	TMNovak
11/05/95	11/05/85	11/07/85	11/12/85	11/ /85



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WASHINGTON, D.C. 20555

December 3, 1985

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DOCKET No. 50-387/388

MEMORANDUM FOR: Docketing and Service Branch
Office of the Secretary of the Commission

FROM: Office of Nuclear Reactor Regulation

SUBJECT: SUSQUEHANNA EXEMPTION

One signed original of the *Federal Register* Notice identified below is enclosed for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (5) of the Notice are enclosed for your use.

- ☐ Notice of Receipt of Application for Construction Permit(s) and Operating License(s).
- ☐ Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for Submission of Views on Antitrust Matters.
- ☐ Notice of Consideration of Issuance of Amendment to Facility Operating License.
- ☐ Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.
- ☐ Notice of Availability of NRC Draft/Final Environmental Statement.
- ☐ Notice of Limited Work Authorization.
- ☐ Notice of Availability of Safety Evaluation Report.
- ☐ Notice of Issuance of Construction Permit(s).
- ☐ Notice of Issuance of Facility Operating License(s) or Amendment(s).
- ☐ Order.
- ☒ Exemption. dated December 3, 1985
- ☐ Notice of Granting of Relief.
- ☐ Other: _____

Office of Nuclear Reactor Regulation

Enclosure:
As stated

OFFICE	PD#2						
SURNAME	EGHyton						
DATE	12/3/85						

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
PENNSYLVANIA POWER & LIGHT COMPANY

Susquehanna Steam Electric
Station Units 1 and 2

Docket Nos. 50-387
50-388

EXEMPTION

I.

The Pennsylvania Power and Light Co. (PP&L/the licensee) is the holder of Facility License Nos. NPF-14 and NPF-22 which authorize operation of the Susquehanna Steam Electric Station, Unit 1 (SSES-1) and Unit 2 (SSES-2) at power levels not in excess of 3293 megawatts thermal for each unit. The facilities are boiling water reactors located at the licensee's site in Luzerne County, Pennsylvania. The licenses provide, among other things, that the facilities are subject to all rules, regulations and Orders of the Commission now or hereafter in effect.

II.

Compliance with the single failure criterion for the onsite electric power supplies is required by 10 CFR 50, Appendix A, Criterion 17. In 10 CFR 50, Appendix A, "Criterion 17-Electrical Power Systems," paragraph 2 states that: "The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure."

The Pennsylvania Power and Light Company proposed an extension to the Limiting Conditions of Operation for Technical Specifications 3.8.1.1 and 3.7.1.2 for both Units 1 and 2, which would allow the existing diesel generators to be removed from service, one at a time, for a cumulative period of 60 days. The staff has found that approval of the proposed extension would conservatively

warrant the granting of this one-time exemption for each Unit so that PP&L may continue to operate the plants during the tie-in of the fifth diesel generator. This tie-in work requires the connection of control and power circuits from the existing diesel generators to transfer points in the new diesel generator building.

With one diesel generator removed from service, PP&L cannot meet the single failure criterion for onsite electrical power supplies as stated in 10 CFR 50 Appendix A, Criterion 17. Thus, approval of the proposed extension would conservatively warrant the granting of this exemption from Criterion 17 for both SSES-1 and SSES-2.

It should be noted that the NRC staff's decision to process an exemption from the requirements of GDC-17 was made so as to interpret the regulations in the most conservative manner. It has previously been the staff's practice to grant LCO extensions to the Technical Specification requirements for out of service equipment, which is required to be operable, as long as the extension does not pose undue risk to the health and safety of the public. These actions have previously been taken without requiring exemptions to the regulations. Nevertheless, the staff has decided to process this temporary exemption from GDC-17. This action should not be viewed as a precedent for use in future considerations.

The exemption is required so as to extend the allowed out of service time for the diesel generators, one at a time, without requiring a shutdown of both units. This exemption will allow both units to remain at power during the tie-in work for the fifth diesel generator.

We have completed our review of the "Probabilistic Evaluation of Temporarily Extending the Diesel Generator LCO's," submitted by PP&L. This submittal was in support of the licensee's proposed one-time change to the Technical Specifications and one-time exemption from GDC-17. The staff has conservatively estimated the probability for severe core damage at one unit to be 3×10^{-5} . Of this, there is a probability of about 2×10^{-5} that both units will experience severe core damage. The probability that Unit 1 will experience severe core damage, but not Unit 2, is about 1×10^{-5} with a similar value for Unit 2 experiencing severe core damage but not Unit 1.

The staff finds that the addition of the 5th diesel generator will likely reduce the probability of severe core damage due to loss of offsite power events for the remainder of the life of the plants.

III.

The NRC staff has evaluated the licensee's schedule for completing the fifth diesel generator tie-in relating to the temporary LCO extensions and finds that not granting this exemption could result in a forced two unit shutdown. Granting of this exemption would only slightly increase the probability of severe core damage due to a loss of offsite power event. The staff finds this temporary small increase in the probability of severe core damage during the proposed 60 days, coincident with a loss of offsite power event, is outweighed by the benefits of the improvement in safety over the remaining life of the plants due to the addition of this fifth diesel generator. For evaluating the changes to the Technical Specifications and the associated exemption, the staff reviewed the licensee's technical justifications for each change and the justifications based on the Probabilistic Risk Assessment (PRA) study on the subject. The staff

also reviewed the reliability of the Offsite Power System as the preferred source of power for the plant's safe shutdown systems and the reliability of the existing diesel generators to ascertain that, while one of them is taken out of service to complete the new diesel generator tie-in work, the remaining three will provide a reliable source of emergency power. The tie-in work, including applicable procedures, was reviewed to demonstrate that this work will not degrade the operability of the safe shutdown systems, including the remaining diesel generators, while the plants continue to operate. Included in this review was the adequacy of the post-modification testing for each diesel generator before one diesel is returned to service and another one is taken out of service for the tie-in work. The staff also reviewed the related plant Emergency Procedures and operator training and knowledge to verify that such procedures are adequate for a postulated emergency during the LCO extension and that the operator would properly respond to the emergency. The details of the above described review are discussed in the attached Safety Evaluation.

Based on the information provided by the licensee, the staff's evaluation of the licensee's submittal and the staff's on site review of the design change packages and procedures to be used for the fifth diesel generator tie-in, the NRC staff concludes that the licensee has used proper planning, has available the proper procedures and detailed design change packages necessary to accomplish the fifth diesel generator tie-in work. The NRC staff finds that operation of SSES-1 and SSES-2 during the proposed LCO extensions is acceptable and that the availability of a fifth diesel generator gives an overall long term improvement in safety for the remaining life of the plants. Therefore, the staff finds that the proposed temporary exemption from 10 CFR 50, Appendix A, Criterion 17 is acceptable.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not endanger life or property or the common defense and security and is otherwise in the public interest. Therefore, the Commission hereby grants the exemption as follows:

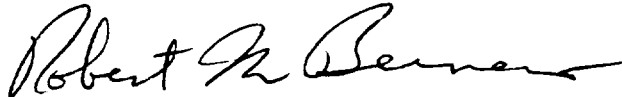
"An exemption is granted from the single failure criterion for onsite electric power supplies as stated in 10 CFR 50, Appendix A, Criterion 17. This exemption is granted for the period specified in the licensee's September 23, 1985, request for exemption (60 cumulative days in the LCO) and is only applicable to SSES-1 and SSES-2 when a diesel generator is out of service specifically for the performance of the fifth diesel generator tie-in work."

Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of the exemption will have no significant impact on the environment (49 FR 48625).

A copy of the Commission's Safety Evaluation dated November 1985, related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, DC and at the Osterhout Free Library, Reference Department, 71 South Franklin Street, Wilkes-Barre, Pennsylvania 18101.

This Exemption is effective upon commencement of the fifth diesel generator tie-in work and is to expire upon completion of 60 cumulative diesel outage days related to the tie-in of the fifth diesel generator.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script, appearing to read "Robert Bernero".

Robert Bernero, Director
Division of BWR Licensing

Dated at Bethesda, Maryland
this 3rd day of December 1985