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AUTH.NAME AUTHOR AFFILIATION
KEISER,H.W. Pennsylvania Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
BUTLER,W.R. Licensing Branch 2

SUBJECT: Requests exemption from 10CFR50 App A,GDC 17 re single failure criteria for onsite electrical power supplies. Exemption necessary for temporary change to Tech Specs 3.8.1.1 & 3.7.1.2 to remove diesel generators from svc.

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PP&L Pennsylvania Power & Light Company
Two North Ninth Street • Allentown, PA 18101 • 215 / 770-5151

Harold W. Keiser
Vice President-Nuclear Operations
215/770-7502

SEP 23 1985

Director of Nuclear Reactor Regulation
Attention: Dr. W. R. Butler, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR EXEMPTION FROM 10CFR50
APPENDIX A, GDC 17
ER 100450 FILE 841-8 Docket Nos. 50-387
PLA-2540 50-388

Dear Dr. Butler:

PP&L is installing a new fifth diesel generator at Susquehanna Steam Electric Station. Permanent tie-in of this diesel generator to the plant, requires connection of control and power circuits from the existing diesel generators to transfer points in the new diesel generator building. In this regard PP&L has requested a one time change to the LCO's for Technical Specifications 3.8.1.1 and 3.7.1.2 which would allow the existing diesel generators to be removed from service, one at a time, for an accumulated period of 60 days. (Ref. PLA-2346 dated December 21, 1984)

According to your Staff, these temporary LCO extensions require an exemption to the single failure criteria for onsite electric power supplies as stated in 10CFR50 Appendix A, Criterion 17. This letter constitutes PP&L's request for this exemption.

The proposed exemption is justified because of the following reasons:

(1) The design of our offsite AC circuits as described in Section 8.2 of the Final Safety Analysis Report.

(2) The results of our probabilistic evaluation on extending the diesel generator LCO.

Current Technical Specifications allow continued dual unit operation for up to three days with a diesel generator inoperable. The associated action statement requires demonstration of operability of the remaining diesel generators and the offsite AC sources. This assures the capability of affecting a safe shutdown and mitigating the effects of a design basis accident. This is maintained with (1) the onsite AC power system (3 diesel generators) or (2) the two offsite AC power sources.

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Since the electrical AC power sources are degraded below the Technical Specification LCO, a time limit on continued operation is specified. This limits the exposure time in the degraded condition which in turn minimizes the risk associated with this level of degradation. The LCO in the case of one diesel generator is not too severe due to the redundance of AC power sources which remain.

The offsite transmission system for Susquehanna SES is described in Section 8.2 of the Final Safety Analysis Report. Based on historical operating data (1975-81) for the PP&L transmission network, the annual forced outage rate per 100 circuit miles for 500KV and 230KV lines is 1.05 and 2.24 outages, respectively.

Transient stability studies were conducted in 1976-77, 1980-81 and 1983. These studies show that for various 230KV and 500KV bus and line faults, system stability and satisfactory recovery voltages are maintained resulting in uninterrupted supply to the offsite power system. These studies also conclude that no single occurrence is likely to cause a simultaneous outage of all offsite sources during operating, accident or adverse environmental conditions.

In the unlikely event that an area-wide blackout were to occur, offsite power can be re-established to Susquehanna SES from either combustion turbine generators or hydro units. This restoration time is approximately 2 hours.

A recent draft report prepared by Battelle Columbus Laboratories for the NRC entitled: "Determination of Allowed Outage Times (AOT's) from a Risk Standpoint" dated July, 1984 states that AOT extensions are only justifiable if there is insufficient time to perform a task and there is no significant increase in total risk. To complete the 5th diesel tie-in, we have estimated that a 15 day LCO per diesel could be required, which exceeds the current LCO limit of 3 days. Further, we have probabilistically evaluated the impact of this temporary extension and conclude there is no significant risk increase. A detailed discussion of this evaluation follows.

Several tasks were performed to examine the impact this extension has on the unavailability of system required to insure adequate core cooling (the assumed indicator of risk). These steps are outlined below:

1. identify loss of offsite power (LOOP) sequences which when coupled with a diesel in an LCO would result in adequate core cooling,

2. estimate the LOOP frequency and the safety function unavailabilities,

3. estimate the frequency of inadequate core cooling with and without the temporary technical specification change.

Sequences leading to inadequate core cooling are identified using the event tree illustrated in Figure 1. The LOOP frequency and system unavailabilities associated with the event tree heading are derived from data available in open

literature. The LOOP frequency and system unavailabilities were combined using the event tree logic to obtain the yearly frequency of inadequate core cooling. This yearly frequency was calculated for two conditions: with all four diesel generators in standby, and with three in standby and one in a LCO. The frequency of inadequate core cooling (per year) is then calculated by summing these frequencies weighted by the yearly fraction of time in each condition. The equation for the frequency of inadequate core cooling is as follows:

$$\text{Frequency of Inadequate Core Cooling} = \frac{365.25 - \text{days in LCO}}{365.25} F_2 + \frac{\text{days in LCO}}{365.25} F_3$$

F_2 = The frequency of inadequate core cooling with all diesels in standby.

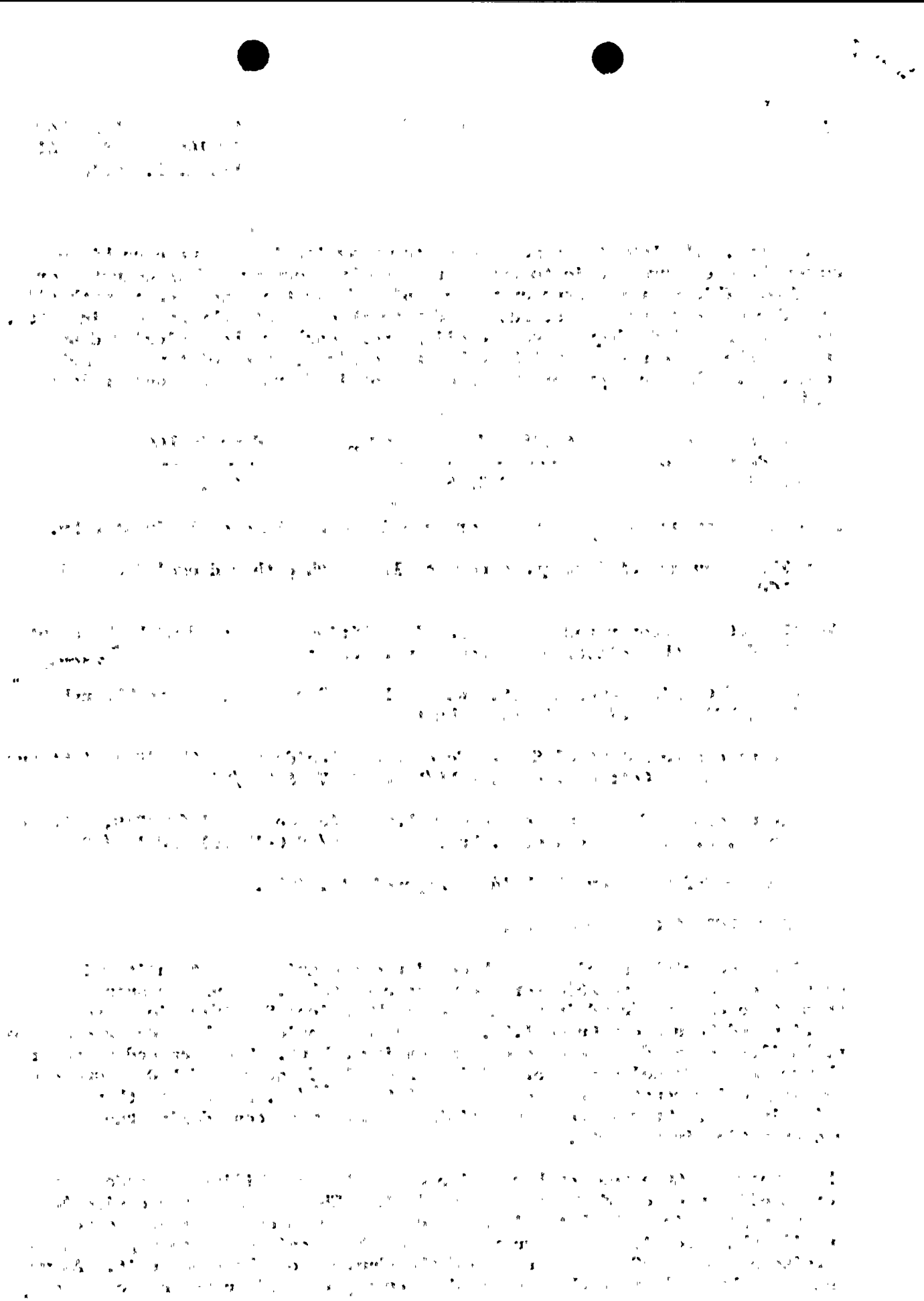
F_3 = The frequency of inadequate core cooling with either diesel A or B in an LCO.

For the LOOP frequency and system unavailabilities associated with the event tree headings, the following references were used:

- Loss of Offsite Power at U.S. Nuclear Power Plant - All Years Through 1983, NSAC-80, July 1984, H. Wychaft
- Precursors to Potential Severe Core Damage Accidents: 1980-1981, A Status Report, W. B. Cottrell, etal. ORNL/NSIC-217/VI & 217/V2.
- Precursors to Potential Severe Core Damage Accidents: 1969-1979, A Status Report, J. W. Minerick, C. A. Kukielka, ORNL/NSIC-182/V1 and 182/V2.
- Reactor Safety Study, Wash-1400, Appendix II, 1975.
- NSAC HPCI/RCIC failure data.

The increased risk associated with continued operation of both units with a diesel generator inoperable for 3 days is acceptable. Arguments supporting this statement are found in the applicable Technical Specification Bases section and Regulatory Guide 1.93. In this evaluation, risk is defined as the probability of inadequate core cooling during a LOOP. The proposed temporary change in the diesel generator LCO increases the frequency of LOOP sequences leading to inadequate core cooling from 5.0×10^{-6}/yr. to no more than 6.4×10^{-6}/yr. This represents a minimal impact when considering the uncertainties in the data.

The temporary LCO extension has no impact on the probability of inadequate core cooling when offsite power is available. The design of the onsite AC power supplies is such that only three diesel generators are required to fulfill the electric power requirements for ECCS equipment assuming a loss of offsite power, a LOCA in one unit and the shutdown of the other unit. As was shown in the evaluation the increased frequency of inadequate core cooling



during the LCO extension is small and therefore the one time LCO extension is acceptable.

In order to assure thoroughness and incorporation of recent ideas on Technical Specification changes, the draft Program Plan for Procedure Evaluating Technical Specifications (prepared for NRC by Brookhaven National Laboratory, October 1984) was reviewed. This report identifies 23 issues which should be addressed in the evaluation of Allowed Outage Times (AOTs). Many of these were determined to be irrelevant to this request. However the following are relevant: analysis level (e.g. system, function, core-damage, etc.), risk importance of the diesel generators, common cause failure, uncertainty, operating accident risk, the length of repair time, and system reconfiguration. Common cause failures, uncertainties, operating accident risk, and system reconfiguration were explicitly addressed in the probabilistic analysis. The length of repair was previously mentioned as the reason for the one-time extension request. The remaining issues are discussed below.

The impact of the extended AOT on operating accident risk was evaluated with respect to inadequate core cooling (as a measure of core damage). This level of analysis was selected since it did not require reference to a full plant probabilistic risk assessment (PRA) and is a level at which the results can be viewed with a meaningful perspective. The availability of diesel generators only affects accident sequences which include a loss of offsite power (LOOP). These are typically low contributors to core damage frequency and public risk as illustrated through the risk achievement worth. Findings of the NRC accident Sequence Precursor Program show the risk achievement worth is only 9.8×10^{-6} for emergency power as compared to 3.5×10^{-1} for long term core cooling. This means the diesel generators would have a relatively low risk importance. The results of our analysis show a negligible increase in the frequency of LOOP sequences which can lead to inadequate core cooling. Therefore, the overall impact on operating accident risk during the AOT is negligible. This negligible increase should be more than offset by the additional capability of the extra diesel generator over the plant lifetime. This diesel is expected to significantly reduce the number of shutdowns and startups of one unit primarily due to the performance of required maintenance (which takes more than three days) during refueling of the other unit.

If you have any questions, please contact us.

Very truly yours,

H. W. Keiser
Vice President-Nuclear Operations

cc: M. J. Campagnone - NRC
R. H. Jacobs - NRC