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SUBJECT: Notifies of deveiation between plant FSAR operational  
description of DG combustion ATCS & actual operation of sys.

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MAY 11 1990

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SUSQUEHANNA STEAM ELECTRIC STATION  
DIESEL GENERATORS  
PLA-3389

FILE R41-2

50.9 Report  
Docket Nos. 50-387  
50-388

Dear Mr. Kane:

The purpose of this letter is to notify NRC of a deviation between the Susquehanna FSAR operational description of the diesel generators' combustion air temperature control system and the actual operation of that system. This letter is being submitted pursuant to 10CFR50.9.

## BACKGROUND

During September and October of 1989, Susquehanna experienced two diesel generator overpressurization events which resulted in formation of a task team whose purpose was to perform a root cause analysis of the events. The efforts of this team resulted in identification of four potential root causes, one of which was low combustion air inlet temperature.

The diesel generators use outside air for combustion. That air is brought through an intake system which includes a turbo-charger. The turbo-charger extracts some useful work from the engine exhaust gases and compresses the intake air. This compression causes the air to heat beyond the level at which efficient engine operation occurs. Therefore, a heat exchanger is installed between the turbo-charger and the engine itself for the purpose of controlling intake air temperature at an optimum level. According to the diesel manufacturer (Cooper Bessemer), the combustion air should be maintained at approximately 105°F.

The heat exchanger, called an intercooler, has both a heating section and a cooling section to assure incoming air is neither too cold or too hot.

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During our root cause investigations, it was discovered that combustion air temperature was not being controlled in the manner outlined above which is consistent with our FSAR.

#### FSAR DESIGN BASIS

FSAR Subsection 9.5.5.2 discusses the diesel generator jacket water system. It states that control valves direct warm jacket water through the heating section of the intercooler when the temperature in the combustion air header falls below 105°F. Similarly, the same subsection describes the emergency service water system (ESW) as supplying cooling to the cooling section of the intercooler except when air temperature is below 105°F.

#### PRESENT DESIGN

The intercooler is currently operated in a way that the combustion air is frequently cooled to a temperature below that which is necessary for peak engine performance. This occurs because ESW flow to the intercooler has no mechanism which would allow combustion air temperature to be controlled. There is a valve on the outlet side of the intercooler, however it is a butterfly valve which can only be operated manually. As long as ESW is available during diesel operation, the heat exchanger has full cooling water flow and intake air is cooled to the greatest degree possible. The heating section of the heat exchanger is so small that it is overpowered by the cooling section.

#### CORRECTIVE ACTION

PP&L is in the process of engineering a modification which will install a single control valve on the outlet side of the intercooler on each diesel generator. The manual valve will be retained for system flow balancing. Intake air temperature will be sensed on both intake air manifolds with the control valve controlling to the higher of the two temperatures. It is anticipated that this modification will result in combustion air temperatures in the range of 95°-125°F which the diesel manufacturer has agreed will result in optimum engine performance.

In addition to the above modification, the diesel generators are presently being inspected and refurbished. This includes installation of new pistons, piston rings, cylinder liners and change out of lubricating oil. These activities result in each diesel generator being restored to a like-new condition. Also, with the onset of spring, cooling water temperature will be higher resulting in increased intake air temperatures. We will have this modification installed on each diesel generator by the end of September.

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SUMMARY

In summary, PP&L is working aggressively to correct the combustion air problem by installing a single control valve on each diesel generator intercooler. In the interim, intake air temperature will be controlled through manual manipulation of the existing butterfly valve. This, in combination with the on-going refurbishment of each diesel generator ensures each machine remains in an operable condition.

We are continuing our review of design basis documents in an attempt to understand how this deviation between the FSAR and actual designed occurred.

If you have any questions regarding this correspondence, please contact D. J. Walters at (215) 770-6536.

Very truly yours,



H. W. Keiser

cc: NRC Document Control Desk (original)  
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