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SUBJECT: Submits 30 Day response to GL 96-06, "Assurance of Equipment Operability & Containment Integrity During DBA Conditions."

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SUSQUEHANNA STEAM ELECTRIC STATION
120-DAY RESPONSE TO GENERIC LETTER 96-06 **Docket Nos. 50-387**
PLA-4551 FILE R41-2 **and 50-388**

Reference: PLA-4521, R.G. Byram to US NRC, "30 Day Response to Generic Letter 96-06," dated October 28, 1996.

The purpose of this letter is to provide Pennsylvania Power and Light's (PP&L) 120-day response to Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions."

At the time the referenced 30-day response was submitted, PP&L had developed a plan to disposition the actions requested with a completion date that supported the 120-day response. On October 29, 1996, NRC met with the Nuclear Energy Institute (NEI) regarding the industry response to the Generic Letter. As discussed in the Attachment, NRC clarifications provided in response to this meeting resulted in PP&L identifying additional evaluations that were necessary to disposition the Generic Letter.

The Attachment to this letter provides PP&L's current response to each of the requested actions in the Generic Letter. Although several evaluations remain to be completed (see Section 4 on Corrective Actions), no issues of near-term safety significance have been identified based on work performed to date. PP&L continues to evaluate the need to enhance the design of SSES to provide further defense-in-depth against these scenarios, and is involved in ongoing industry work led by NEI, EPRI, and the BWR Owners' Group to develop long term solutions. Our current plan is to provide you the final results of our evaluations by June 30, 1997, and to ensure that any resulting necessary actions are completed prior to startup following the Unit 1 10th (Spring 1998) and Unit 2 9th (Spring 1999) refueling and inspection outages.

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We trust that the Commission will find the attached response acceptable. Should any of our conclusions as presented in this response be altered by future work, we will inform the NRC. Questions concerning this response should be direct to R. D. Kichline at (610) 774-7705.

Very truly yours,

R. G. Byram

Attachment

copy: NRC Region I
Mr. M. Jenison, NRC Sr. Resident Inspector
Mr. C. Poslusny, NRC Sr. Project Manager

PP&L 120-Day Response to NRC Generic Letter 96-06

BACKGROUND

On September 30, 1996, the NRC issued Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions." In the Generic Letter, the potential for the following conditions to occur during design basis accidents were identified: water hammer and two phase flow in primary containment air cooling systems, and thermally induced overpressurization of isolated sections of containment piping. Licensees were requested to evaluate their plant design and to submit a written report within 120 days, summarizing: 1) actions taken by the licensee in response to the Generic Letter; 2) conclusions reached relative to the potential conditions identified; 3) the basis for continued operability of the affected systems and components as applicable; and 4) corrective actions which have been implemented or planned.

Subsequent to the issuance of the Generic Letter, the NRC provided clarification in a November 22, 1996 letter entitled "Meeting with NEI and Licensees to Discuss Generic Letter (GL) 96-06," regarding specific expectations. This letter stated that even if the drywell coolers are not credited in accident analyses, an evaluation addressing the potential for water hammer should be made if a plant's Emergency Operating Procedures (EOPs) allow for the restoration of drywell cooling during accident/transient mitigation. In addition, it was further clarified that the NRC concerns for piping overpressurization not only applied to piping inside containment, but also to containment penetrations (i.e., the piping between the two containment isolation valves).

RESPONSE TO REQUESTED ACTIONS

The following provides PP&L's summary response to each of the items requested in the Generic Letter.

1. Actions Taken by PP&L in Response to the Generic Letter:

Upon receipt of Generic Letter 96-06, PP&L initiated engineering evaluations under our Industry Event Review Program to address applicability and potential impact to the Susquehanna Units. These evaluations included: 1) the assessment for the potential for a water hammer during the restoration of non-essential drywell cooling per the Susquehanna Steam Electric Station (SSES) EOPs, and 2) evaluations to determine the susceptibility of containment piping and penetrations to thermally induced overpressurization. The two-phase flow question was determined not to be a concern since the SSES drywell cooling system is not in operation during Design Basis Action conditions, nor is it credited in their mitigation.

In addition, for those containment piping and penetrations which were deemed potentially susceptible to thermally induced overpressurization, the basis for continued operability of affected systems was evaluated.

2. Overall Conclusions

Water Hammer

The containment air cooling system at SSES is a non safety-related system which is used for drywell cooling during normal power operations. In the event of a design basis Loss of Coolant Accident (LOCA), the system automatically isolates and hence serves no safety-related cooling function. However, since provisions for the restoration of drywell cooling are identified in the SSES EOPs, an evaluation to address the potential for a water hammer and any resulting impact on containment integrity is in progress. Analyses performed to date indicate that the piping loads imposed in the unlikely event of a water hammer will not impact containment integrity.

In order for a water hammer to occur, a portion of the drywell cooling piping inside containment must become partially voided. This is possible since this piping is susceptible to overpressurization as discussed below. If the overpressure condition were to result in a small system breach, the piping could depressurize and void if containment temperatures exceed 212°F. Upon the re-opening of the containment isolation valves in accordance with the guidance in the SSES EOPs, the re-filling of this piping could result in a water hammer.

However, the piping loads induced by this water hammer are being evaluated and are not believed to pose a threat to the integrity of the penetration. In addition, when drywell cooling is being restored under the conditions described above, plant circumstances would indicate that maintaining containment cooling is paramount and that the containment isolation valves may be opened without impact to offsite doses. Finally, if re-isolation of the penetration is required, multiple alternate means exist to isolate the piping.

Closed Loop System Overpressurization

Open-ended, as well as gas-filled systems and instruments are not susceptible to thermally induced overpressurization during Design Basis Accidents at SSES. The only containment piping systems susceptible to this mechanism are the non safety-related Reactor Building Closed Cooling Water (RBCCW), Reactor Building Chilled Water (RBCW) systems and the Drywell Floor Drain Sump pump discharge lines. The potential

for overpressurization of these systems does not threaten the function of any safety-related equipment nor containment integrity.

The RBCCW and RBCW systems are non safety-related cooling systems and are not required for accident mitigation. The closed loop RBCCW and RBCW piping inside containment is not credited in our safety analyses of Design Basis Accidents. The potential for a system rupture due to overpressurization does not in any way threaten the availability of safety-related equipment needed to mitigate Design Basis Accidents.

If the RBCCW and/or RBCW piping were to remain intact during a Design Basis Accident, it is possible that it would exhibit a pressure increase. However, this condition is indicative that the closed loop piping inside containment is extremely leak-tight. As a result, the piping, which is not credited in the current SSES design and licensing basis would act as a very effective, passive containment barrier should a leak or rupture occur at an associated penetration. Therefore, under these conditions the potential thermal overpressurization does not create a credible leakage path for the transmission of fission products from the primary to secondary containment.

The Drywell Floor Drain Sump system is a non-safety related system and is not required for accident mitigation. The potential for a system rupture due to overpressurization does not threaten the availability of safety-related systems. The system will pressurize only if all four pump discharge check valves are leak tight. Minor leakage will prevent overpressurization. The design function of these check valves is to prevent gross back flow into the drywell sumps. This system pumps water containing a high concentration of particulate matter; accordingly, particles collect on the check valve seats and prevent the valve disks from positively seating. Such leakage is confirmed based on operational history, and therefore it is not believed that this portion of system piping will overpressurize.

Containment Penetration Overpressurization

Evaluation of containment penetrations has determined that gas-filled and instrument penetrations are not susceptible to thermally induced overpressurization during Design Basis Accidents at SSES. The only containment penetrations susceptible to this mechanism are the RBCCW supply and return lines to Recirculation pump seals and motor oil coolers, the RBCW supply and return lines to the Drywell coolers, the RBCW supply and return lines to Recirculation pump motors, the Demineralized Water line to the Drywell and the Residual Heat Removal (RHR) Head Spray injection line. The potential for overpressurization of this piping does not threaten the function of any safety-related equipment nor containment integrity.

The RBCCW and RBCW systems are non safety-related cooling systems and are not required for accident mitigation. Overpressurization of the containment penetrations for these systems does not in any way threaten the availability of safety-related equipment needed to mitigate Design Basis Accidents.

Overpressurization of any of the affected penetrations during a Design Basis Accident is indicative that the penetration isolation valves are extremely leak tight. Under these conditions, relief of the overpressure through one of the containment isolation valves or rupture of the penetration piping itself would not lead to a loss of containment integrity. If the RBCCW and RBCW or the Demineralized water penetration piping were to rupture, the worst case would be a failure that occurs on the outboard side of the penetration. In this case the piping overpressurization would create a release path for system fluid to secondary containment. The fluid released would be uncontaminated nitrated closed system cooling water or demineralized water.

The Demineralized water system provides a water source to containment (Drywell) for refueling maintenance activities. The demineralized water line provides no safety function. Overpressurization of this containment penetration does not threaten the availability of safety-related equipment needed to mitigate Design Basis Accidents.

Due to the fact that the RHR system will be in operation post-accident, the differing ways in which the RHR Head Spray penetration overpressure may be relieved have been evaluated to assure that containment integrity is maintained. The first failure evaluated was rupture of the line between the inboard and outboard isolation valves. A failure of this type would result in only that fluid contained between the two isolation valves leaking to secondary containment. This release into secondary containment would be monitored and treated and would not increase offsite dose, as this fluid would not contain significant levels of radioisotopes.

The second type of overpressurization failure that was evaluated for the RHR Head Spray line is a failure of or at the outboard isolation valve. The overpressurization of the containment penetration may be relieved at the outboard isolation valve through its pressure seal and/or packing. Relief of the overpressurization through the valve seal and packing would result in release of the fluid contained between the containment isolation valves to secondary containment. This release into secondary containment would be monitored and treated and would not increase offsite dose, as this fluid would not contain significant levels of radioisotopes. The concern then becomes that the valve packing failure could provide a leakage path to secondary containment for fluid being circulated from primary containment through secondary containment by the RHR system post-accident. The outboard containment isolation valves in question are globe valves. Evaluations have been completed to determine seating capabilities for these valves. It has

been determined that the valves will provide positive sealing at RHR system pressures up to four to five times the maximum RHR system post-accident operating pressure at the Head Spray penetration, for Unit 1 and Unit 2, respectively. These evaluations are based upon current valve configurations as determined by the most recent valve diagnostic test results. Therefore, we conclude that the valves will positively seat and maintain system and primary containment integrity at RHR post-accident system pressure.

3. Basis for Continued Operability

Water Hammer

The containment air cooling system at SSES is a non-safety-related system required to maintain containment temperature within Technical Specification limits during normal plant operations. The system is not required to mitigate postulated design basis accidents. While the SSES EOPs allow for the restoration of drywell cooling, these scenarios involve conditions which are beyond the plant's design basis and therefore do not impact operability.

A remote possibility for a hydraulic transient during the restoration of drywell cooling has been identified. However, the loads induced by this transient are not currently anticipated to impact containment integrity nor any other systems related to safety. The evaluation regarding the effects of this transient is ongoing and no conditions with the potential to adversely impact safety have been identified.

Closed Loop System Overpressurization

No safety-related equipment function is threatened by the potential for RBCCW, RBCW or Drywell Floor Drain Sump system overpressurization, nor does the condition represent a viable threat to the integrity of primary containment.

The assumption that the RBCCW and RBCW piping is not available during Design Basis Accidents is already an integral part of the SSES design and licensing bases.

The Drywell Floor Drain Sump system is a non safety-related system and is not required for accident mitigation. The potential for a system rupture due to overpressurization does not in any way threaten the availability of safety-related systems. The system will pressurize only if all four pump discharge check valves are leak tight. As described in Section 2 above, this portion of system piping is not likely to overpressurize. Pending completion of ongoing activities described below under Corrective Actions, this system remains operable.

Containment Penetration Overpressurization

The following summarizes operability evaluations for those containment penetrations that are susceptible to the overpressurization condition.

The effective ASME code for SSES is the 1971 Edition with addenda through Winter 1972. Section NC/ND-3621.2 identifies fluid expansion effects as a general design consideration but in a broad and nondescript fashion. That is, no specific design guidance or acceptance criteria is provided for evaluating isolated sections of ASME Class 1, 2, and 3 piping which is exposed to an external heat source, that causes thermal expansion of the trapped fluid. A detailed review of design documents shows that SSES penetration design is in compliance with the FSAR, GE and Bechtel design specifications, pertinent sections of the Standard Review Plan (NUREG-0800) related to containment isolation systems, and Industry Standards, in particular ANS 56.2 / ANSI N271-1976.

Overpressurization of any of the above mentioned penetrations during a Design Basis Accident is indicative that the penetration isolation valves are extremely leak-tight. Penetration overpressurization can be relieved in one of two directions. If the overpressure were to relieve such that the piping or valve packing were to fail on the primary containment side of the penetration there would be no leakage of contained fluid into secondary containment because the outboard containment isolation valve would remain as a barrier. If the penetration piping were to rupture or a containment isolation valve packing were to fail at the outboard side of the penetration a release path would be created for system fluid to secondary containment for only that fluid which was contained within the two isolation valves. In the case of the RBCCW, RBCW and Demineralized water systems the fluid released would be uncontaminated nitrated closed system cooling water or demineralized water. Failure of the RHR Head Spray line could result in release of potentially contaminated fluid to secondary containment. This release into secondary containment would be monitored and treated and would not increase offsite dose, as this fluid would not contain significant levels of radioisotopes.

Based on the above, overpressurization of the containment penetrations for the RBCCW, RBCW, Demineralized Water, and RHR (Head Spray) systems will not threaten the availability of safety-related equipment needed to mitigate Design Basis Accidents.

The Demineralized water system provides a water source to containment (Drywell) for refueling maintenance activities. The demineralized water line provides no safety function. Overpressure of this containment penetration does not in any way threaten the availability of safety-related equipment needed to mitigate Design Basis Accidents.

The Head Spray mode of RHR does not provide any safety related function. The RHR Head Spray is designed to provide additional reactor vessel cooling during shutdowns. Overpressure of the Head Spray line will not affect post-accident operation of the safety modes of RHR nor primary containment integrity.

4. Corrective Actions

Water Hammer

Evaluations performed in response to Generic Letter 96-06 have identified a remote possibility for a hydraulic transient during the restoration of drywell cooling. However, this evolution, which is performed on a discretionary basis, would be performed when plant circumstances indicate that maintaining containment cooling is paramount and that the containment isolation valves may be opened without impact to offsite dose. If a hydraulic transient were to occur, the magnitude of the loads of the transient should not compromise the integrity of containment nor systems important to safety.

The evaluation of the subject hydraulic transient is ongoing and upon its completion, precautions which note the potential for this transient will be incorporated, if necessary, into the appropriate station procedures. Completion of this evaluation is currently scheduled for June 1997.

Closed Loop System Overpressurization

The consequences with respect to the potential for overpressurization of Closed Loop RBCW and RBCCW piping inside containment are within the current SSES design and licensing bases. Therefore, no corrective actions are deemed required and none are planned at this time.

Activities to determine corrective actions for the Drywell Floor Drain sump pump discharge piping will be evaluated along with penetrations that are affected by overpressurization. See below.

Containment Penetration Overpressurization

The potential for overpressurization of the Demineralized water line will be eliminated by procedure revisions. The revisions will address the draining of the affected lines upon completion of Refueling and Inspection outage activities. Procedure revisions will be completed prior to the next refueling outage for each unit: Unit 2 8th refueling outage (Spring 1997) and the Unit 1 10th refueling outage (Spring 1998). The procedures will be performed during the respective refueling outages.

Activities to determine corrective actions for the affected RBCCW, RBCW and RHR penetrations and the Drywell Floor Drain piping are ongoing. Long term solutions will be pursued based in part upon generic industry guidance which is currently being developed. PP&L will then evaluate the industry guidance with respect to the SSES system configurations, system design, and licensing bases. The results of this evaluation, currently scheduled to be complete by June 1997, will be provided to the NRC.

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA)
: SS
COUNTY OF LEHIGH)

I, ROBERT G. BYRAM, being duly sworn according to law, state that I am Senior Vice President - Nuclear of Pennsylvania Power & Light Company and that the facts set forth on the attached Response to Generic Letter 96-06 issued pursuant to 10CFR50.54(f) are true and correct to the best of my knowledge, information and belief.

Robert G. Byram
Senior Vice President - Nuclear

Sworn to and subscribed
before me this 24th day
of January, 1997.

Martha C. Sedora
Notary Public

Notarial Seal
Martha C. Sedora, Notary Public
Allentown, Lehigh County
My Commission Expires Jan. 15, 1998
Member, Pennsylvania Association of Notaries