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U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
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**SUSQUEHANNA STEAM ELECTRIC STATION  
STATUS OF FIRE PROTECTION  
CORRECTIVE ACTIONS  
PLA-5172**

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**Docket Nos. 50-387  
and 50-388**

*References:*

1. *Letter, Victor Nerses to R. G. Byram, "Confirmatory Order Modifying Licenses, Susquehanna Steam Electric Station (SSES), Units 1 and 2", dated July 2, 1998.*
2. *Letter, R. A. Capra to R. G. Byram, "Fire Protection Functional Inspection Of Susquehanna Steam Electric Station Units 1 and 2 (NRC Inspection Report Nos. 50-387/97-201 and 50-388/97-201)", dated May 13, 1998.*
3. *PLA-4945, R. G. Byram to USNRC, "Response to NRC Fire Protection Functional Inspection (NRC Inspection Report Nos. 50-387/97-201 & 50/388-97-201)", dated July 20, 1998.*
4. *Letter, W. H. Ruland to R. G. Byram, "NRC Special Inspection Report Nos. 50-387 and 50-388/98-09", dated September 4, 1998.*
5. *PLA-5074, R. G. Byram to USNRC, "Follow Up Response to NRC Fire Protection Functional Inspection (NRC Inspection Report Nos. 50-387/98-09 & 50-388/98-09)", dated June 23, 1999.*
6. *Letter, J. T. Wiggins to R. G. Byram, "Notice of Violation and NRC Special Inspection Reports Nos. 50-387/98-09 and 50-388/98-09", dated October 19, 1998.*

This letter provides the status of PPL's actions in response to the NRC Confirmatory Order regarding fire barriers at Susquehanna Steam Electric Station (Reference 1). In addition, this letter provides the status of Unresolved Items (URI) identified during the Susquehanna Steam Electric Station (SSES) Fire Protection Functional Inspection (FPFI) (References 2 through 5). Attachment 1 to this letter provides updated information on PPL's actions taken relevant to URIs 97-201-02, 97-201-03, 97-201-05 and 97-201-06.

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## **I. Status of Thermo-Lag Fire Barrier Confirmatory Order**

In PLA-4921, dated June 3, 1998, PPL agreed to a confirmatory order for Susquehanna Steam Electric Station Units 1 and 2 which stated the following:

“Pennsylvania Power and Light Company shall complete final implementation of Thermo-Lag 330-1 fire barrier corrective actions at SSES, Units 1 and 2, described in Pennsylvania Power and Light Company’s submittal to the NRC dated April 15, 1993, February 3 and December 22, 1994, August 2, 1995, February 4, 1997, January 6 and May 4, 1998, by completion of the April 2000 refueling outage for SSES, Unit 1. Overall work package closeout will be completed by the end of December 2000.”

This letter confirms that PPL has completed final implementation of Thermo-Lag 330-1 fire barrier corrective actions at SSES, Units 1 and 2 including the closure of all work packages associated with the physical work. These corrective actions involved the upgrading of approximately 9,000 linear feet of raceway fire barriers to a qualified status, including those raceway previously protected with Kaowool. These corrective actions have been completed in advance of the required date (prior to startup following the Unit 1 11<sup>th</sup> RIO) in the Commission’s Confirmatory Order. All compensatory actions (i.e., fire watches implemented due to the inoperable raceway fire barriers will be terminated by the end of the Unit 1 11<sup>th</sup> Refueling Outage. A final work package to update and verify the consistency of our Licensing documents will be completed by the end of December 2000, consistent with the Commission’s Confirmatory Order.

## **II. Status of FPFIs**

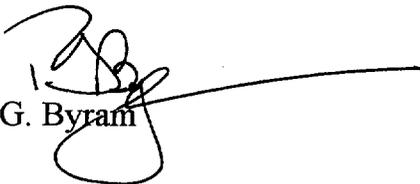
The results of the Susquehanna SES FPFIs were issued in NRC Inspection Report Nos. 50-387/97-201 and 50-388/97-201 (Reference 2). These inspection reports identified a total of 7 URIs, which were originally responded to in Reference 3. The URIs were subsequently reviewed during a NRC Regional Inspection in the summer of 1998 and documented in NRC Special Inspection Report Nos. 50-387/98-09 and 50-388/98-09 (Reference 4). At present, five of the seven unresolved items are closed. For the remaining two unresolved items, one is currently under review by NRR as a BWROG generic issue. The other requires physical modifications to the plant’s fire detection and suppression systems which will be completed as described in the following table. Both of these issues were recently reviewed as a part of a NRC Regional Inspection. The following table provides the current status of each of the URIs.

<b>NRC FPF I URI</b> (NRC Inspection Report Nos. 50-387/97-201 and 50-388/97-201 dated May 13, 1998)	<b>URI Description</b>	<b>Status per NRC</b> (NRC Inspection Report Nos. 50-387/98-09 and 50-388/98-09 dated September 4, 1998)
97-201-01	Failure to follow plant administrative procedures	Closed
97-201-02	Availability of the keepfill system to prevent water hammer.	Closed (See Attachment 1 for the status of additional PPL commitments made in response to the FPF I.)
97-201-03	Adequacy of the SSES shutdown methodology  (Concern with the ability to maintain reactor water level above the top of active fuel)	Open, pending resolution of the BWROG and NRC/NRR issue related to the Use of SRVs and Low Pressure Systems in support of post-fire safe shutdown.
97-201-04	Safe Shutdown Procedures	Closed
97-201-05	Adequacy of the design and installation of fire protection systems	Open, corrective actions related to the NRC's NOV will be completed prior to startup from Unit 1 11 <sup>th</sup> RIO. All remaining actions have been included in our corrective action program (See Attachment 1 to this letter).
97-201-06	Operational capability of the CO <sub>2</sub> systems	Closed (See Attachment 1 for the status of additional PPL commitments made in response to the FPF I.)
97-201-07	Failure to provide post-fire safe shutdown lighting	Closed

In conclusion, the analysis and physical work including work packages associated with the NRC Confirmatory Order on Thermo-lag fire barriers is complete. The Licensing documentation work package associated with the Confirmatory Order will be completed by the end of December 2000. The actions and physical work associated with the URIs will be completed as stated in Attachment 1. PPL will provide a submittal confirming the completion of our remaining activities by January 31, 2001.

If you have any questions, please contact Mr. Terry Harpster, Manager – Nuclear Licensing, at 610-774-7504.

Sincerely,

  
R. G. Byram

Copy: Regional Administrator - Region I  
Mr. S. L. Hansell, NRC Sr. Resident Inspector  
Mr. R. G. Schaaf, NRC Sr. Project Manager

**Attachment 1**  
**Update on open FPFi Commitments**

**NRC Unresolved Item URI 50-387, 388/97-201-02 – Availability of ECCS Keepfill**

In PLA-4945, dated July 20, 1998, PPL provided the following information:

“As a result of the discussions held with the inspection team during the FPFi, PP&L has concluded that a more positive means of demonstrating the availability of the ECCS and RCIC Systems which addresses the potential system initiation on time lines different than those assumed in the analysis and which would also monitor and account for degradation over time in the leak tightness of the pump discharge valves is necessary. Based on this conclusion, PP&L will perform additional reviews to demonstrate that the loss of keepfill will not result in these systems being unable to function or that means are available to assure that keepfill pressures are maintained at those times when system initiation may be required in response to fire conditions. These reviews will be integrated into our fire protection work activities and will be completed by April 2000.”

**PPL Action Status**

The reviews described above have been completed. PPL is in the process of dispositioning the results. We consider this item closed as documented by the NRC in Reference 4.

**NRC Unresolved Item URI 50-387, 388/97-201-03 – Use of ADS/CS**

In PLA-5016, dated December 30, 1998, PPL provided the following information:

“PP&L will perform a study to determine the efficacy of revising the minimum water level for operator initiation of ADS such that downcomer water level remains above TAF. Upon confirmation that the revised minimum water level meets all pertinent requirements, PP&L will initiate appropriate revisions to plant procedures, engineering documentation, and licensing documentation, and will implement the requisite operator training.”

“PP&L will complete the study described above and inform the NRC Sr. Resident Inspector of the results by July 1, 1999. At that time, based on the study results, PP&L will provide the Inspector with our schedule for either completion of the follow-up actions described above, or with an alternate course of action to achieve full compliance.”

PPL Action Status

In Reference 5, PPL provided a follow-up response to the violation cited above. This follow-up information stated that PPL had completed its commitment to perform a study to determine the efficacy of revising the minimum water level for operator initiation of ADS such that downcomer water level remains above TAF. PPL also stated that the BWROG had submitted a position paper on the use of safety relief valves and low pressure systems as redundant safe shutdown paths for NRC review. As stated in Reference 5, PPL will implement the appropriate procedure changes when the generic issue is resolved. Therefore, this issue remains open pending resolution of the industry generic issue.

**NRC Unresolved Item URI 50-387, 388/97-201-05 –  
Fire Detection and Suppression Systems**

A. Item on Detector and Sprinkler Systems

In PLA-4945, dated July 20, 1998, PPL provided the following information:

“Any areas requiring additional detector or sprinkler coverage will be identified through this process and corrected through our plant modification process under the corrective action program.”

PPL Action Status

All areas not meeting the criteria described in PLA-4945 have been identified. These areas have been included into the corrective action program. Items specifically identified in Reference 6 are addressed below. All physical work associated with these seven (7) items will be completed prior to startup following Unit 1 11<sup>th</sup> RIO.

Described below is the NRC statement on each issue identified in Reference 6 and the actions taken by PPL to address these issues.

1. NRC Statement

As of November 7, 1997, smoke detectors 1I-222 and 1I-219 were suspended more than one foot below the ceiling of the 670'-0" elevation of the Unit 1 Reactor Building, contrary to NFPA 72E, Section 4-3, "Location and Spacing," which requires that spot detectors be mounted on the ceiling.

PPL Action Status

The location of these detectors could result in an increased detection time if a small smoldering fire were to occur in this fire zone. For a larger fire, the delay time would be shorter and the other detectors in this fire zone would assist in detection of the fire.

The delay in detection time does not represent a condition that would have an impact on the ability to achieve or maintain safe shutdown in the event of a fire in this fire zone. Required safe shutdown raceway in this fire zone are protected with a 1-hour fire barrier. This condition is considered to have low safety significance.

A modification package has been issued to relocate detectors 1I-219 and 1I-222 to the ceiling for purposes of code compliance.

2. NRC Statement

As of November 7, 1997, room 406 and 407 on the 719'-0" elevation each had one of the two installed smoke detectors located within one foot of a fresh air supply diffuser, with the diffuser discharge directed across the detector, contrary to NFPA 72E, Section 4-4, Heating, Ventilation and Air Conditioning," which prohibits placing detectors where air from supply diffusers would dilute the smoke before it reaches the detector.

PPL Action Status

These installations are in the Unit 2 switchgear rooms on elevation 719'-0" of the Unit 2 Reactor Building. Both rooms have 2 detectors each; one of which is near the supply register. These rooms are fire areas and are surrounded on all sides by fire rated construction. The safe shutdown analysis postulates the loss of all of the equipment in the fire area and still enables the plant to achieve and maintain safe shutdown.

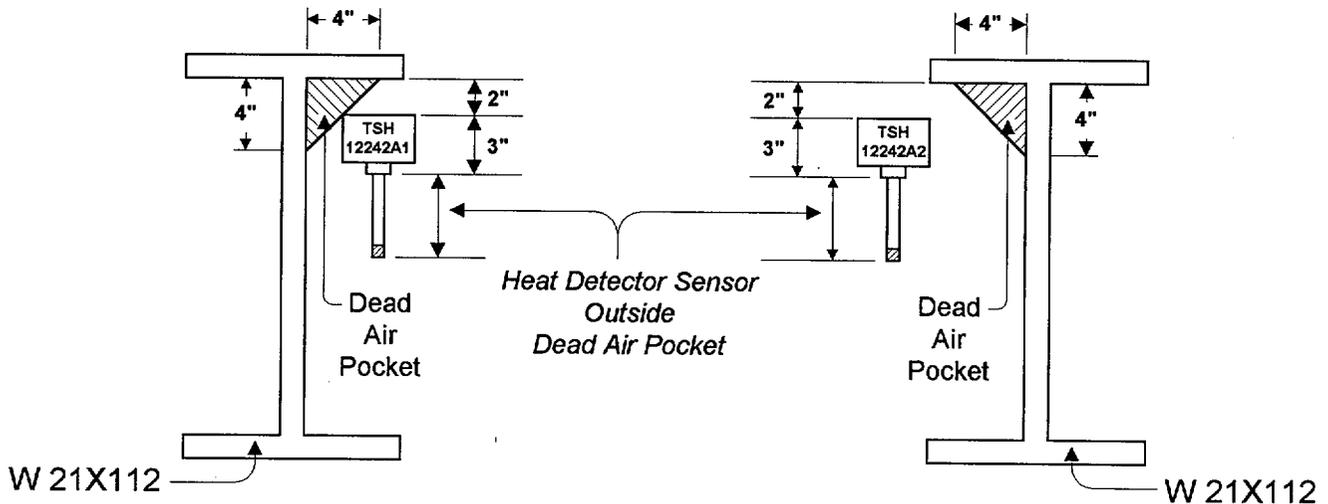
PPL has determined that the condition described for the present location of the detectors has low safety significance. A modification package has been initiated to relocate these smoke detectors for purposes of code compliance.

3. NRC Statement

As of November 7, 1997, heat detectors needed to actuate the water spray system which protects the Unit 1 HPCI pump were located in a dead air pocket along structural steel members, contrary to NFPA 72E, Section 3-4, which requires spot type heat detectors to be placed on the ceiling not less than 4 inches from side walls, or on side walls between 4 and 12 inches from the ceiling.

PPL Action Status

A field walkdown of this item was performed. There are two heat detectors located along structural steel members, which activate the Unit 1 HPCI Pump Water Spray system. Closer inspection verified that these two detectors are not located in the dead air pocket. The exact location of these heat detectors relative to the dead air pocket formed along the W21 x 112 Structural Steel member has been verified under a work order. The following sketch depicts the Unit 1 HPCI Pump water spray system detectors.



From a code compliance standpoint, the existing Unit 1 HPCI Pump Water Spray System Heat Detector locations are in compliance with NFPA Detector location requirements. The Heat Detector Sensor Elements are not located in the Dead Air Pocket formed along the W21 x 112 Structural Steel Beam. No further action is required on this item. This item is considered closed.

4. NRC Statement

As of July 31, 1998, the upright sprinkler head located outside door 1-109 was mounted at a 45 degree angle and had sprayed on fire barrier material on its deflector and fusible link, contrary to the 1974 edition of NFPA 13, Section 4-2.4.7 which requires sprinkler deflectors to be parallel to ceilings and/or roofs; and Section 3-16 which prohibits the application of any type of coating to sprinklers after they have left the place of manufacture.

PPL Action Status

The sprinkler head has been cleaned and the misaligned pipe re-aligned to the vertical orientation. This item is considered to be closed.

5. NRC Statement

As of November 7, 1997, a sprinkler head above the Unit 1 HPCI pump was located in a beam pocket such that its spray pattern is obstructed on all sides, contrary to NFPA 13, Section 4-2.4, which requires that sprinklers in bays be at sufficient distances from the beams to avoid obstruction of the sprinkler discharge pattern.

PPL Action Status

A plant walkdown confirmed that this sprinkler head is located on elevation 670' in Fire Zone 1-2B, which is the floor elevation above the HPCI pump.

The safety significance of having this sprinkler head blocked is low since an evaluation showed that a postulated fire in the immediate area of the blocked head would not spread to other plant areas since the remaining heads in the area would activate and suppress the fire.

A modification package has been generated to relocate the subject sprinkler head for purposes of code compliance.

6. NRC Statement

As of November 7, 1997, an upright sprinkler head above the Unit 1 HPCI pump was mounted on a 1/2" x 4" pipe nipple, contrary to NFPA 13, Section 7-1, which prohibits the use of ferrous piping smaller than one-inch nominal size.

PPL Action Status

A plant walkdown confirmed that the described condition is in the area above the HPCI pump room on elevation 670' in Fire Zone 1-2B. Our walkdown revealed no specific instances where 1/2" nipples were installed.

A modification package was issued as part of the Thermo-Lag project to install fire barrier material on a protected raceway in this area. As part of this installation, a portion of the sprinkler system was dismantled in this area to allow installation of the fire barrier material. The dismantled sprinkler system components were subsequently cleaned and re-installed. All sprinkler heads are mounted either directly on a Tee, or on piping no smaller than one inch. This item is considered to be closed.

7. NRC Statement

As of November 7, 1997, on the 719'-0" elevation of the Unit 2 Reactor Building, outside door 406 to the Unit 2 traversing incore probe room, there were numerous obstructions below the sprinkler heads including light fixtures, beams and electrical junction boxes: the control rod drive pump area on the 719'-0" elevation of the Unit 2 Reactor Building had multiple overhead obstructions including lighting fixtures, beams and electrical components which inhibit the sprinkler from delivering an effective spray pattern to the floor within the protected area: and, on the 749'-0" elevation of the Unit 2 Reactor Building, near column-line T30.5, the ceiling level sprinklers were obstructed by an HVAC duct which is greater than four feet in width. These configurations were contrary to NFPA 13, Chapter 4, which requires minimizing the interference to discharge patterns from beams, braces, girders, trusses, piping, lighting fixtures and air conditioning ducts.

PPL Action Status

An evaluation of the TIP room and CRD areas on elevation 719'-0" has determined that automatic suppression systems are adequate. The obstructions identified are considered to be minor and they will not affect the ability of the sprinkler system to perform its function. Therefore, no modifications are required in these areas.

The sprinkler system obstructions near column T30.5 have been determined to be located on the 719' elevation below the 749' steel framing and not on the 749' elevation as described in Reference 6. These obstructions have been evaluated, and the existing suppression system is being modified to install additional sprinkler heads below the ventilation duct to eliminate the obstructions. A modification package has been generated to complete this work.

For the remaining items identified through our plant walkdowns and included in our corrective action program, an operability assessment has determined that there are no conditions which would render either the fire detection, fire suppression or any raceway fire barriers inoperable as a result of the identified conditions. Approximately 57 areas (including the seven areas specifically identified in Reference 6) were identified. Approximately thirty-seven (37) of these areas have been resolved. All engineering design for the remaining areas will be completed prior to the startup from Unit 1 11th RIO. All physical work related to this issue will be completed by the end of December 2000.

B. Item on Hose Stations

In PLA-4945, dated July 20, 1998, PPL provided the following information:

"Standpipe systems not meeting their required coverage area determined by the code are being re-evaluated under Calculation EC-013-0012. Preliminary results from the calculation indicate it will be acceptable to resolve this issue by staging additional fire hose at the hose station."

PPL Action Status

Calculation EC-013-0012 revision 1 has been approved. This calculation has demonstrated that adequate pressure and flow are available at each location where additional hose is required. To preclude modifications at each of the hose stations, the additional hose has been staged in the fire brigade sheds. The SSES Pre-Fire Plans have been updated to identify hose stations that require the use of additional hose lengths. The Fire Brigade is trained on the addition of fire hose to locations where existing hose may not be adequate to reach all areas on a fire scene. This item is considered closed.