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SUBJECT: Forwards application for amend to License NPF-22.Amend modifies RHR waterhammer in suppression pool cooling.

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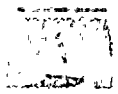

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Harold W. Keiser
Vice President-Nuclear Operations
215/770-7502

Director of Nuclear Reactor Regulation
Attention: Dr. W. R. Butler, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENT 57 TO LICENSE
NPF-22: RHR WATERHAMMER MODIFICATION
PLA-2955 FILES A17-2, R41-2 Docket No. 50-388

References: 1. PLA 2793, H.W. Keiser to E. Adensam, "Change of Design Basis for RHR Suppression Pool Cooling", dated February 3, 1987.

2. USNRC IE Information Notice No. 87-10, "Potential for Water Hammer During Restart of Residual Heat Removal Pumps", dated February 11, 1987.

Dear Dr. Butler:

The purpose of this letter is to propose changes to the SSES Unit 2 Technical Specifications in support of a modification which reduces the potential for a waterhammer during operation in the Suppression Pool Cooling (SPC) mode of the Residual Heat Removal (RHR) System. (Similar changes will be proposed for Unit 1 in support of a future outage.)

BACKGROUND

Via Reference 1, PP&L justified a change to the design basis for operation of the RHR system in the SPC Mode. This change was required because SPC must be utilized more frequently than was originally anticipated due to unanticipated problems which contribute to suppression pool heatup. Although the event is considered improbable as described in Reference 1, one of the commitments PP&L made was to evaluate modifications which would minimize the potential for waterhammer during the more frequent SPC operation. The NRC staff has recognized the potential for this phenomenon as described in Reference 2.

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DESCRIPTION OF CHANGES

This proposal results in the addition of a new valve to Table 3.6.3-1, "Primary Containment Isolation Valves", and the relocation of an existing valve from the automatic to the manual section of that table. A revision to Bases Section 3.6.2, "Depressurization Systems", is also proposed. These changes are illustrated on the attached marked-up pages.

SAFETY ANALYSIS

The following provides a complete description of the planned modification which results in the need for the proposed Technical Specification changes (see the attached figure for illustration).

The modification will install a new section of piping from the RHR pump discharge header to the suppression pool return line in each loop. This flow path will be used for normal suppression pool cooling with the RHR heat exchanger. This function is currently being performed through the HV-251F028A/B valves which will be normally closed in the new configuration. The new flowpath is sized for pool cooling at 10,000 gpm only. Two pressure reducing orifices are included to reduce the throttling burden on the suppression pool cooling/test control valves (HV-251F024A/B). The new piping will also include a fast closing shutoff valve (HV-25129A/B) which will isolate upon a RHR pump trip or a LPCI initiation signal. The closing stroke time is selected to allow the RHR piping to remain water filled following a pump trip. This is necessary in a LOCA/LOOP event because the RHR pumps restart for LPCI injection as soon as power is available from the emergency diesel generators. The piping system remaining full prevents a waterhammer. The HV-25129A/B valves also perform the containment isolation function. In this role, stroke time is less critical.

The HV-25129A/B valves are safety related components which will have fail-closed air cylinder actuators with closing stroke time adjustable between 2-10 seconds. They will fail closed on loss or air or electric power. The stroke time adjustment will be made based on two requirements. Fast valve closure loads on the piping and supports have been analyzed and a minimum stroke time is specified at 2.5 seconds. Maximum stroke time will be selected based on preventing void formation of the system high points following a pump trip. The stroke time range will provide a window to allow for normal operational variations. There will be no special requirements for opening stroke since the valve is not required to be opened for any safety function.

The new valves will be controlled from hand switches in the Main Control Room which also provide position indication lights. All electrical cabling and control devices will be designed to standards commensurate with the LPCI and containment isolation function of the valves. The valves will be dynamically qualified and the operator and actuator assembly will be environmentally qualified components. HV-25129A will be automatically closed by activating the remote shutdown panel transfer switch. Computer points will be added to the HV-25129A/B valves to input valve position into SPDS.

This modification also affects the RHR F011A/B valves which were used in conjunction with the steam condensing mode to reject water to the suppression pool. The non safety-related steam condensing mode will be rendered inoperative. The F011A/B valves will be converted to locked closed manual valves by removing the electrical connections, controls, and position indicating lights. The computer points for position will be deleted.

SPDS software will be modified to reflect the addition of the HV-25129A/B valves and the deletion of the automatic closure of the F011 A/B valves.

The following safety functions are noted to be affected by the above description:

1. LPCI injection,
2. Containment isolation, and
3. Suppression Pool Cooling - post accident.

An analysis of the safety impact on each of these functions due to this modification follows:

1. LPCI Injection: The new flow path is required to be isolated to support LPCI injection. Given a LOCA with or without off-site power available, the HV-25129A and B valves will close. The closing stroke time for the HV-25129A/B valves is much faster than the F028A/B valves which currently fulfill this function in order to ensure that in the event of a LOCA/LOOP a waterhammer which could threaten RHR integrity will not occur.

   As a fast closing valve, special care was given to accommodate the additional structure loading caused by closure while a pump is running. These loads are included in the design.

   The design, maintenance, and testing of the valve controls will assure that the valves cannot close faster, thereby causing dynamic loads in excess of the analysis.

   Based on the above, the new HV-25129A/B valves will perform as well or better than the existing F028A/B valves in support of LPCI injection. Therefore, the basis for the staff's original approval of this function remains valid.

2. Containment Isolation: The new valves also serve as one of the isolation boundaries for the primary containment. The external piping system provides the other barrier. This arrangement is in compliance with GDC54 and USNRC Standard Review Plan 6.2.4 Para. II.3.e and is identical to the current arrangement of the F028 and F011 valves. This modification also converts the F011 A/B valves from AC motor operated to locked closed manual which also increases safety by eliminating the possibility of inadvertent opening.

   Based on the above, the modification complies with all regulatory criteria upon which the design was originally evaluated.

3. Suppression Pool Cooling: The post-accident decay heat removal function of this mode will continue to be supported by the existing F028 valves. Therefore, no impact has occurred to this function and the original determination of its acceptability by the NRC remains unchanged.

NO SIGNIFICANT HAZARDS CONSIDERATIONS

I. The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

As stated previously none of the safety functions related to this modification (LPCI, Containment Isolation, and Suppression Pool Cooling - post accident) are adversely impacted by this change. This conclusion is based upon the following.

a. LPCI injection is supported by faster acting valves which ensure its function while performing the dual role of mitigating waterhammer during a LOCA/LOOP.

b. Containment isolation and integrity are ensured by the new valves meeting existing regulatory criteria, and because no increase to the allowable leakage limits is being proposed.

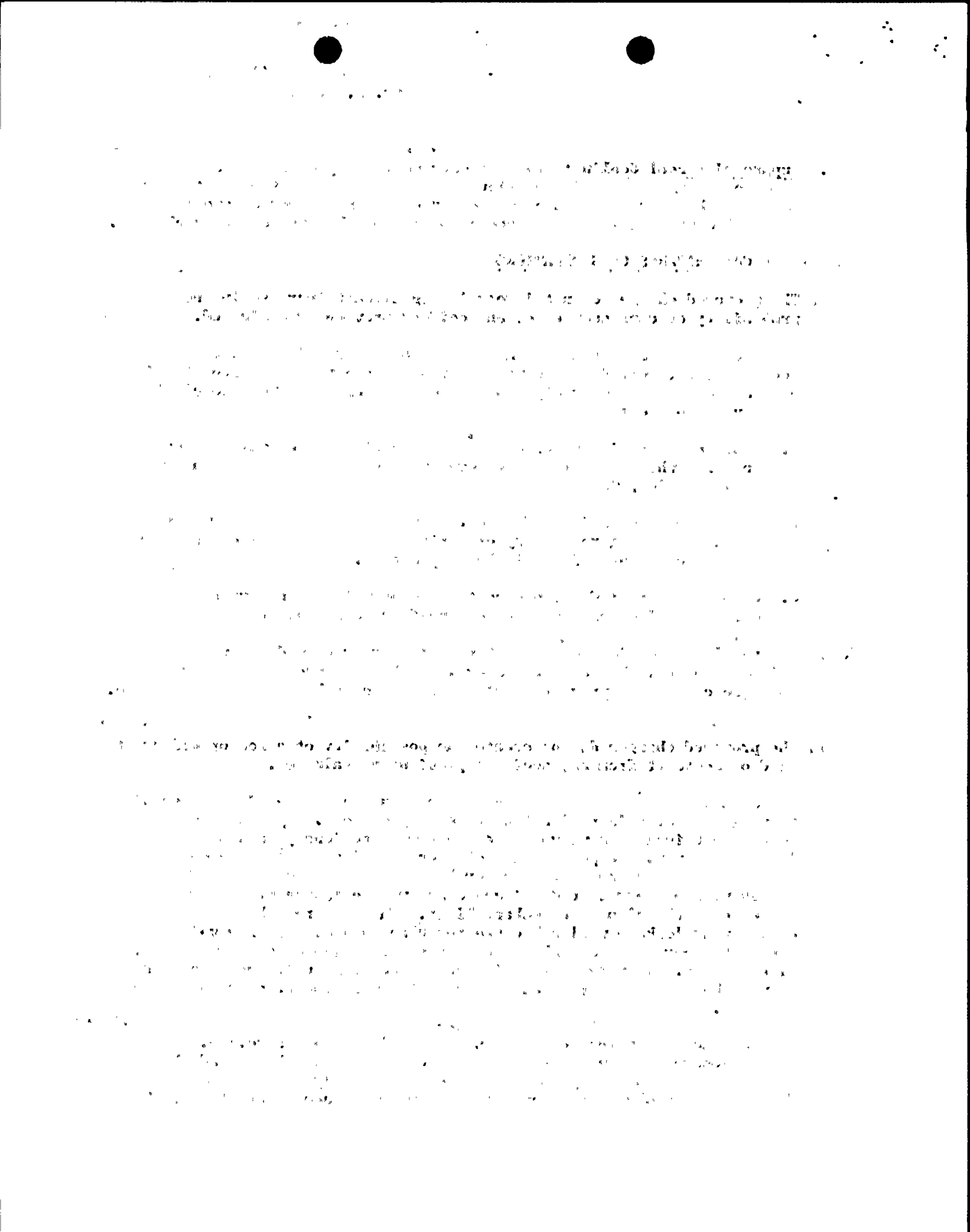
c. Suppression Pool Cooling - post accident will be supported by the existing valves and is therefore unaffected by this change.

All pertinent sections of FSAR Chapter 15 were reviewed in support of this evaluation. Based on the above, neither the probability nor the consequences of any previous analysis is affected by the proposed change.

II. The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

The addition of any new active components must be reviewed for possible reduction in overall reliability of safety systems. By adding a containment isolation valve where there was previously no possible leakage pathway, the possibility of increased leakage and accidental opening must be addressed, even for highly reliable equipment. The new valves will be leak tested in accordance with existing programs with no increase in the allowable leakage limit. This assures that total containment leakage will be no greater than before. The new valves form one of two barriers to leakage so that single failure is accommodated. Since the F011A/B valves are being converted to manual, locked closed valves the total number of automatic containment isolation valves remains the same.

The fast acting feature of the new valves also requires review. Fast valve closure can cause piping and support loading. These loads have been determined by analysis and included in the piping system design. The closing stroke time is critical to the magnitude of the loads. The



valve actuator will be adjusted to close the valve no faster than the time allowed by the analysis. The actuator has no active components whose failure could cause the valve to close more quickly.

Based on the above, no new concerns are created by this proposal.

III. **The proposed changes do not involve a significant reduction in a margin of safety.**

Support of LPCI injection is actually improved during normal suppression pool cooling due to the new faster closing valves. Other safety functions remain unaffected as previously discussed; i.e., containment isolation and integrity are assured to the same relevant criteria, and post accident suppression pool cooling will retain its existing flow path. Safety margin is improved due to the reduction in the potential for waterhammer of the RHR System during SPC.

Based on the above, overall safety margin is improved due to the proposed changes.

IMPLEMENTATION

The proposed changes are required to support modifications planned for the Unit 2 Second Refueling and Inspection Outage, which is currently scheduled to begin on March 5, 1988 and to end as early as May 3, 1988. Therefore, it is requested that these changes be approved prior to the start of the outage and be conditioned to become effective prior to startup following the outage.

Pursuant to 10CFR170, the appropriate fee is enclosed. Any questions on this submittal should be directed to Mr. R. Sgarro at (215) 770-7916.

Very truly yours,

H. W. Keiser
Vice President-Nuclear Operations

Attachments

cc: NRC Document Control Desk (original)
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