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Document Control Desk
Washington, DC 20555

Perry Nuclear Power Plant
Docket No. 50-440
Engineering Issues

Ladies and Gentlemen:

On June 5, the Perry Nuclear Power Plant (PNPP) shut down due to an electrical component failure. Telephone conferences were conducted on June 6 and June 7, 1997, between the NRC staff and the PNPP staff to discuss engineering issues of concern that were unrelated to the cause of the plant shutdown. Specifically, the issues are 1) system leakage associated with the Emergency Closed Cooling (ECC) system, 2) adequacy of the plant's tornado missile protection, and 3) adequacy of a 10 CFR 50.59 Safety Evaluation for an ECC system modification. A discussion of each of these items is contained in Attachments 1 through 3, respectively. Attachment 4 lists the items/activities considered to be regulatory commitments.

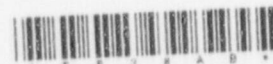
PNPP management acknowledges the significance of each of these issues with respect to plant safety and is committed to providing the NRC staff the technical and regulatory bases upon which the PNPP staff believes plant operation is based. PNPP management will not restart the plant until NRC questions on these issues have been adequately addressed. Furthermore, the PNPP Corrective Action Program will be used to determine the root cause, extent of condition, and combined significance of the issues, to ensure that thorough and complete corrective actions will be implemented to resolve the issues and to prevent their recurrence.

If you have questions or require additional information, please contact Mr. Henry L. Hegrat, Manager - Regulatory Affairs at (216) 280-5606.

Very truly yours,

Attachments

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cc: NRC Region III
NRC Resident Inspector
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Emergency Closed Cooling System Leakage

Background/Status

As part of the in-service testing program, Emergency Closed Cooling (ECC) system Loop B valves, 0P42-F295B and 0P42-F325B, were leak tested in September 1996. The test results indicated ECC Loop B leakage was 1.1 gallons per minute which is a degraded condition since the design basis, as described in the Updated Final Safety Analysis Report (USAR), is 0.5 gallons per hour (gph). The design engineering staff reviewed and evaluated the valves in an operability determination and determined follow-on corrective action to restore the degraded valves to full compliance with the licensing bases. The ECC system design leakage was used as one of the key criteria in the operability determination since there were no criteria associated with individual ECC valve leakage rates. The ECC system design leakage values contained in the USAR provide a post accident seven day supply of water in the ECC surge tank without reliance upon any make-up capability. The results of the determination indicated the affected ECC B Loop was operable. As part of the follow-on corrective action, the Perry Nuclear Power Plant (PNPP) staff incorporated the leakage values from the operability determination into the USAR. The USAR change was supported by a 10 CFR 50.59 safety evaluation which was based partially upon a reliance on the use of operator action allowed by NUREG-0800, "Standard Review Plan", for compensatory measures to provide manual ECC make-up capability. During the Architect/Engineer Design Inspection performed in February/March of 1997, the NRC identified this as a potential unreviewed safety question.

Short-Term Corrective Actions

The following short-term corrective actions either have been or will be implemented to resolve this issue:

1. The four valves in question have been individually tested with their valve seat leakage rates quantified. The leakage rates are as follows: 0P42-F295A is 0.0000 gph, 0P42-F325A is 0.0285 gph, 0P42-F295B is 0.0160 gph, and 0P42-F325B is 0.0003 gph.
2. The USAR is being revised to restore the original assumptions for ECC system leakage rates. The USAR change will be performed in accordance with 10 CFR 50.59. This USAR change will be approved prior to plant restart.

3. Each loop of the ECC system will be tested to determine the system leakage rates. The testing acceptance criteria will support the seven day supply of water in the ECC surge tanks without the reliance on make-up capability as described in the USAR after the completion of Item 2 above. This testing will be completed prior to plant restart. Subsequent testing will be performed in accordance with the in-service test program.
4. If ECC system leakage is found to be within the limits described in the USAR (Item 2 above), there will be no restrictions to the PNPP restart. If system leakage exceeds the USAR limits, plant restart will be subject to an operability determination performed in accordance with Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability."

Long-Term Corrective Actions

The following long-term corrective actions will be implemented:

1. Any subsequent changes to the leakage rates contained in the USAR will be evaluated under 10 CFR 50.59. If the 10 CFR 50.59 evaluation dictates, a license amendment will be processed in accordance with 10 CFR 50.90.
2. The issue is being addressed under the PNPP Corrective Action Program.

Regulatory Actions

No regulatory action is requested. If ECC system leakage is within the above prescribed licensing limits, the licensing basis is satisfied. If ECC system leakage exceeds the above prescribed licensing limits, an operability determination will be performed in accordance with Generic Letter 91-18.

Tornado Missile Protection

Background/Status

During the Architect/Engineer Design Inspection performed in February/March of 1997, the NRC identified that although the Updated Final Safety Analysis Report (USAR) states that safety-related systems and components located outside of Seismic Category I structures are provided with unique missile barriers, the Condensate Storage Tank (CST) instrument level sensing lines, and the High Pressure Core Spray (HPCS) and Reactor Core Isolation Cooling (RCIC) systems' common suction line at the CST did not have adequate tornado missile protection. At the time of identification, the plant staff recognized the significance of the issue and promptly realigned the HPCS/RCIC suction to the suppression pool rather than the CST.

Through further evaluation of this condition, the design engineering staff determined that when the NRC reviewed and accepted the plant's design, as documented in the Safety Evaluation Report (SER) issued May 1982, the approval reflected the above statement about the safety-related systems and components being protected from tornado missiles. Such an approach does not utilize the NUREG-0800, "Standard Review Plan (SRP)", Section 3.5.1.4 method of determining the "probability per year of damage to the total of all important structures, systems and components (as discussed in Regulatory Guide 1.117)" due to a tornado, and designing the plant to "reduce the estimate of damage probability to an allowable level."

In 1984, subsequent to the issuance of the SER, but prior to the issuance of the Perry Nuclear Power Plant (PNPP) Operating License, the PNPP staff utilized a "probability of tornado missile damage" approach in a calculation to provide the basis for not providing physical protection of certain exterior building openings and equipment, without obtaining NRC review. As part of the evaluation of the recent CST issue, the 1984 calculation was re-evaluated by the design engineering staff. The calculation was determined to not address the equipment located at the CST (i.e., instrument level sensing lines and HPCS/RCIC suction pipe), and further, the calculation did not consider the cumulative probability of damage to equipment important to safety, as required by the guidance contained in SRP Section 3.5.1.4.

The acceptability of the overall tornado missile protection design was evaluated on May 21, 1997 in accordance with the PNPP Corrective Action Program. The evaluation included a walk-down of safety-related plant structures to determine the extent of condition, which identified the unprotected building openings and unprotected equipment important to safety. A preliminary evaluation addressing the building openings and equipment was conducted, which included a comparison between the existing PNPP

design and comparable plants with designs evaluated utilizing the probability type methodology. This comparison provided reasonable assurance that a more precise probability calculation will result in an acceptable cumulative damage probability. The above described evaluation, along with procedural compensatory actions which have been put in place for control room operators to realign the HPCS/RCIC suction line from the CST to the suppression pool when a tornado is sighted in the immediate vicinity of the plant, provide confidence that PNPP systems and components remain operable in the current configuration. To provide additional confidence, physical barriers are currently being put in place for the tornado missile issue.

Although assurance exists that the intent of the NRC review guidance is satisfied, the plant staff has recognized that until the long-term corrective actions are completed, the plant is not in full compliance with the PNPP licensing basis for satisfying 10 CFR 50, Appendix A, Criterion 2, "Design Bases for Protection Against Natural Phenomena", and Criterion 4, "Environmental and Dynamic Effects Design Bases".

Short-Term Corrective Actions

The following short-term corrective actions will be implemented:

1. Until such time that the tornado missile issue is resolved, instructions will remain in place for the control room operators to transfer the HPCS/RCIC suction line from the CST to the suppression pool when a tornado is sighted in the immediate vicinity of the plant.
2. Physical barriers are being put in place to provide additional confidence for the tornado missile issue. The systems and components receiving additional protection are the safe shutdown and decay heat removal equipment conservatively evaluated to be vulnerable to tornado missile damage, along with the spent fuel. These barriers will be in place prior to plant restart, and administrative controls of barrier placement will be implemented until such time that the tornado missile issue is resolved.

Long-Term Corrective Actions

The following long-term corrective actions will be implemented prior to restart from RFO6, currently scheduled for September 12 through October 22, 1997:

1. The methodology to be used for the final resolution of the tornado missile issue will be determined, either through compliance with the current PNPP licensing

bases, incorporation of the probability of tornado missile damage methodology, or a combination of both.

2. If the probability of tornado missile damage methodology is used, it will be evaluated in accordance with 10 CFR 50.59. If the 10 CFR 50.59 evaluation dictates, a license amendment will be submitted to the NRC in accordance with 10 CFR 50.90.
3. The issue is being addressed under the PNPP Corrective Action Program.

Regulatory Actions

PNPP management will not restart the plant until NRC questions on the above stated issues have been adequately addressed.

Emergency Closed Cooling System Temperature Control Valve Modification

Background/Status

In NRC Inspection Report 50-440/97002, transmitted by letter dated April 23, 1997, the NRC included a Notice Of Violation (NOV) which stated in part: "...your record of a safety evaluation required by 10 CFR 50.59, regarding a modification of the emergency closed cooling system, did not adequately support your conclusion that the probability of a malfunction was not increased or that the potential for a different malfunction was not introduced." In response to this NOV, extensive review of the subject 10 CFR 50.59 safety evaluation was performed. Of the two issues described in the violation, the review determined that the potential for a different malfunction of equipment was not introduced since the failure effects of the modification to the Emergency Closed Cooling (ECC) system (addition of a temperature control bypass valve around the ECC heat exchanger) were bounded by existing analyses. However, central to the review of the safety evaluation was the development of an adequate basis to demonstrate that the probability of a malfunction of equipment important to safety was not increased as a result of the modification. The overall ECC system reliability increased as a result of having automatic temperature control during periods of cold intake water operation; however, the addition of an active valve, the failure of which could render a train of ECC inoperable, could increase the probability of a malfunction of equipment important to safety. Ultimately, without a strong basis for a conclusion that the probability of malfunction of equipment important to safety has not increased, a decision was made to modify the system such that the potential for an unreviewed safety question is removed.

Short-Term Corrective Actions

The following short-term corrective actions will be implemented:

1. The ECC system will be modified prior to plant restart such that the heat exchanger temperature control bypass valve will be disabled to remain in the "full flow through the heat exchanger" position, providing adequate assurance of ECC system operation in the required modes.
2. The appropriate system operating instructions will be revised prior to plant restart to reflect the effects of the modification on ECC system operation.

Long-Term Corrective Actions

The following long-term corrective actions will be implemented:

1. A long term solution to this issue will be developed, which may involve reactivation of the temperature control valve to perform its intended design function.
2. The final resolution may result in additional changes to the Updated Final Safety Analysis Report (USAR). These changes, if necessary, will be made in accordance with 10 CFR 50.59. If the 10 CFR 50.59 evaluation dictates, a license amendment will be submitted to the NRC in accordance with 10 CFR 50.90.
3. A revised response to the Notice Of Violation associated with NRC Inspection Report 50-440/97002 will be provided to document resolution of the issue. This response will be submitted to the NRC by June 27, 1997.
4. The issue is being addressed under the PNPP Corrective Action Program.

Regulatory Actions

No regulatory action is requested. The proposed short-term resolution of this issue will restore the plant to within its licensing basis.

Regulatory Commitments

The following table identifies those actions which are considered to be regulatory commitments. Any other actions discussed in this document represent intended or planned actions, are described for the NRC's information, and are not regulatory commitments. Please notify the Manager - Regulatory Affairs at the Perry Nuclear Power Plant of any questions regarding this document or any associated regulatory commitments.

Commitments

Emergency Closed Cooling System Leakage

The USAR is being revised to restore the original assumptions for ECC system leakage rates. The USAR change will be performed in accordance with 10 CFR 50.59. This USAR change will be approved prior to plant restart.

Each loop of the ECC system will be tested to determine the system leakage rates. The testing acceptance criteria will support the seven day supply of water in the ECC surge tanks without the reliance on make-up capability as described in the USAR after the completion of Item 2 above. This testing will be completed prior to plant restart. Subsequent testing will be performed in accordance with the in-service test program.

Tornado Missile Protection

Until such time that the tornado missile issue is resolved, instructions will remain in place for the control room operators to transfer the HPCS/RCIC suction line from the CST to the suppression pool when a tornado is sighted in the immediate vicinity of the plant.

Physical barriers are being put in place to provide additional confidence for the tornado missile issue. The systems and components receiving additional protection are the safe shutdown and decay heat removal equipment conservatively evaluated to be vulnerable to tornado missile damage, along with the spent fuel. These barriers will be in place prior to plant restart, and administrative controls of barrier placement will be implemented until such time that the tornado missile issue is resolved.

The following long-term corrective actions will be implemented prior to restart from RFO6, currently scheduled for September 12 through October 22, 1997:

1. The methodology to be used for the final resolution of the tornado missile issue will be determined, either through compliance with the current PNPP licensing bases, incorporation of the probability of tornado missile damage methodology, or a combination of both.
2. If the probability of tornado missile damage methodology is used, it will be evaluated in accordance with 10 CFR 50.59. If the 10 CFR 50.59 evaluation dictates, a license amendment will be submitted to the NRC in accordance with 10 CFR 50.90.

Emergency Closed Cooling System Temperature Control Valve Modification

The ECC system will be modified prior to plant restart such that the heat exchanger temperature control bypass valve will be disabled to remain in the "full flow through the heat exchanger" position, providing adequate assurance of ECC system operation in the required modes.

The appropriate system operating instructions will be revised prior to plant restart to reflect the effects of the modification on ECC system operation.

A long term solution to this issue will be developed, which may involve reactivation of the temperature control valve to perform its intended design function.

A revised response to the Notice Of Violation associated with NRC Inspection Report 50-440/97002 will be provided to document resolution of the issue. This response will be submitted to the NRC by June 27, 1997.
