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NUCLEAR ENGINEERING
CALCULATION / STUDY COVER SHEET
and
NUCLEAR RECORDS TRANSMITTAL SHEET

File # R2-1

1. Page 1 of
Total

*2. TYPE: Study >3. NUMBER: EC-013-0788 >4. REVISION: 1

5. TRANSMITTAL#: _____ *6. UNIT: 3 *7. QUALITY CLASS: F *8. DISCIPLINE: E

>9. DESCRIPTION: Disposition of EDR G10122 - Appendix R Flow Diversion

Components - HPCI

SUPERSEDED BY: EC-

10. Alternate Number: SEA-EE-447 11. Cycle: _____

12: Computer Code or Model used: _____ Fiche Disks Am't _____

13. Application: Appendix R

*>14 Affected Systems: 013 , 013H

** If N/A then line 15 is mandatory.

*>15. NON-SYSTEM DESIGNATOR: _____

16. Affected Documents: EDR G 10122

17. References: _____

18. Equipment / Component #: _____

19. DBD Number: DBD 076; DBD 019; DBD 004

>20. PREPARED BY

>21. REVIEWED BY

Print Name Thomas A. Gorman

Print Name Eric R. Jebson

Signature Thomas A. Gorman

Signature Eric R. Jebson

>22. APPROVED BY / DATE

23. ACCEPTED BY PP&L / DATE

Print Name F.G. Butler

Print Name _____

Signature F.G. Butler 4/4/96

Signature _____

TO BE COMPLETED BY NUCLEAR RECORDS

NR-DCS SIGNATURE/DATE

ADD A NEW COVER PAGE FOR EACH REVISION

FORM NEPM-QA-0221-1, Revision 1

* Verified Fields
> REQUIRED FIELDS

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PDR ADDCK 05000387
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2/11/88

1.0 Objective: This study provides the basis for the disposition of the HPCI inadvertent initiation concern identified in EDR G10122. The concern is that cable fault conditions resulting from a fire could cause an inadvertent initiation of the HPCI system in conjunction with a fire induced failure of the HPCI 54" trip logic.

This study is being revised to reflect the recent changes in the approach to addressing the issue of spurious operations resulting from fires for fire conditions outside of the main Control Room at SSES where safe shutdown is governed by the requirements of 10CFR50 Appendix R Section III.G. The spurious operation criteria used in this study is the criteria agreed to in a technical meeting with the NRC on January 25, 1996.

2.0 Conclusions and Recommendations: The concern of a spurious initiation of HPCI coincident with a loss of the 54" HPCI trip can occur at SSES. Mitigating operator actions, however, have been identified for all fire zones where this condition can occur. The mitigating action instructs the operator upon recognition of the condition to close the F002, Inboard Steam Isolation Valve, from the main Control Room. This action which is contained in Operating Procedure OP-1(2)52-001 for the HPCI system will terminate the event.

3.0 References:

- 3.1 NCR 89-0726
- 3.2 Calculation EC-013-0873, Evaluation to Ensure Isolation of RCS Flow Diversion.
- 3.3 Calculation EC-013-0965, Reactor Water Level vs. Time for Inadvertent HPCI Initiation
- 3.4 GE Elementaries:
 - M1-E41-59, Sheet 4
 - M1-E41-59, Sheet 5
 - M1-E41-69, Sheet 4
 - M1-E41-69, Sheet 5

4.0 Assumptions and Inputs:

4.1 EC-013-0873 provided the review which identified those fire zones in which this condition could occur.

5.0 Problem Description:

5.1 Spurious initiation of HPCI can occur in 2 ways:

Type (1): A Hot Short on the start circuitry for the HPCI Aux. Oil Pump, 1/2P213, could open the HPCI Control and Stop valves. A Hot Short on the HPCI Steam Admission Valve, 1/2F001, could open the Steam Admission Valve. A Hot Short on the HPCI Pump Discharge Valve, 1/2F006, could open the HPCI Pump Discharge valve. The combination of these 3 Hot Shorts could result in the inadvertent initiation of HPCI.

Type (2): A single Hot Short on the DC control circuitry for HPCI initiation could result in the inadvertent initiation of HPCI.

Should either of these 2 types of initiations occur in conjunction with a loss of the HPCI 54" trip, a condition could result where vessel overfill occurs unless a mitigating action is taken.

6.0 Evaluation and Results:

The following fire zones impacts were identified in Calculation EC-013-0873:

Fire Zone	Fire Zone Description	Initiation Type	Mitigating Action	Remarks
0-24D	Unit 1 Lower Relay Room	(1)	Close 1F002 Valve	1
0-25E	Unit 1 Lower Cable Spreading Room	(1)	Close 1F002 Valve	1
1-3B-N	Unit 1 Rx. Bldg. Equip. Area	(1)	Close 1F002 Valve	1
0-24G	Unit 2 Lower Relay Room	(1)	Close 2F002 Valve	1
0-25A	Unit 2 Lower Cable Spreading Room	(1)	Close 2F002 Valve	1
2-3B-N	Unit 2 Rx. Bldg. Equip. Area	(1)	Close 2F002 Valve	1
0-26H	Main Control Room	N/A	N/A	2

Remarks Explanation:

1. A fire in this Fire Zone could impact circuits for the Aux. Oil Pump, the HPCI Steam Admission Valve and the HPCI Pump Discharge Valve. The fire could also disable the 54" HPCI trip. Circuitry for the HPCI Inboard Steam Isolation Valve, F002, however, is not impacted by a fire in this Fire Zone. Therefore, closing the F002 Valve will mitigate the effects of this series of potential spurious operations.

Calculation EC-013-0965 has determined that under worst case conditions, the operator will have at least 3 minutes to take the required action. Since the prescribed action is taken by the operator in the main Control Room and since the action is the same action

that the operator is trained to take to prevent a unit SCRAM in response to an inadvertent initiation of HPCI, 3 minutes is considered to be an acceptable amount of time for the operator to act. This procedural action is contained in Procedure OP-1(2)55-001, HPCI System.

2. For the fire in the main Control Room, the manual initiation switch for HPCI-initiation and the reactor high level relay contacts for the HPCI 54" trip are a part of the same DC control circuit. As a result, should a single hot short inadvertently initiate HPCI, the 54" trip would be preserved. Similarly, should a short to ground blow the fuses for the 54" HPCI trip circuitry, this would also disable the start signal to HPCI. Therefore, a spurious start of HPCI is not possible due to a single hot short in a Control Room fire.

NRC Generic Letter 86-10 Section 5.3.10 requires that for fires using Alternate or Dedicated Shutdown only one worst case spurious operation needs to be considered for non-high/low pressure interfaces.