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SUBJECT: Responds to request for addl info re App R safe shutdown analysis fire protection review rept, rev 4.

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**SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO THE REQUEST FOR ADDITIONAL INFORMATION
REGARDING THE APPENDIX R SAFE SHUTDOWN ANALYSIS
FIRE PROTECTION REVIEW REPORT REVISION 4
PLA-4321**

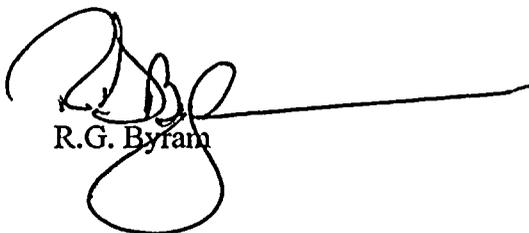
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**Docket Nos. 50-387
and 50-388**

This letter is provided in response to your request for additional information regarding the Appendix R Safe Shutdown Analysis documented in revision 4 to the Fire Protection Review Report.

Should you have any questions regarding this response, please call W.W. Williams at (610) 774-7742.

Very truly yours,



R.G. Byram

Attachments

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

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NRC QUESTION NO. 1

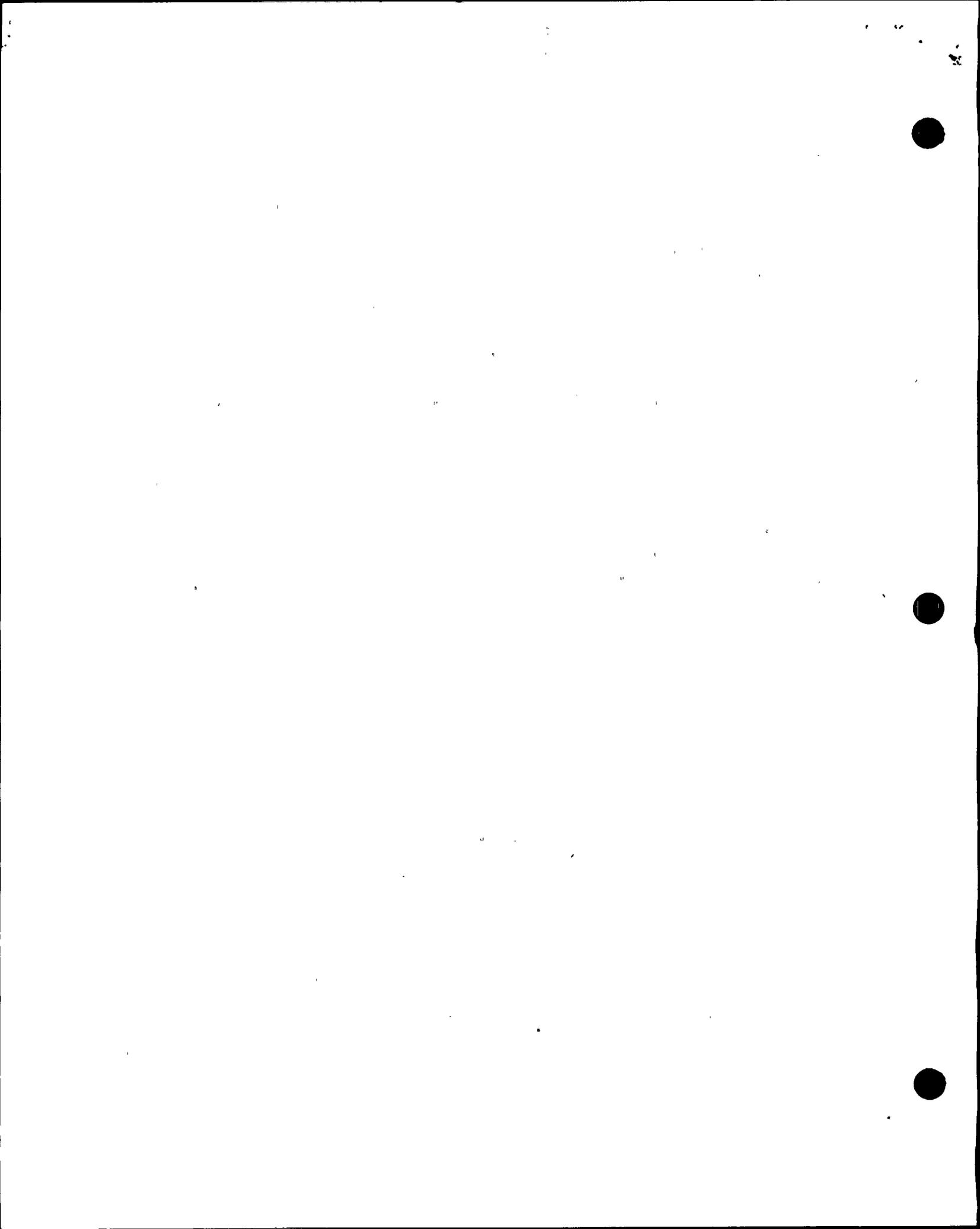
Deviations

Revision 4 of the SSES FPRR identifies a total of 40 deviation requests. Additionally, by letter dated June 21, 1993, and additional deviation (deviation request No. 41) was submitted to the Nuclear Regulatory Commission (NRC). The staff requests an itemization of deviation requests-dates submitted and dates approved or other disposition by the NRC. Where applicable, please reference the appropriate NRC Safety Evaluation Report.

PP&L Response:

The table given below provides a listing of all deviations submitted to date. Each listing of a deviation currently in effect provides the date requested and the status of approval. Deviation requests which have been withdrawn are so indicated.

LISTING OF SSES FIRE PROTECTION DEVIATION REQUESTS			
Deviation Request No.	Subject	Date Submitted	Status
1	This Deviation Request has been Withdrawn	Withdrawn	Withdrawn 12/29/89
2	Suppression Pool Temperature Indication	6/30/88	Approved SER dtd. 8/09/89
3	Fire Doors-Non-Rated	6/30/88 ⁽³⁾	Approved SER dtd. 8/09/89
4	Wraparound Area	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
5	This Deviation Request has been Withdrawn at the Request of the NRC	Withdrawn	Withdrawn
6	Non Fireproofed Structural Steel	6/30/88 ⁽⁴⁾	Approved SER dtd 8/09/89
7	Fire Spread Limitations	6/30/88	Approved SER dtd 8/09/89
8	One Hour Fire Barrier Wrap With Limited Suppression	2/09/82	Approved Suppl. 4 to NUREG-0776
9	Insufficient Spatial Separation of Unit 2 Emergency Switchgear Room Direct Expansion Refrigeration Units	12/13/83 ⁽¹⁾	Approved Suppl. 6 to NUREG 0776 ⁽⁵⁾



LISTING OF SSES FIRE PROTECTION DEVIATION REQUESTS

Deviation Request No.	Subject	Date Submitted	Status
10	This Deviation Request has been Withdrawn at the Request of the NRC	Withdrawn	Withdrawn
11	HVAC Penetrations Reactor Building Fire Walls	6/30/88	Approved SER dtd 8/09/89
12	Fire Barriers Without Fire Dampers in Vertical Ventilation Duct Penetrations	6/30/88 ⁽¹⁾⁽²⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
13	Essential Redundant Raceway Protection	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
14	Reactor Building Fire Zones Without Fire Detection	6/30/88	Approved SER dtd 8/09/89
15	Fire Areas Control Structure Without Fire Suppression	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
16	Emergency Switchgear Room Cooling System Components Insufficient Spatial Separation Fire Zones 1-4A-S and 2-4A-S	6/30/88 ⁽¹⁾⁽⁴⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
17	Kaowool System As An Acceptable 1-Hour Fire Barrier Wrap	6/30/88 ⁽⁴⁾	Approved SER dtd 8/09/89
18	This Deviation Request has been Withdrawn	Withdrawn	Withdrawn
19	Incomplete Fire Suppression and Fire Detection In Diesel Generator Fire Areas	6/30/88	Approved SER dtd 8/09/89
20	Penetration Seals - Conduits	6/30/88	Approved SER dtd 8/09/89
21	Control Structure Fire Zones Without Fire Detection and/or Fire Suppression	6/30/88 ⁽¹⁾⁽⁴⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
22	This Deviation Request has been Withdrawn	Withdrawn	Withdrawn
23	Control Structure Fire Area CS-9 Partial Fire Suppression	6/30/88	Approved SER dtd 8/09/89
24	Automatic Fire Suppression in Fire Zone 2-5D	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
25	Automatic Fire Suppression and Intervening Combustibles in Fire Zone 1-3A	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
26	Automatic Fire Suppression and Intervening Combustibles in Fire Zone 2-3B-N	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾

LISTING OF SSES FIRE PROTECTION DEVIATION REQUESTS

Deviation Request No.	Subject	Date Submitted	Status
27	Nuclear Boiler Instrumentation in Fire Zone 1-5A-S	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
28	Nuclear Boiler Instrumentation in Fire Zone 2-5A-N	6/30/88 ⁽¹⁾⁽⁴⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
29	Category I Components in Fire Zone 1-3C-W and 2-3C-W	6/30/88	Approved SER dtd. 8/09/89
30	Control Structure HVAC System Components Fire Zones 0-29B and 0-30A	6/30/88 ⁽¹⁾	Approved SER dtd 8/09/89 ⁽⁵⁾
31	This Deviation Request has been Withdrawn	Withdrawn	Withdrawn
32	Lack of Separation of Safe Shutdown Components and Electrical Cables	6/30/88	Approved SER dtd 8/09/89
33	Reactor Coolant Makeup and Pressurization Systems	6/30/88	Approved SER dtd 8/09/89
34	This Deviation Request has been Withdrawn	Withdrawn	Withdrawn
35	This Deviation Request has been Withdrawn	Withdrawn	Withdrawn
36	Control Structure Chiller ESW Valves Insufficient Fire Barrier Fire Zone 1-3A	6/30/88	Approved SER dtd 8/09/89
37	Control Room Raised Floor and Control Structure Cable Chase Fire Protection	6/30/88	Approved SER dtd 8/09/89
38	Protection of Redundant Safe Shutdown Raceways in the Unit 2 Main Steam Pipeway (Fire Zone 2-4G)	12/29/89	Approved SER dtd 3/29/93
39	Category I Components in Fire Zones 1-6D and 2-6D	12/29/89	Under Evaluation
40	Protection of Safe Shutdown Raceway in Fire Zone 2-3C-W	12/29/89	Under Evaluation
41	Control Structure Fire Area CS-9 MOV-Hot Short Issue (NRC IN 92-18)	6/21/93	Under Evaluation

- Notes: (1) Deviation revised in FPRR Rev. No. 4.
(2) Deviation revised in FPRR Rev. No. 5.
(3) Deviation revised in FPRR Rev. No. 6.
(4) Deviation revised in FPRR Rev. No. 7.
(5) Revision to deviation approved in SER dated 3/29/93.

NRC QUESTION NO. 2

Category 1 Components

Category 1 components are described in the FPRR as components that are required for post-fire shutdown and located within the fire affected zone. Section 6 of the FPRR, identifies Category 1 components by fire zone and provides a brief description of the method of achieving compliance with the post-fire safe shutdown requirements of Appendix R (e.g., modification, deviation request, or engineering analysis). To facilitate our review, please provide more detailed information with regard to these components. Specifically, for all fire zones containing Category 1 components, we request a separate table or listing which includes the following information: (1) The Fire Zone, (2) the Fire Area, (3) Category 1 components located within the fire zone (component name and I.D. number), (4) the post-fire safe shutdown function of the component, (5) method of resolution (i.e. deviation, analysis, or modification, and (6) for those cases where analysis or modification have been used to achieve compliance with Appendix R, provide detailed description of the specific method implemented.

PP&L Response:

A table responding to your request is given below. This table represents the current Category 1 component listing and is not reflective of the FPRR listing. An FPRR change is in process.

SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-1A	1-1A	HV-15768, Suppression Pool Filter Pump Suction Valve	This valve is a containment isolation valve. Both this Division II outboard isolation valve and the Division I inboard isolation valve, HV-15766, are located in the same fire zone. Neither of these valves are required to function for safe shutdown. Simultaneous opening of both valves could result in a flow diversion from the suppression pool.	Analysis	Either one of these normally closed, fail closed valves must remain closed to prevent the unwanted flow diversion. For both valves to open simultaneously, a hot short on each valve is required. NRC Generic Letter 86-10 does not require the assumption of multiple hot shorts for non-hi/lo pressure interfaces. Therefore, one of these two valves is assured to remain closed.
R-1A	1-3A	HV-08693B, Cont. Struct. Chilled Water ESW Control Valve	Both this Division II valve and the Division I Chilled Water Valve, HV-08693A, are contained in this fire zone. These valves are used to supply condenser cooling water to the Control Structure HVAC Chillers. One of these valves must remain free of fire damage for the Chiller to function. Control Structure Chillers provide room cooling to the Control Structure and to the Unit #1 Emergency Switchgear Rooms.	Deviation Request No. 36	N/A
		FT-E21-1N003B and FIS-E21-1N006B, Core Spray Loop B Instruments	Both these Division II flow instruments and their Division I counterparts are located in the same fire zone. These instruments provide indication of core spray flow and the flow indicting switch provides a signal to close the min. flow valve. The core spray system is used for vessel inventory make-up for Appendix R Safe Shutdown.	Deviation Request No. 25	N/A

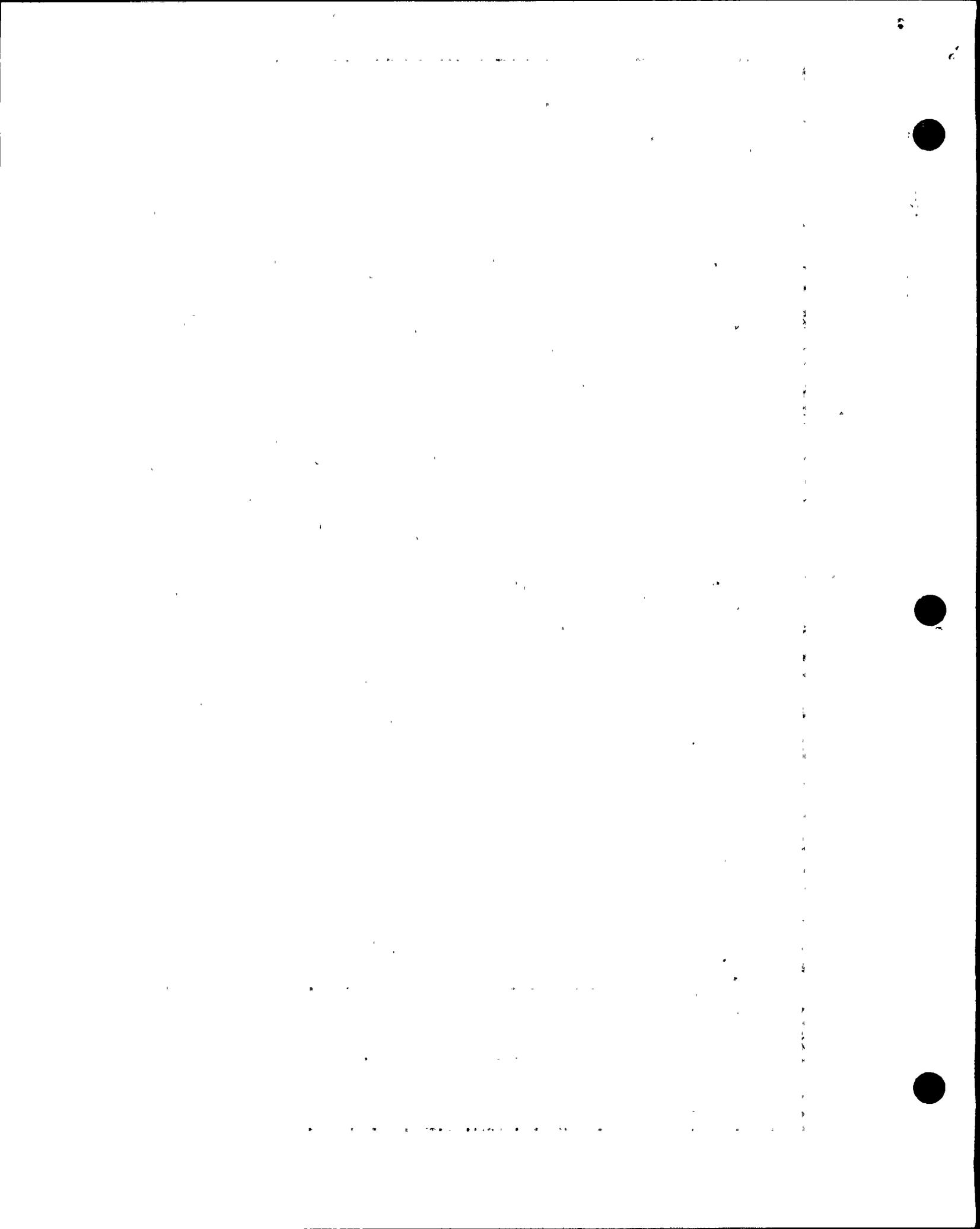
SSES CATEGORY I EQUIPMENT

Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-1A	1-3C-W	HV-E11-1F008, RHR Shutdown Cooling Outboard Iso. Vlv.	This valve is a containment isolation valve for the RHR Shutdown Cooling function. RHR Shutdown Cooling is not used for path 1 or 3 safe shutdown. Either the F008 or the F009, the inboard isolation valve, must remain closed to prevent a flow diversion and a hi/lo pressure interface concern.	Modification	Both the F008 and the F009 valves are normally closed and fail closed. Therefore, a hot short on each valve is necessary to cause a flow diversion condition. Since this line is a hi/lo pressure interface, postulating of multiple hot short is required. Cabling for the F009 valve was run in a dedicated conduit in this fire zone. This condition will prevent a hot short on the cable and therefore, the F009 valve will be assured of remaining closed for a fire in this fire zone.
		HV-E11-1F015A and HV-E11-1F0015B RHR Injection Inboard Iso. Valves	These valves are the Division I and II RHR LPCI injection valves. They are also containment isolation valves. RHR LPCI is not used to support safe shutdown on paths 1 and 3. These valves are used to prevent flow diversion.	Deviation Request No. 29	N/A
		HV-E11-1F048A and HV-E11-1F048B, RHR Ht. Ex. Shell Side Bypass Vlv.	These valves are the Division I and II RHR Heat Exchanger bypass valves. RHR Suppression Pool Cooling is used on path 1, 2 and 3. Therefore, these valves must remain closed to support the use of RHR SPC on the required shutdown path.	Deviation Request No. 29	N/A
		TE-E11-1N027A and TE-E11-1N027B, RHR Ht. Ex. Outlet Temp. Element	These instruments are the Division I and II RHR Heat Exchanger Outlet Temperature Elements.	Deviation Request No. 29	N/A

SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-1A	1-4A-S	CRD Hydraulic Control Units	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows scram capability is not defeated by a fire in this zone.
		1V222B, Emergency Switchgear and Load Center Room Unit Cooler B	These components provide cooling for the Emergency Switchgear Room .	Deviation Request No. 16	N/A
		Emergency Switchgear and Load Center Room Dampers and Coolers Controls	These components provide cooling for the Emergency Switchgear Room.	Deviation Request No. 16	N/A
R-1A	1-4A-W	SV-C12-1F009 and SV-C12-1F182, Scram Vent and Drain Vlv.	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis demonstrates scram capability will not be defeated by a fire in this zone.
R-1A	1-5A-S	LIS-B21-1N042B, Confirmatory Level 3 for ADS	This component is a level indicating switch providing the confirmatory level 3 signal required for automatic initiation of ADS.	Deviation Request No. 27	N/A
		1Y201B, 120V RPS Pwr. Dist. Panel B	This component provides power to Division II safe shutdown components.	Analysis	Analysis shows fire in this zone will not affect safe shutdown. The affected components either fail in a safe position or can be restarted from the control room.
		LIS-B21-1N024C and LIS-B21-1N024D, Reactor Scram on Level 3	These components provide the automatic SCRAM of the Reactor on low vessel Level.	Deviation Request No. 27	N/A
		LIS-B21-1N031B and LIS-B21-1N031D, Level I Core Spray Start and ADS	These components provide the permissive for auto start of the core spray pump on low Reactor vessel level.	Deviation Request No. 27	N/A
		LT14201B, RPV Level Wide Range II	This component provides RPV wide range level indication.	Deviation Request No. 27	N/A
		PIS-B21-1N021B, Core Spray Instrument	This component prevents spurious initiation of core spray on a high drywell signal.	Deviation Request No. 27	N/A
		PS-B21-1N023C and PS-B21-1N023D, High Press. Rx. Scram	These components provide automatic Reactor SCRAM on high RPV pressure.	Deviation Request No. 27	N/A
		PT14201B, RPV Wide Range	This component provides wide range RPV	Deviation	N/A



SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		PS-B21-1N022A thru S, SRV Pressure Switches	pressure indication. These components were included to address spurious SRV opening.	Request No. 27 Analysis	Analysis shows that a spurious SRV actuation can either be terminated by manually operating the control switches to the "off" position in the control room or the effects can be mitigated by the manual initiation of core spray from the control room.
R-1A	1-5A-W	1T212 A thru M, Cont. Inst. Gas Bottles	These components provide a back-up supply of Containment Instrument Gas for the ADS valves.	Analysis	These are mechanical components with no electrical connections.
		SV-12643, CIG Bottle Isolation Valve	This valve must be open to allow flow from the CIG bottle, 1T-212A thru M, through valve SV-12654A to the ADS valves.	Analysis	Either loop of CIG is sufficient to supply back-up containment instrument gas to ADS. Therefore, either this valve or the SV12648 valve must remain open. These valves are normally closed, but fail open. Therefore, a simultaneous hot short on both valves is required to defeat this safe shutdown function. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required. As a result, one of these valves is assured to be open.



SSES CATEGORY I EQUIPMENT

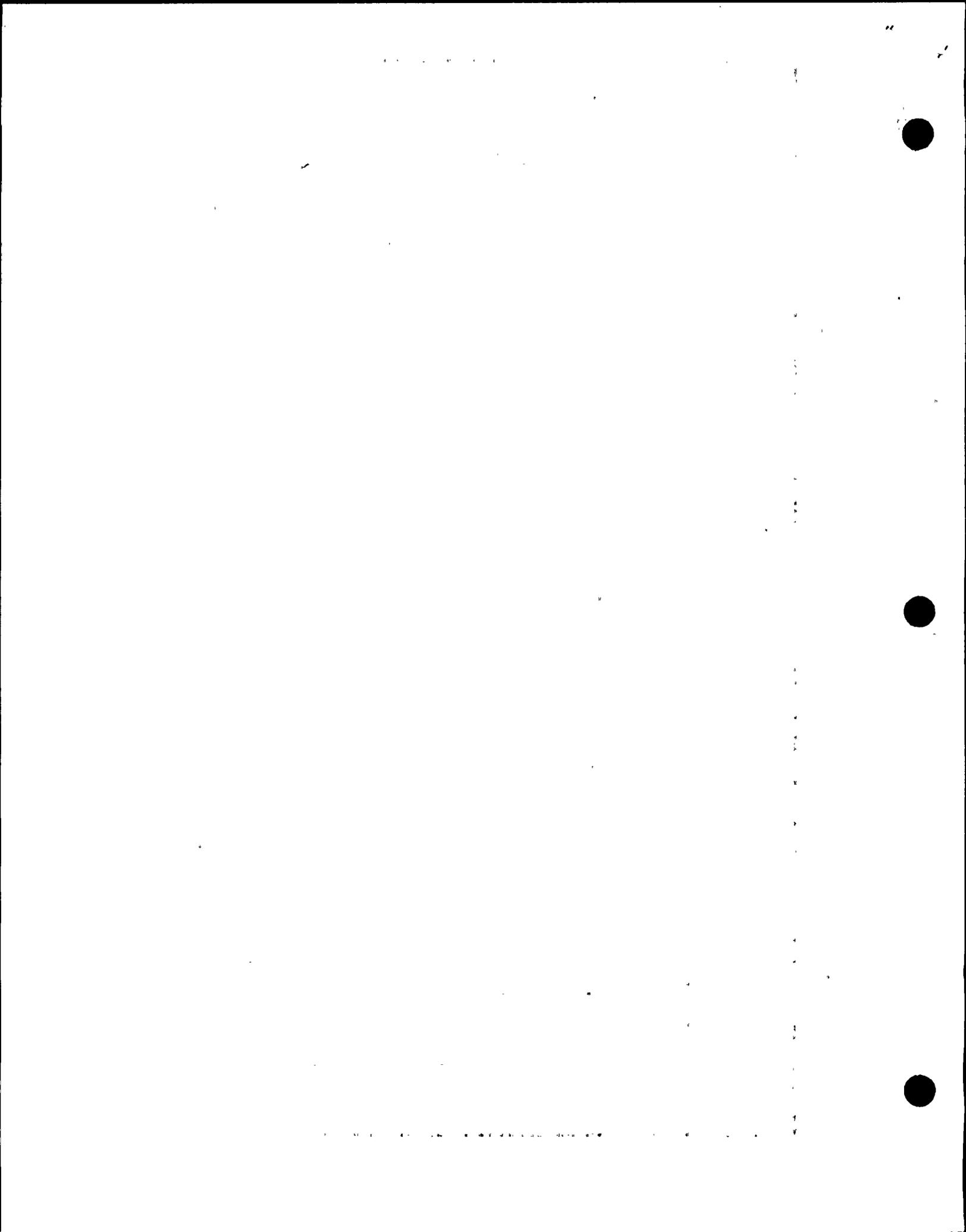
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-1A	1-5E	SV-12654A, Cont Inst. Gas Vlv.	A back-up source of Containment Instrument Gas is supplied through this valve to three ADS valves. Each of the three ADS valves is controlled by two solenoid valves. One solenoid valve is from each division and only one is required for successful valve opening.	Analysis	Analysis has shown that only three ADS valves are required to support safe shutdown. Since the back-up supply of Containment Instrument Gas can be supplied through either SV-12654 A or B, only one of these valves must be open. Since both valves are normally open and fail open, multiple hot shorts must occur to close both redundant valves simultaneously. Since this is not a h/o pressure interface, the assumption of multiple hot shorts is not required and one of these valves is assured to remain open.
R-1A	1-6D	PS-E11-1N010A and PS-E11-1N010C, Press. Switch Primary Cont.	These components provide the high drywell pressure permissive required for automatic initiation of ADS.	Deviation Request No. 39	N/A
R-1B	1-3C-W	HV-E11-1F015A and HV-E11-1N015B, RHR Inj. Inbd. Iso. Vlv.	These valves are the Division I and II RHR LPCI Injection valves. They are also containment isolation valves. RHR LPCI is not used to support safe shutdown on paths 1 and 3. These valves are used to prevent flow diversion.	Deviation Request No. 29	N/A
		HV-E11-1F048A and HV-E11-1F048B, RHR Ht. Exch. Shell Side Bypass Vlv.	These valves are the Division I and II RHR Heat Exchanger bypass valves. RHR Suppression Pool Cooling is used on path 1, 2 and 3. Therefore, these valves must remain closed to support the use of RHR SPC on the required path.	Deviation Request No. 29	N/A

SSES CATEGORY I EQUIPMENT

Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		HV-E11-1F008, RHR Shutdown Cooling Iso. Viv.	This valve is a containment isolation valve for the RHR Shutdown Cooling function. RHR Shutdown Cooling is not used for path 1 or 3 safe shutdown. Either the F008 or the F009, the inboard isolation valve, must remain closed to prevent a flow diversion and a hi/lo pressure interface concern.	Modification	Both the F008 and the F009 valves are normally closed and fail closed. Therefore, a hot short on each valve is necessary to cause a flow diversion condition. Since this line is a hi/lo pressure interface, postulating of multiple hot short is required. Cabling for the F009 valve was run in a dedicated conduit in this fire zone. This condition will prevent a hot short on the cable and therefore, the F009 valve will be assured of remaining closed for a fire in this fire zone.
		TE-E11-1N027A and TE-E11-1N027B, RHR Ht. Exch. Outlet Temp. Elements	These instruments are the Division I and II RHR Heat Exchanger Outlet Temperature Elements.	Deviation Request No. 29	N/A
R-1B	1-4A-N	CRD Hydraulic Control Units	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows a fire in this zone will not defeat the scram capability of these components.
		1T213 A thru M, Cont. Inst. Gas Bottles	These components provide a back-up source of Containment Gas for the ADS valves.	Analysis	These are mechanical components with no electrical connections.

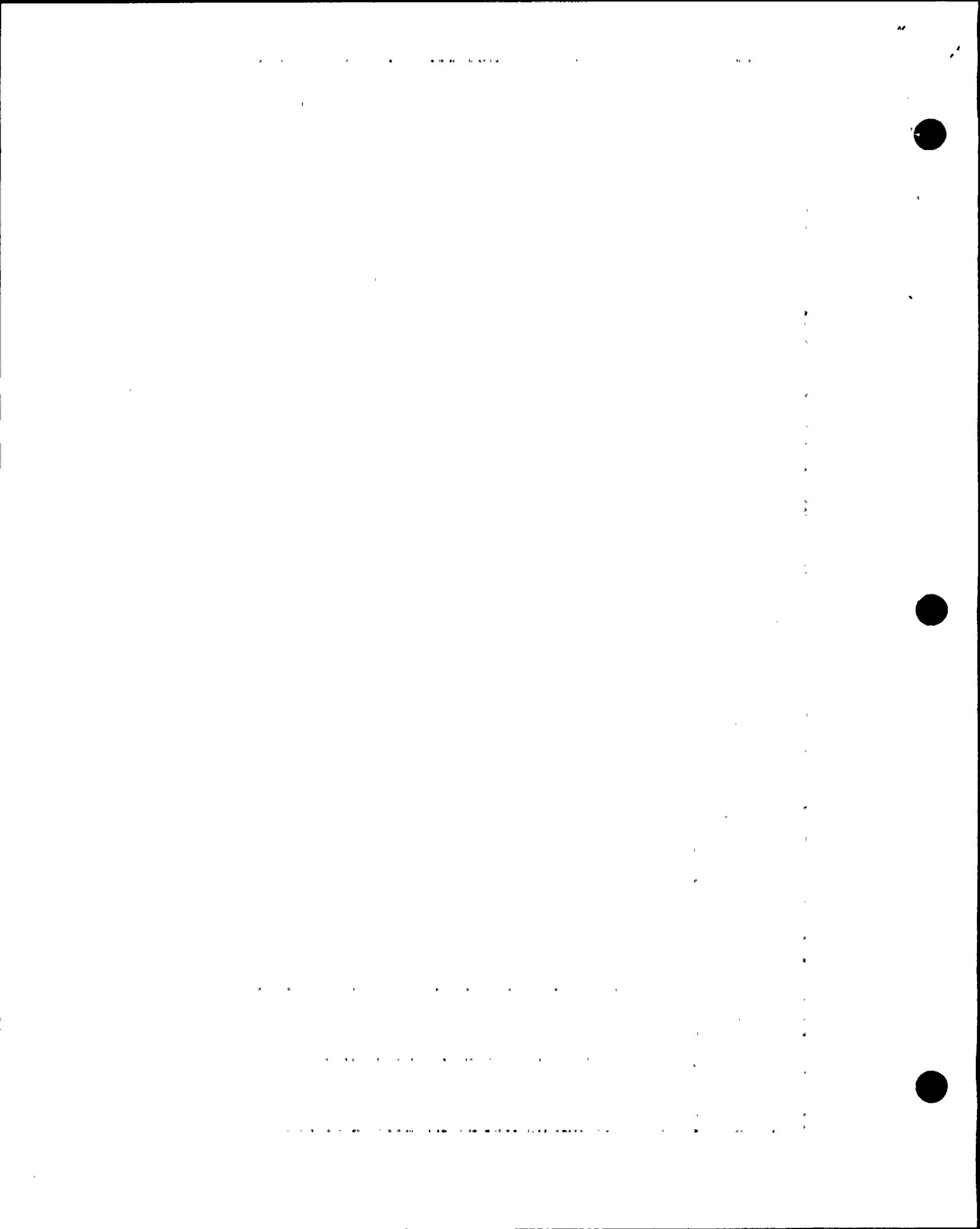
SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		SV-12648, CIG Bottle Isolation Valve	This valve must be open to allow flow from the CIG bottle, 1T-213A thru M, through valve SV-12654B to the ADS valves.	Analysis	Either loop of CIG is sufficient to supply back-up containment instrument gas to ADS. Therefore, either this valve or the SV12643 valve must remain open. These valves are normally closed, but fail open. Therefore, a simultaneous hot short on both valves is required to defeat this safe shutdown function. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required. As a result, one of these valves is assured to be open.
		SV-12654B, Cont. Inst. Gas Vlv.	A back-up source of Containment Gas is supplied through this valve to three ADS valves. Each of the Three ADS valves is controlled by two solenoid valves. One solenoid valve is from each division and only one is required for successful valve opening.	Analysis	Analysis has shown that only three ADS valves are required to support safe shutdown. Since the back-up supply of Containment Gas can be supplied through either the SV-12654A or B valves, only one of these valves must remain open. Since both valves are normally open and fail open, multiple hot shorts must occur to close both redundant valves simultaneously. Since this is not a hi/lo pressure interfaced, the assumption of multiple hot shorts is not required and one of these valves is assured to remain open.
R-1B	1-4A-W	SV-C12-1F009 and SV-C12-1F182, Scram Vent and Drain Vlv.	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows a fire in this zone will not defeat the scram capability of these components.

SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-1B	1-4G	HV-B21-1F019, Main Strm. Outbd. Dm. Iso. Viv.	Either this valve or HV-B21-1F016, the inboard valve, is a required to close to prevent a flow diversion when using alternate shutdown cooling on paths 1 and 3.	Analysis	Analysis shows that the redundant valve will remain closed.
R-1B	1-5A-W	1T212 A thru M, Cont. Inst. Gas Bottles	These components provide a back-up supply of Containment Instrument Gas for the ADS valves.	Analysis	These are mechanical components with no electrical connections.
		SV-12643, CIG Bottle Isolation Valve	This valve must be open to allow flow from the CIG bottle, 1T-212A thru M, through valve SV-12654A to the ADS valves.	Analysis	Either loop of CIG is sufficient to supply back-up containment instrument gas to ADS. Therefore, either this valve or the SV12648 valve must remain open. These valves are normally closed, but fail open. Therefore, a simultaneous hot short on both valves is required to defeat this safe shutdown function. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required. As a result, one of these valves is assured to be open.
R-1B	1-5D	HV-G33-1F004, Reactor Wtr. Cleanup Outboard Iso. Viv. Flow Diversion	Either this valve or the F001 inboard isolation valve must close to prevent a flow diversion from the RPV.	Analysis	Analysis has shown that the redundant valve will function to prevent flow diversion in the event of a fire in this zone.
R-1B	1-6D	PS-E11-1N010A and PS-E11-1N010C, Primary Cont. Press. Switches	These components provide the high drywell pressure permissive required for automatic initiation of ADS.	Deviation Request No. 39	N/A



SSES CATEGORY I EQUIPMENT

Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-2A	2-1B	HV-25768, Suppression Pool Filter Pump Suction Valve	This valve is a containment isolation valve. Both this Division II outboard valve and the Division I inboard isolation valve, HV-25766, are located in the same fire zone. Neither of these valves are required to function for safe shutdown. Simultaneous opening of both of these valves could result in a flow diversion from the suppression pool.	Analysis	Either one of these normally closed, fail closed valves must remain closed to prevent the unwanted flow diversion. For both valves to open simultaneously, a hot short on each valve is required. NRC Generic Letter 86-10 does not require the assumption of multiple hot shorts for non-hi/lo pressure interfaces. Therefore, one of these two valves is assured to remain closed.
R-2A	2-3C-W	HV-E11-2F008, RHR Shutdown Cooling Outbd Iso. Vlv.	This valve is a containment isolation for the RHR Shutdown Cooling Function. RHR Shutdown Cooling is not used for path 1 or 3 safe shutdown. Either the F008 or the F009, the inboard valve, must remain closed to prevent a flow diversion and a hi/lo pressure interface.	Modification	Both the F008 and the F009 valves are normally closed and fail closed. Therefore, a hot short on each valve is necessary to cause a flow diversion condition. Since this line is a hi/lo pressure interface, postulating of multiple hot short is required. Cabling for the F009 valve was run in a dedicated conduit in this fire zone. This condition will prevent a hot short on the cable and therefore, the F009 valve will be assured of remaining closed for a fire in this fire zone.
		HV-E11-2F015A and HV-E11-2F015B, RHR Inj. Inbd. Iso. Vlv.	These valves are the Division I and II RHR LPCI injection valves. They are also containment isolation valves. RHR LPCI is not used to support safe shutdown on paths 1 and 3. Therefore, these valves are used to prevent flow diversion.	Deviation Request No. 29	N/A



SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		HV-E11-2F048A and HV-E11-2F048B, RHR Ht. Exch. Shell Side Bypass Vlv.	These valves are the Division I and II RHR Heat Exchanger bypass valves. RHR Suppression Pool Cooling is used on path 1, 2 and 3, therefore, these valves must remain closed to support the use of RHR SPC on the required shutdown path.	Deviation Request No. 29	N/A
		TE-E11-2N027A and TE-E11-2N027B RHR Ht. Exch. Outlet Temp. Element	These instruments are the Division I and II RHR Heat Exchanger Outlet Temperature Elements.	Deviation Request No. 29	N/A
R-2A	2-4A-S	CRD Hydraulic Cont. Units	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows that the scram capability is not defeated by a fire in this zone.
		2V222B, Div. II Emerg. Switchgear Rm. Unit Cooler and Inst.	These components provide cooling for the Emergency Switchgear Room.	Deviation Request No.16	N/A
		Dampers and Cooler Controls for Emerg. Switchgear and Load Cntr. Rms.	These components provide cooling for the Emergency Switchgear Room.	Deviation Request No. 16	N/A
R-2A	2-4A-W	SV-C12-2F009A and SV-C12-2F009B, Scram Disch. Vol. Vent and Drain Vlv.	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows that the scram capability will not be defeated by a fire in this fire zone.
R-2A	2-5A-W	2T212 A thru M, Cont. Inst. Gas Bottles	These components provide a back-up supply of Containment Instrument Gas for the ADS valves.	Analysis	These are mechanical components with no electrical connections.

SSES CATEGORY I EQUIPMENT

Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		SV-22643, CIG Bottle Isolation Valve	This valve must be open to allow flow from the CIG bottle, 2T-212 A thru M, through valve SV-22654A to the ADS valves.	Analysis	Either loop of CIG is sufficient to supply back-up containment instrument gas to ADS. Therefore, either this valve or the SV22648 valve must remain open. These valves are normally closed, but fail open. Therefore, a simultaneous hot short on both valves is required to defeat this safe shutdown function. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required. As a result, one of these valves is assured to be open.
R-2A	2-5D	HV-G33-2F004, RWCU Outbd. Iso. Viv.	Either this valve or the F001 inboard valve must remain closed to prevent a flow diversion from the RPV.	Analysis	Analysis shows that the redundant inboard isolation valve will function to prevent a flow diversion for a fire in this fire zone.
R-2A	2-5E	SV-22654A, Cont. Inst. Gas Viv.	A back-up source of Containment Instrument Gas is supplied through this valve to three ADS valves. Each of the three ADS valves is controlled by two solenoid valves. One solenoid valve is from each division and only one is required for successful valve opening.	Analysis	Analysis has shown that only three ADS valves are required to support safe shutdown. Since the back-up supply of Containment Instrument Gas can be supplied through either SV-22654 A or B, only one of these valves are normally open and fail open, multiple hot shorts must occur to close both redundant valves simultaneously. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required and one of these valves is assured to remain open.



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SSES CATEGORY I EQUIPMENT

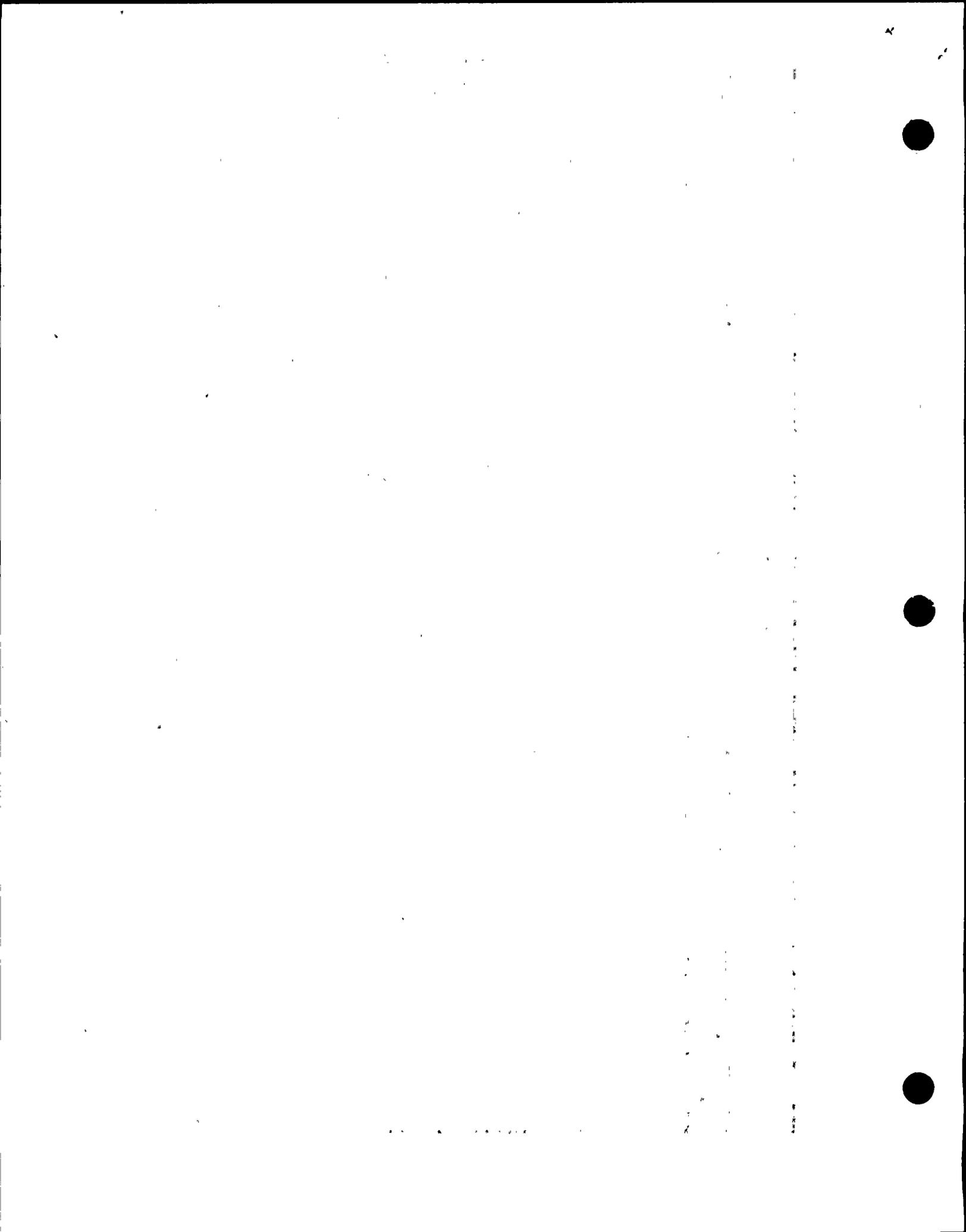
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-2A	2-6D	PS-E11-2N010A and PS-E11-2N010C, Drywell Press. Switches for ADS	These components provide the high drywell pressure permissive for automatic initiation of ADS.	Deviation Request No. 39	N/A
R-2B	2-3B-N	RHR Viv. (HV-E11-2F009) Controls and Control Circuits (K-33 and Pressure Inst. B31-2N108A)	This valve is a containment isolation valve for the RHR Shutdown Cooling function. RHR Shutdown Cooling is not used for path 1 or 3 safe shutdown. Either the F008 or the F009, the inboard valve, must remain closed to prevent a flow diversion.	Deviation Request No. 26	N/A
		FIS-E21-2N006A and FT-E21-2N003A, Core Spray System Loop A	Both of these Division I flow instruments and their Division II counterparts are located in the same fire zone. These instruments provide indication of core spray flow and the flow indicating switch provides a signal to close the min. flow valve. The core spray system is used for vessel inventory make-up for Appendix R Safe Shutdown.	Deviation Request No. 26	N/A
R-2B	2-3C-W	HV-E11-2F015A and HV-E11-2F015B, RHR Inbd. Iso. Viv.	These valves are the Division I and II RHR LPCI injection valves. They are also containment isolation valves. RHR LPCI is not used to support safe shutdown on paths 1 and 3. These valves are used to prevent flow diversion.	Deviation Request No. 29	N/A

SSES CATEGORY I EQUIPMENT

Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		HV-E11-2F008, RHR Shutdown Cooling Iso. Viv.	This valve is a containment isolation valve for the RHR Shutdown Cooling function. RHR Shutdown Cooling is not used for path 1 or 3 safe shutdown. Either the F008 or the F009, the inboard valve, must remain closed to prevent a flow diversion.	Modification	Both the F008 and the F009 valves are normally closed and fail closed. Therefore, a hot short on each valve is necessary to cause a flow diversion condition. Since this line is a hi/lo pressure interface, postulating of multiple hot short is required. Cabling for the F009 valve was run in a dedicated conduit in this fire zone. This condition will prevent a hot short on the cable and therefore, the F009 valve will be assured of remaining closed for a fire in this fire zone.
		TE-E11-2N027A and TE-E11-2N027B, RHR Ht. Exch. Outlet Temp. El.	These instrument are the Division I and II RHR Heat Exchanger Outlet Temperature Elements.	Deviation Request No. 29	N/A
		HV-E11-2F048A and HV-E11-2F048B, RHR Ht. Shell Side Bypass Viv.	These valves are the Division I and II RHR Heat Exchanger Bypass valves. RHR Suppression Pool Cooling is used on path 1, 2 and 3, therefore, these valves must remain closed to support the use of RHR SPC on the required shutdown path.	Deviation Request No. 29	N/A
R-2B	2-4A-N	CRD Hydraulic Control Units	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows that the scram capability is not defeated by a fire in this fire zone.

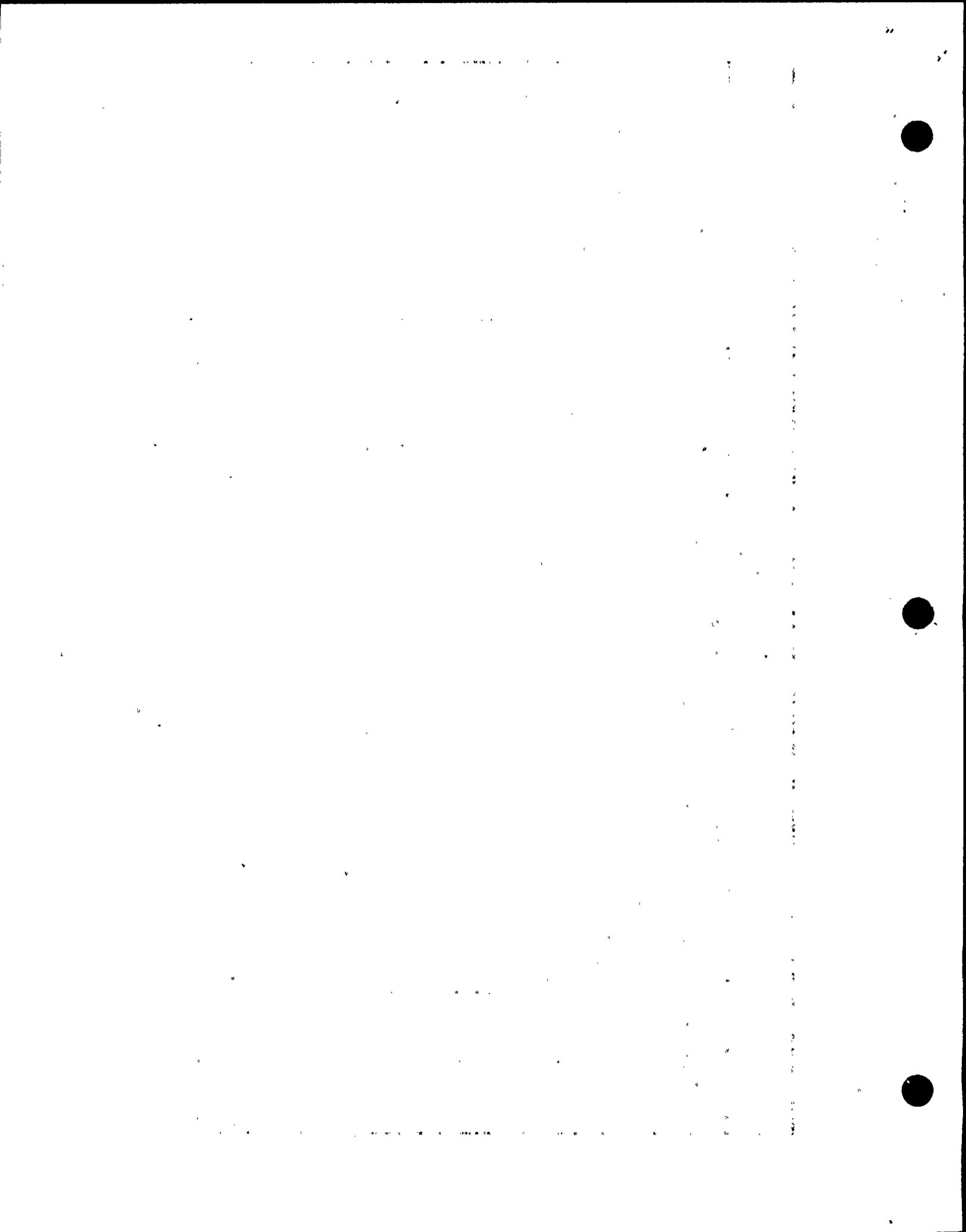
SSES CATEGORY I EQUIPMENT

Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		SV-22648, CIG Bottle Isolation Valve	This valve must be open to allow flow from the CIG bottle, 2T-213 A thru M, through valve SV-22654B to the ADS valves.	Analysis	Either loop of CIG is sufficient to supply back-up containment instrument gas to ADS. Therefore, either this valve or the SV22643 valve must remain open. These valves are normally closed, but fail open. Therefore, a simultaneous hot short on both valves is required to defeat this safe shutdown function. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required. As a result, one of these valves is assured to be open.
		SV-22654B, Containment Inst. Gas Vlv.	A back-up source of Containment Instrument Gas is supplied through this valve to three ADS valves. Each of the three ADS valves is controlled by two solenoid valves. One solenoid valve is from each division and only one is required for successful valve opening.	Analysis.	Analysis has shown that only three ADS valves are required to support safe shutdown. Since the back-up supply of Containment Instrument Gas can be supplied through either the SV-22654A or B valves, only one of these valves must remain open. Since both valves are normally open and fail open, multiple hot shorts must occur to close both redundant valves simultaneously. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required and one of these valves is assured to remain open.
R-2B	2-4A-W	SV-C12-2F009A and SV-C12-2F009B, SDV Vent and Drain Vlv.	These components provide Reactivity Control through the SCRAM function.	Analysis	Analysis shows that the scram capability will not be defeated by a fire in this fire zone.

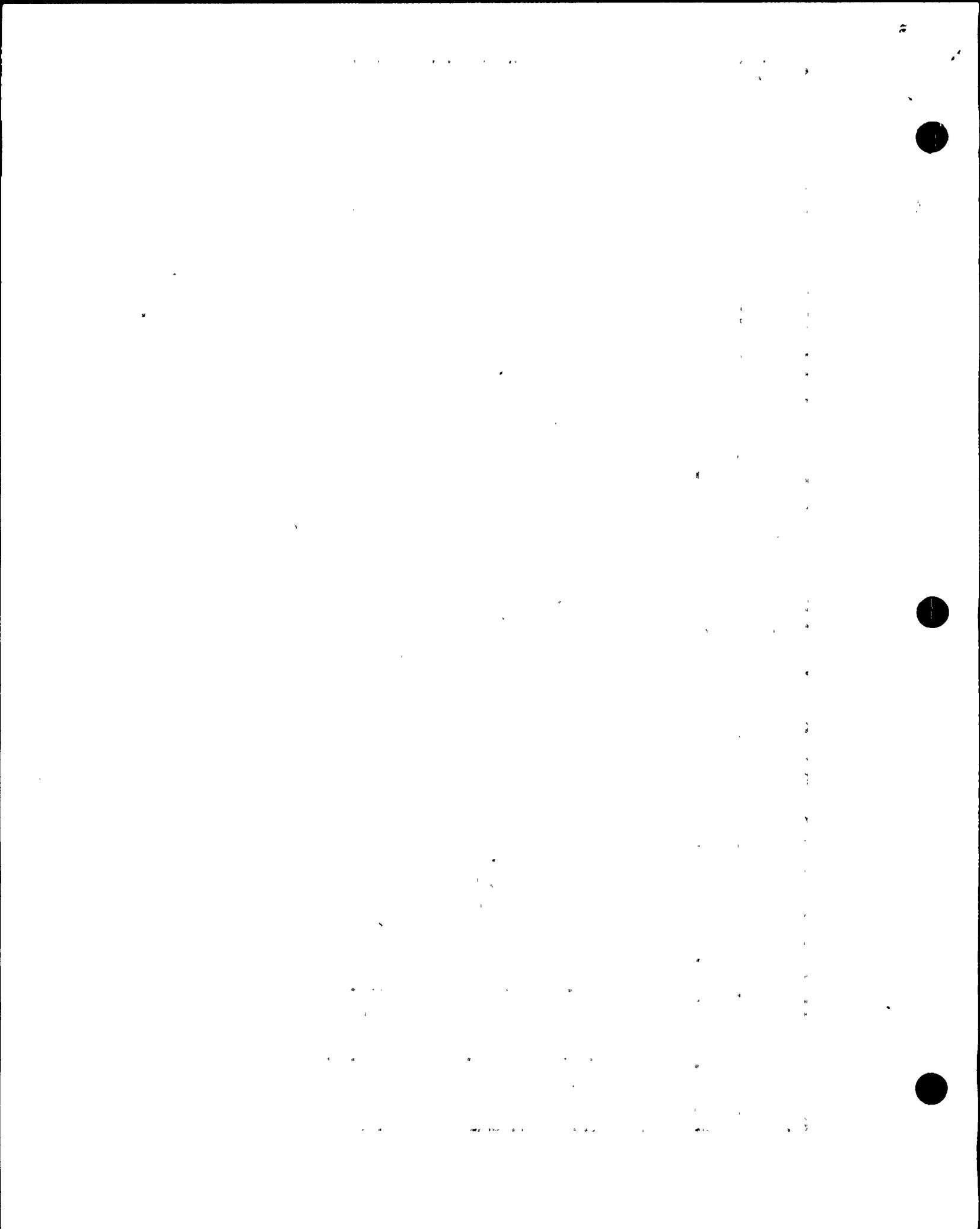


SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
R-2B	2-4G	HV-B21-2F019, Mn. Stm. Line Drain Outbd. Iso. Valve.	Either this valve or the HV-B21-2F016, the inboard isolation valve, is required to close to prevent a flow diversion when using alternate shutdown cooling on paths 1 and 3.	Analysis	Analysis shows that the redundant valve can be closed manually.
R-2B	2-5A-N	2T213 A thru M, Containment Inst. Gas Bottles	These components provide a back-up source of Containment Instrument Gas for the ADS valves.	Analysis	These are mechanical components with no electrical connections.
		LIS-B21-2N042A, Reactor Vessel Level 3 Conf.	This component is a level indicating switch providing the confirmatory level 3 signal required for automatic initiation of ADS.	Deviation Request No. 28	N/A
		2Y201A, 120V RPS Pwr. Dist. Panel	This component provides power to Division I safe shutdown components.	Analysis	Analysis shows that a fire in this fire zone would not affect safe shutdown. The affected components either fail in a safe position or can be restarted from the control room.
		LIS-B21-2N024A and LIS-B21-2N024B, Reactor Scram on Level 3	These components provide the automatic SCRAM of the Reactor on low vessel Level.	Deviation Request No. 28	N/A
		LIS-B21-2N031A and LIS-B21-2N031C, Level I Core Spray Start and ADS	These components provide the permissive for auto start of the core spray pump on low Reactor vessel level.	Deviation Request No. 28	N/A
		LT24201A, RPV Level Wide Range II	This component provides RPV wide range level indication.	Deviation Request No. 28	N/A
		PIS-B21-2N021A, Core Spray Instrument	This component prevents spurious initiation of core spray on a high drywell signal.	Deviation Request No. 28	N/A
		PS-B21-2N023A and PS-B21-2N023B, High Press. Rx. Scram	These components provide automatic Reactor SCRAM on high RPV pressure.	Deviation Request No. 28	N/A

SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
		PT24201A, RPV Wide Range	This component provides wide range RPV pressure indication.	Deviation Request No. 28	N/A
		PS-B21-2N022 A thru S, SRV Press. Switch	These components were included to address spurious SRV opening.	Analysis	Analysis shows that a spurious SRV actuation can either be terminated by manually operating the control switches to the closed position in the control room or the effects can be mitigated by the manual initiation of core spray from the control room.
R-2B	2-5A-W	2T212 A thru M, Cont. Inst. Gas Bottles	These components provide a back-up supply of Containment Instrument Gas for the ADS valves.	Analysis	These are mechanical components with no electrical connections.
		SV-22643, CIG Bottle Isolation Valve	This valve must be open to allow flow from the CIG bottle, 2T-212 A thru M, through valve SV-22654A to the ADS valves.	Analysis	Either loop of CIG is sufficient to supply back-up containment instrument gas to ADS. Therefore, either this valve or the SV22648 valve must remain open. These valves are normally closed, but fail open. Therefore, a simultaneous hot short on both valves is required to defeat this safe shutdown function. Since this is not a hi/lo pressure interface, the assumption of multiple hot shorts is not required. As a result, one of these valves is assured to be open.
R-2B	2-6D	PS-E11-2N010A and PS-E11-2N010B, Press. Switches - Primary Cont.	These components provide the high drywell pressure permissive required for automatic initiation of ADS.	Deviation Request No. 39	N/A
CS-4	0-29B	Both trains of cont. structure HVAC include fans, dampers, pumps, valves, and instruments.	These components provide Control Structure HVAC cooling.	Deviation Request No. 30	N/A



SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
	0-30A	Both trains of cont. structure HVAC including fans, dampers, pumps, valves and instruments.	These components provide Control Structure HVAC cooling.	Deviation Request No. 30	N/A
CS-9	0-26H	FSHL-08612A and FSHL-08612B, Emerg. Cond. Wtr. Circ. Pump Return Flow Switches	These components provide Control Structure HVAC cooling.	Modification	A modification has been implemented to enable manual operation of the control structure HVAC from outside the control rm.
		FSHL-08623A and FSHL-08623B, Cont. Structure Chill Wtr. Loop Flow Switches	These components provide Control Structure HVAC cooling.	Modification	A modification has been implemented to enable manual operation of the control structure HVAC from outside the control room.
		FY-08612A, FY-08612B, FY-08623 A and FY-08623B, Emergency Cond. Wtr. Circ. Signal Conditioner	These components provide Control Structure HVAC cooling.	Modification	A modification has been implemented to enable manual operation of the control structure HVAC from outside the control room.
		TSH-08621A, TSH-08621B, TT-08621A and TT-08621B, Chilled Wtr. Supply Temp. Switches and Transmitters	These components provide Control Structure HVAC cooling.	Modification	A modification has been implemented to enable manual operation of the control structure HVAC from outside the control room.
CS-20	0-28A-II	2D624 and 2D644, 125V DC ESS Dist. Panel	These components provide 125vdc power to safe shutdown components.	Deviation Request No. 15 & Modification	The deviation request provides the justification for using 1-hour protection in this unsprinklered area. The modification provides a 1-hour fire rated enclosure around these components.
CS-24	0-28B-II	1D624 and 1D644, 125V DC ESS Dist. Panels	These components provide 125vdc power to safe shutdown components.	Deviation Request No. 8 & Modification	The deviation request provides the justification for using 1-hour protection in this unsprinklered area. The modification provides a 1-hour fire rated enclosure around these components.



SSES CATEGORY I EQUIPMENT					
Fire Area	Fire Zone	Category I Equipment Located in Zone	Post Fire Shutdown Function of Category I Equipment	Method of Resolution	Description of (Analysis/Mod)
CS-28	0-24D	RISHHOK618B, Cont. Struct. HVAC High Rad. Switch	This instrument provides a high radiation signal to the Control Structure HVAC System.	Analysis	Analysis shows that a fire in this fire zone will not affect the safe shutdown capability of the control structure HVAC.
CS-33	0-27E	RISHHOK618A, Cont. Struct. HVAC High Rad Switch	This instrument provides a high radiation signal to the Control Structure HVAC System.	Analysis	Analysis shows that a fire in this fire zone will not affect the safe shutdown capability of the control structure HVAC.
T-1	0-TB	Loss of Vacuum Inst.	These instruments provide a trip signal to trip the main turbine and close the MSIV's in the event of a loss of condenser vacuum.	Analysis	Analysis shows that the malfunction of these instruments due to a fire would not jeopardize safe plant shutdown.
A-1	0-00	Diesel Generator Fuel Oil Transfer Pumps	These pumps provide fuel oil to the diesel generators.	Analysis	A fire hazard analysis on these buried pumps has concluded that the operating considerations, protective cover construction, and the lack of combustible loading provide acceptable fire protection equivalent to the tech. req. of App. R III.G.2.
		RHR Service Wtr. Spray Pond Valves	These valves open to allow return of RHRSW to the spray pond.	Analysis	Div. I valves and Div. II valves are each located in separate compartments of the spray pond valve vault.

NRC QUESTION NO. 3

Alternative Shutdown Capability

FPRR Section 6.2.25.5, "Consequences of fire in Fire Area CS-9" indicates that the alternative shutdown capability provided for a fire in this area is more fully described in a separate analysis entitled "Control Room Analysis". Please provide a copy of this report for our review.

PP&L Response:

The "Control Room Analysis" referred to above is not a single concise document that can be readily copied. Rather, it is a voluminous collection of inter-related documents.

Rather than attempt to provide all of the documentation and description necessary to understand this issue, we propose the following options:

- (1) Conduct a joint review meeting with the appropriate representation from both PP&L and the NRC. During this meeting PP&L engineering personnel would familiarize NRC personnel with the analysis and provide an overview of the documentation prepared to address this issue. During the meeting any specific questions could be answered and appropriate documentation provided,
- (2) Or defer the response to this question until after the completion of the Appendix R documentation consolidation efforts currently ongoing as a part of our Cable and Raceway Information Management, Design Basis Documentation and Thermo-Lag Resolution Projects. The schedule for completing these efforts is documented in PLA-4236.

NRC QUESTION NO. 4

Alternative Shutdown Procedures

Please provide a copy of abnormal or emergency operating procedures developed to implement the alternative shutdown capability. Additionally, please confirm that a sufficient number of trained operating personnel will be available to implement this capability, and describe the method used to confirm that operations delineated in the procedure can be accomplished in a timely manner.

PP&L Response:

Safe shutdown for all fires except fires associated with the Control Room, Fire Area CS-9, are accomplished from the Control Room. The only plant fire area at Susquehanna SES which requires an alternative shutdown path for a postulated fire is the Control Room, Fire Area CS-9. In order to achieve shutdown for the Appendix R postulated Control Room fire, those systems available for use at the Remote Shutdown Panel, Shutdown Path 2, and described in Procedure ON-1(2)00-009 "Control Room Evacuation" (Formerly EO-1(2)00-009) are used. A copy of this procedure is provided as Attachment I to this response. Within the body of this procedure, those additional actions that are specific to Appendix R Safe Shutdown have been incorporated and are so noted.

The entire operations staff is regularly trained in the use of ON-1(2)00-009. Therefore, trained personnel are available to implement these procedures should the need arise. Remote shutdown panel equipment failures are covered in training so the operators are prepared to use all available systems, as the procedures direct.

As with all of our operating, off normal and emergency operating procedures, the feasibility of accomplishing the actions required by the procedure using the available staff is addressed as a part of the procedure preparation process and the operator training program. This process assures that sufficient qualified personnel will be available on shift to implement the actions required.

For these specific procedures, ON-1(2)00-009 (formerly EO-1(2)00-009), the capability to implement the required actions in an orderly and timely manner was demonstrated to the NRC as a part of an inspection at the plant during the week of December 5-9, 1988. Two individuals from Region I accompanied by two individuals from Brookhaven National Labs participated in the review. The results of this demonstration were that no unacceptable conditions were identified. These results are documented in NRC Inspection Reports No's. 50-387/88-21 and 50-388/88-24.

NRC QUESTION NO. 5**Alternative Shutdown Capability - Electrical Loads Management**

Please provide a detailed narrative of the method of providing power to required electrical loads in the event of fire requiring alternative shutdown from outside the main control room. This narrative should consider two cases: (a) offsite power remains available, and (b) offsite power is not available. Additionally, the narrative should include all assumptions used during the evaluation of this capability, and fully describe the electrical independence provided for electrical power sources and required support equipment.

PP&L Response:

The Alternate Shutdown Capability is required only for a Control Room fire, Fire Area CS-9. Fire in the Control Room will remain within Fire Area CS-9. As a result, as long as the equipment used for Safe Shutdown is located external to Fire Area CS-9 and is electrically isolated from Fire Area CS-9, Safe Shutdown is assured. Shutdown for the condition of a Control Room fire is performed in accordance with PP&L Procedure ON-1(2)00-009, "Control Room Evacuation" using the Remote Shutdown Panel.

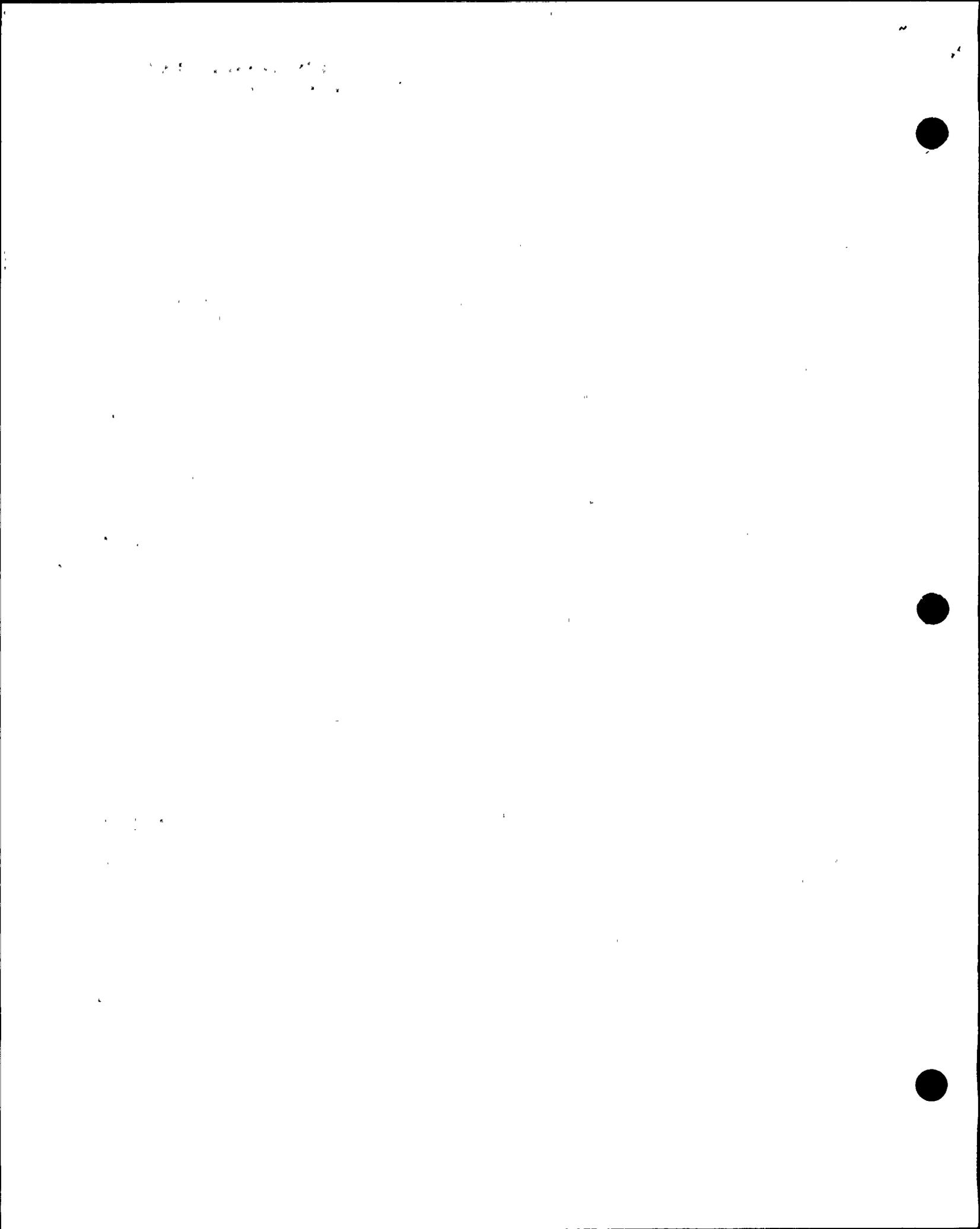
Shutdown from the Remote Shutdown Panel requires that transfer switches be actuated at the Remote Shutdown Panel to isolate circuits from the Control Room and transfer control of equipment to the Remote Shutdown Panel. In making this transfer the transfer switches at the Remote Shutdown Panel automatically provide another set of fuses to the circuit in case the Control Room fire caused any fuses from the Control Room circuit to blow. It is assumed in this analysis that the transfer switches are activated prior to the occurrence of a hot short that could affect MOV's required for safe shutdown as described in Deviation Request No. 41. (currently under NRC review)

The equipment used for safe shutdown from the Remote Shutdown Panel is powered from the 4.16 kv ESS buses. These buses are powered from either of two offsite power sources or the emergency diesel generators. For the Control Room fire scenario, two cases are considered: (a) offsite power available, and (b) offsite power is not available.

Power cabling, other than power cabling for equipment located in the Control Room, is not routed through the Control Room. Breaker control circuits for the power distribution systems are located in the Control Room. A loss of control power, however, to these breakers will not affect the availability of offsite power. To render offsite power unavailable, multiple hot shorts to the control power circuits would be required. Therefore, offsite power should be available for this condition.

Due to the requirement in Appendix R section III.L, which mandates the assumption of a loss of offsite power for a 72 hours period, shutdown from the Control Room must demonstrate the availability of the emergency diesel generators.

For shutdown using the assumption of a loss of offsite power, since an automatic diesel start signal has not been guaranteed, provisions must be made to assure that the local start of the diesels is feasible. Provisions have been made in the procedures for locally starting the diesels and racking in the 4.16 kv breakers.



NRC QUESTION NO. 6**Associated Circuits - Spurious Actuations**

The discussion of potential actuations presented in Section 3.3 of the FPRR lacks sufficient technical detail necessary to complete our review. Therefore, please provide a more detailed discussion of the analyses performed for potential spurious actuations. In addition to describing the analysis methodology, this discussion should clearly define the assumptions used and the scope of the evaluation performed.

PP&L Response:

Associated Circuits - Spurious Actuation issues were addressed as a part of the Appendix R Safe Shutdown analysis in the following way. Initially, the systems and components necessary to perform the Appendix R Safe Shutdown required functions of: reactivity control; reactor coolant make-up; reactor depressurization and heat removal; process monitoring; and associated support systems were identified.

With these systems and components identified those components whose spurious actuation could prevent the proper functioning of these safe shutdown components were identified. Examples of the items included in this group of components were:

hi/lo pressure interface components whose spurious opening could cause a failure of low pressure piping and a subsequent loss of vessel inventory;

flow diversion components that could divert flow from either the RPV or from safe shutdown systems;

spurious opening of SRV's which could deplete the motive steam force required to drive the high pressure make-up systems or significantly reduce vessel inventory without a readily available source of low pressure make-up.

All of these components were then added to the safe shutdown component list and classified as required safe shutdown components. For all components on the safe shutdown component list, the cabling required for the operation of or any cabling that could either directly or indirectly cause the maloperation of the components was identified. As a part of the cable "hit resolution" process, the actions necessary to preclude an impact to the required shutdown functions for safe shutdown and associated cables was addressed.

For cables identified as "cable hits", a cable fault analysis was performed on each of the identified cables. For consideration of spurious actuations, all possible functional failure states (hot shorts, open circuits, or shorts to ground) were evaluated, that is, the component could be energized or de-energized by one or more failure mode. For three-phase AC circuits, the probability of getting a hot short on all three phases in the proper sequence to cause spurious operation of a motor was considered sufficiently low as to not require evaluation except for cases involving hi/lo pressure interfaces. For ungrounded DC circuits, if it could be shown that only two hot shorts of the proper polarity without grounding could cause spurious operation, no

further evaluation was considered necessary, except for cases involving hi/lo pressure interfaces.

A hot short condition was assumed to exist until action is taken to isolate the circuit from the fire area, or other actions as appropriate have been taken to negate the effects of spurious actuation. The fire was not postulated to eventually clear the hot short.

For Appendix R, Section III.L analysis of alternative or dedicated shutdown systems, the following assumptions were considered.

The safe shutdown capability should not be adversely affected by any one spurious actuation or signal resulting from a fire in any plant area; and

The safe shutdown capability should not be adversely affected by a fire in any plant area which results in the loss of all automatic function (signal, logic) from the circuits located in the area in conjunction with one worst case spurious actuation or signal resulting from the fire; and

The safe shutdown capability should not be adversely affected by a fire in any plant area which results in spurious actuation of the redundant valves in any one high/low pressure interface.

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NRC QUESTION NO. 7**Associated Circuits - Common Enclosure**

Circuits associated by Common Enclosure are appropriately defined in Section 2.0, "Definitions," of the FPRR. However, the discussion of Associated Circuits presented in Section 3.3, "Methodology," (pg. 3.3-12) does not appear to address the evaluation of this concern. Therefore, please provide a detailed narrative that fully describes the evaluation performed and method of protection provided for the associated circuits by the common enclosure concern. This discussion should address evaluation assumptions, the analysis methodology, and method of resolution.

PP&L Response:

Associated Circuits - Common Enclosure has been addressed at Susquehanna using the following position. A common enclosure associated circuit can pose a problem to a safe shutdown circuit in one of two ways:

- (1) Either the fire can propagate along the associated circuit cable from the fire area of fire origin to the fire area where the associated circuit cable resides in the common enclosure with the safe shutdown circuit. By virtue of this fire propagation, the safe shutdown cable could be damaged,
- (2) or, the associated circuit cable could become so hot by virtue of the fire effects (i.e. or a hot short in the area with the fire) that this heat is conducted along the cable resulting in associated circuit cable ignition and damage to adjacent safe shutdown cables in the common enclosure in another fire area.

[Note that the effects of common power supply issues are not considered under this subsection of associated circuits, but rather under the Associated Circuits - Common Power Supply section.]

With respect to item 1 above, it is PP&L's position that such a condition will not result at Susquehanna for the following reasons:

- (1) Safety Related or Affiliated cables at SSES are IEEE-383 cables that will not sustain fire propagation in the absence of an ignition source.
- (2) The fire rated barrier and penetration designs at SSES will not allow the propagation of fire from one fire area to the next.

With respect to item 2 above, it is PP&L's position that such a condition will not result at Susquehanna because the electrical circuit design provides proper circuit protection in the form of circuit breakers and fuses. This position is substantiated by the high degree of circuit coordination found during the Associated Circuits - Common Power Supply review.

NRC QUESTION NO. 8**Associated Circuits - Common Power Supply**

FPRR Section 3.3 states, in part, "It was verified by calculation or analysis that the potential associated circuit of concern would not impair the safe shutdown function of any other circuit powered from the same bus." Please provide a detailed narrative which describes the evaluation method, defines the assumptions used in the analysis or calculations, and describes the specific type(s) of protection provided (e.g., Appendix R III.G.2 protection of selective coordination of protective devices) to ensure that a fire-induced fault on non-essential circuits will not cause the loss of power sources required for post-fire safe shutdown.

PP&L Response:

Circuits associated by common power supply are those circuits not required for safe shutdown, but which are powered from safe shutdown buses. Safe shutdown buses are those buses which provide power to circuits necessary for safe shutdown.

Each safe shutdown bus was reviewed to identify all associated circuits connected to the bus. The routing of the associated circuits was reviewed to determine if the circuit was routed in an area where the shutdown path credited for safe shutdown is the same as the bus safe shutdown path.

Any associated circuit routed in an area like this was termed a potential associated circuit of concern.

For each potential associated circuit of concern an analysis was performed to show coordination existed between the load side circuit breaker and the main feeder breaker for the bus. If coordination did not exist, the circuit was termed an associated circuit of concern and a modification was performed to preclude any impact to safe shutdown.

In GL 86-10, NRC expressed concern about the potential for multiple high impedance faults (MHIFs) for associated circuits. GL 86-10 requires that simultaneous MHIFs (below the trip point for the breaker on each individual circuit) for all associated circuits located in the fire area be considered in the evaluation of the safe shutdown capability.

An analysis for MHIF's was performed. This analysis postulated MHIF's on all potential associated circuits of concern capable of sustaining damage in an area and verified that the MHIF current when added to the total running current for the bus was less than the long time trip setting of the main feeder breaker.

NRC QUESTION NO. 9

Manual Operator Actions

Section 6 of the FPRR identifies manual operator actions that may be required in the event of a fire in each Fire Zone. Please describe how these actions, which may be unique for specific fire zones, were incorporated into the applicable shutdown procedures. Additionally, provide the results of the analysis performed to verify that required actions can be performed in a timely manner and that all operator actions performed outside the main control room are feasible and can be performed in a timely manner.

PP&L Response:

The procedural actions that may be required in the event of a fire in each Fire Zone have been identified in the FPRR. In addition, an engineering study compiled all of these actions and, subsequently, converted them into an engineering drawing. This engineering drawing was used by operations as the input for changing their operating procedures.

Even if the required action was one that would normally be taken based on the symptom based EOPs, these actions were incorporated into either an operating procedure, an off normal procedure or the Fire Pre-Plans. In performing this work, care was taken to tie each of the required actions to the Appendix R analysis to assure that the basis for the requirement was understood.

The philosophy behind the Appendix R Safe Shutdown Analysis performed for Susquehanna SES was to rely upon, the symptom based EOPs currently in place. Operators are trained to use EOPs when entry conditions exist. EOPs are symptom oriented responses that can be used without determining an initiating event or transient.

The strength behind this approach was to preclude the need to positively assess the exact extent of damage caused by a fire at each and every location throughout the plant.

As a result, many of the actions required by Appendix R are the same actions that would be required by the symptomatic EOP's. As such the two Nuclear Department procedures covering verification and validation of EOP's cover many of the actions required by Appendix R. The two SSES Nuclear Department Procedures that apply to the verification and validation of EOP procedures are, NDAP-QA-0331, "Verification Program for SSES EPG and System Oriented EOPs," and NDAP-QA-0332, "Validation Program for Symptom-Oriented EOPs,".

The remaining procedural actions were addressed as to their required timing as a part of the engineering evaluation that recommended the action. The feasibility of accomplishing the action and the appropriate personnel for performing the action were determined by plant personnel at the time of incorporation of the actions into the procedures.

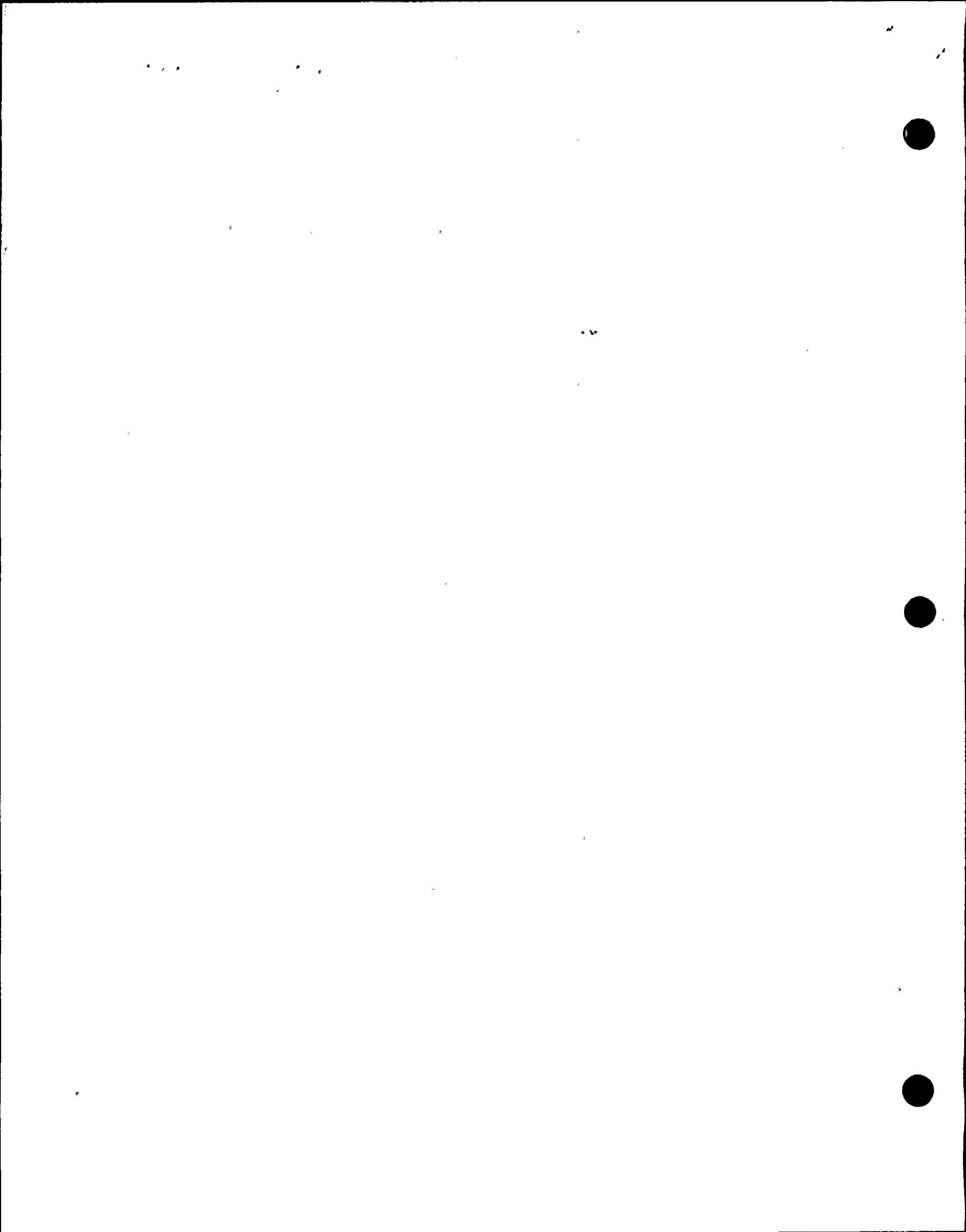
NRC QUESTION NO. 10

Cold Shutdown Repairs

It is not clear if repairs are required to achieve and maintain cold shutdown conditions. Please clarify.

PP&L Response:

Repairs are not required to achieve and maintain cold shutdown conditions.



NRC QUESTION NO. 11

Hot Shutdown Repairs

The FPRR does not appear to specifically state that hot shutdown conditions can be achieved and maintained without repairs. Please clarify.

PP&L Response:

Hot shutdown condition can be achieved and maintained without repairs.



NRC QUESTION NO. 12**High/Low Pressure Interfaces**

Section 3.3 of the FPRR (pg. 3.3-13) states that spurious operation of the safety relief valves (SRVs) was investigated, and, based on the results of this review, it was determined that spurious operation of multiple SRV's was credible. However, the FPRR does not appear to provide any additional explanation with regard to how this concern was resolved. Please clarify.

PP&L Response:

The Appendix R Safe Shutdown Analysis concluded that spurious operation of multiple SRV's was credible. This conclusion was based on the assumption that the SRV's represented a hi/lo pressure interface. Using this assumption, the multiple hot shorts required to obtain multiple valve openings were assumed.

The disposition of this issue relative to the current Appendix R analysis is that the spurious opening of multiple SRV's does not affect our ability to safely shutdown since the operator for such a condition will manually initiate a low pressure make-up system to mitigate the effects of the condition. Core Spray is the protected means of providing vessel inventory make-up for shutdown paths 1 and 3. RHR LPCI is provided for the similar condition for Path 2 shutdown.

As a part of the current work being performed for the Thermo-Lag Resolution Project, the position is being developed which states that the SRV's do not represent a hi/lo pressure interface, since high pressure steam blowdown to the suppression pool is actually the design function of the system. When this position is finalized, the assumption of multiple hot shorts opening multiple valves will no longer be used.

LIST OF ATTACHMENTS

ATTACHMENT I - ON-1(2)00-009, "Control Room Evacuation"

ATTACHMENT 1 TO PLA-4321

ON-1(2)00-009

CONTROL ROOM EVACUATION