MAIN STEAM TUNNEL FLOODING ANALYSIS

REVISION 1

HOPE CREEK GENERATING STATION

PUBLIC SERVICE ELECTRIC & GAS CO.

FEBRUARY 1986

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PURPOSE

The Hope Creek Safety Evaluation Report (SER) requires submittal for NRC staff review a hazards analysis for effect of a feedwater line break in the main steam tunnel (MST) on the plant's ability to safely shut down. (SER Section 8.3.3.1.4 - Confirmatory Item No. 28)

METHODOLOGY

The analysis was conducted in the following manner:

1. Identify all Class 1E equipment and components in the main steam tunnel, Room 4316, that will be subject to the worst case submergence which results from a break in a main feedwater line. (Flood level is Elevation 126' of this room).

2. Identify the safety channel and safety function/system of each equipment or component identified.

3. Determine if the equipment or component is qualified for submergence. If not, determine if the equipment or component circuit has a primary and backup protective device located in a hazard-free area.

4. Determine if the plant can be safely shut down after both the primary and backup protective device open as a result of the failure of the unprotected equipment or component together with the worst case single failure.

ANALYSIS

The Class 1E equipment and components which will be subjected to flooding are identified on the attached table. This table also provides information on safety channel, safety function/system, submergence qualification and location of the primary and backup protective devices. The evaluation of safe shutdown after loss of the equipment/components not qualified for submergence is as follows:

A. Motor Operated Valves (MOVs)

   1. 1AB-HV-F071 - Main Steam drain line isolation downstream of the outboard MSIVs. This valve is not required to mitigate the consequences of a feedwater line break or any other pipe break which could cause flooding of the main steam tunnel, nor is it required for safe shutdown.

   2. 1KP-HV-5829A&B, -5834A&B, -5835A&B, -5836A&B, and 5837A&B - MSIV sealing system gas supply valves. These valves are only required to mitigate the consequences of a LOCA. Should any valve(s) spuriously open, upstream piping is protected from overpressurization by check valves (See FSAR Figure 6.7-1). These valves have no safe shutdown function.

A. Motor Operated Valves (MOVs) - Cont'd

3. 1AE-HV-F039 - RWCU return to feedwater.
This valve is powered from AC motor control center 10B242, Channel D. The supply line to the RWCU system has a containment inboard isolation valve 1BG-HV-F001 powered from the Channel A source and an outboard isolation valve 1BG-HV-F004 powered from 10B242. Neither these valves nor their power supplies are located in the MST. There is no single failure which can prevent both supply isolation valves from closing. They will close automatically on low level in the RPV.

4. 1AE-HV-4144 - FW crosstie isolation valve.
This valve is required to mitigate the consequences of a LOCA only. This valve has no safe shutdown function following a F.W. Line break in the steam tunnel. 1

B. Solenoid Operated Valves

1KL-PDV-5825A&B - MSIV sealing system supply valves. See discussion of item A.2 above.

C. Thermocouples

The thermocouples provide input to the MSIV isolation logic which closes the MSIVs on high temperature in the MST. Closure of the MSIVs is not required to mitigate the consequences of a feedwater line break or to safely shut down the reactor. Closure of the MSIVs will not prevent safe shutdown of the reactor.

CONCLUSION

As discussed above, none of the components which are flooded and are not qualified for submergence are required for safe shutdown of the plant, nor will their failure prevent safe shutdown. Because the equipment/systems that are required to safely shutdown the plant are single-failure proof, no single failure can prevent safe shutdown.

MAIN STEAM TUNNEL FLOODING ANALYSIS

CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1SK-TE-N010A (Thermocouple)	RPS W	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N012A (Thermocouple)	RPS W	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N016 (Thermocouple)	RPS W	None (alarm and indication)/ Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)

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CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1SK-TE-N010B (Thermocouple)	RPS X	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1SK-TE-N012B (Thermocouple)	RPS X	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1SK-TE-N010C (Thermocouple)	RPS Y	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N012C (Thermocouple)	RPS Y	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C609 - Primary 10C410 - Backup (1)
1SK-TE-N010D (Thermocouple)	RPS Z	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1SK-TE-N012D	RPS Z	Main Steam Tunnel high temp. trip input to NSSSS/Steam Leak Detection	No	10C611 - Primary 10C411 - Backup (1)
1AB-HV-F071 (Motor operated valve)	C	Main Steam lines downstream drain isolation	"	10B232 (2)

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1KL-PDV-5825B (Solenoid valve)	C	MSIV Outboard Seal Gas Supply	No	1YF403 (2)
1KP-HV-5829B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5834B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5835B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5836B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)
1KP-HV-5837B (Motor operated valve)	C	MSIV Outboard Seal Gas Supply	No	10B232 (2)

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CLASS 1E EQUIPMENT AND COMPONENTS ANALYZED

EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1KL-PDV-5825A (Solenoid Valve)	D	MSIV Inboard Seal Gas Supply	No	1YF404 (2)
1KP-HV-5829A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5834A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5835A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5836A (Motor operated valve)	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1KP-HV-5837A (Motor operated valve	D	MSIV Inboard Seal Gas Supply	No	10B242 (2)
1AE-HV-F039 (Motor operated valve)	D	RWCU Discharge to Feedwater Isolation	No	10B242 (2)
1AE-HV-4144 (Motor operated valve	C	FW Crosstie Isolation	No	10B232 (2)

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EQUIPMENT/ COMPONENT No.	SAFETY CHANNEL	SAFETY FUNCTION/ SAFETY SYSTEM	QUALIFIED FOR SUBMERGENCE	LOCATION OF PRIMARY/BACKUP PROTECTIVE DEVICE
1AB-HV-F019 (Motor operated valve)	D	Steam Lines Drain Outboard Isolation	Yes	10B242 (3)
1AB-HV-F067A (Motor operated valve	D	Main Steam Line A Outboard Drain	Yes	10B242 (3)
1AB-HV-F067B (Motor operated valve)	D	Main Steam Line B Outboard Drain	Yes	10B242 (3)
1AB-HV-F067C (Motor operated valve)	D	Main Steam Line C Outboard Drain	Yes	10B242 (3)
1AB-HV-F067D (Motor operated valve	D	Main Steam Line D Outboard Drain	Yes	10B242 (3)

(1) Opening the backup protective device de-energizes the associated RPS channel which may result in a reaction trip. This is a safe condition.

(2) Opening the primary and backup protective device does not affect any component other than the identified component.

(3) For qualified operators, only primary protection device location is provided.

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