Lewis Sumner
Vice President
Hatch Project Support

Southern Nuclear Operating Company, Inc.
40 Inverness Parkway
Post Office Box 1295
Birmingham, Alabama 35201

Tel 205.992.7279
Fax 205.992.0341

SOUTHERN COMPANY
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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant
Request for Additional Information on Hatch Individual
Plant Examination of External Events (IPEEE) Submittal

Ladies and Gentlemen:

By letter dated December 8, 1997, the NRC staff requested Southern Nuclear Operating Company (SNC) provide additional information regarding the Edwin I. Hatch Nuclear Plant Individual Plant Examination of External Events (IPEEE) submittal. By letter dated March 13, 1998, SNC provided a response to the request for additional information. Response to the first three requests was deferred pending industry resolution of generic issues. By letter dated June 15, 1999, the staff accepted the industry's response. The enclosure to this letter contains the SNC responses to NRC requests 1 through 3, based on the accepted guidance. The enclosure includes each NRC request followed by the SNC response.

Should you have any questions in this regard, please contact this office.

Respectfully submitted,

H. L. Sumner, Jr.

IFL/eb

Enclosure: Request for Additional Information on Hatch Individual Plant Examination of External Events (IPEEE)

cc: (See next page.)

A011

February 9, 2000

cc: Southern Nuclear Operating Company
Mr. P. H. Wells, Nuclear Plant General Manager
SNC Document Management (R-Type A02.001)

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. L. N. Olshan, Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. J. T. Munday, Senior Resident Inspector - Hatch

Enclosure

Edwin I. Hatch Nuclear Plant
Request for Additional Information on Hatch Individual
Plant Examination of External Events (IPEEE) Submittal

NRC Request No. 1:

It is important that the human error probabilities (HEPs) used in the screening phase of the analysis properly reflect the potential effects of fire (e.g., smoke, heat, loss of lighting, and poor communication), even if these effects do not directly cause equipment damage in the scenarios being analyzed. If these effects are not treated, the HEPs may be optimistic and result in the improper screening of scenarios. Note that HEPs which are realistic with respect to an internal events analysis could be optimistic with respect to a fire risk analysis.

Please identify: (a) the scenarios screened out from further analysis whose quantification involved one or more HEPs, (b) the HEPs (description and numerical values) for each of these scenarios, and (c) how the effects (e.g., smoke, heat, loss of lighting, and poor communication) of the postulated fires on HEPs were treated.

SNC Response:

The quantitative fire analysis performed in the Hatch Individual Plant Examination of External Events (IPEEE) was conducted in two phases: quantitative screening of location fire scenarios and detailed fire scenario analysis. In the quantitative fire scenario screening analysis, no credit was taken for the fire fighting efforts. All equipment contained in the location(s) affected by fire was assumed to be damaged. Furthermore, no additional operator recovery actions other than those already considered in the internal events analysis were included. As such, human error probabilities were not relevant in the calculations of the fire scenario frequencies. They were, however, used in the calculations of the conditional core damage probabilities (CCDPs) for each of the fire scenarios evaluated.

The location fire scenarios screened out from further detailed analysis are provided in Tables 4.1-2 and 4.1-3 of the Hatch IPEEE submittal for Unit 1 and Unit 2, respectively. Tables 1 and 2 of this response also list these fire scenarios that were screened in the IPEEE from detailed fire analysis for Plant Hatch Units 1 and 2, respectively. The screened fire scenarios are presented as the row headings of these tables. Although these scenarios were screened from detailed analysis, the core damage frequencies estimated for these scenarios were added to the total fire-induced core damage frequency presented in Table 4.6-1 of the Hatch IPEEE submittal.

It is noted that, since the control room fire scenarios were not screened from the detailed analysis, this response only addresses those fire scenarios initiated outside of the control room. As discussed earlier, only those operator actions modeled in the internal events analysis were considered in the calculations of CCDPs for fire scenarios in the screening phase. Most of these operator actions are performed in the main control room. For fires initiated outside of the control room, the impact of fire on the performance of operator actions in the control room should not be significantly higher than other event scenarios with the same impact on plant equipment. As such, operator actions performed in the control room are not significantly affected by fire scenarios initiated outside of the control room. Therefore, during the fire scenario screening phase, only operator actions performed outside of the control room were considered for such fire effects as heat, smoke, loss of lighting, etc. in the analysis of CCDPs.

Also included in Tables 1 and 2 of this response are the list of the modeled operator actions performed outside of control room and the impact of each of the screened fire scenarios on these operator actions. The operator actions are listed as the column headings of these tables. In addition, the locations of the postulated fire events and the locations where these operator actions are performed are also provided in Tables 1 and 2. Note that the operator actions shown in Tables 1 and 2 include only those actions applicable to the fire initiating events.

Based on the information provided in Tables 1 and 2, impact of the screened fire scenarios on the operator actions performed outside the control room is insignificant even in the few cases with the presence of minor smoke. In some cases, the effects of fire are not important because an alternate route is available for the operator to complete the required actions or an alternate device is available at a different location.

At Plant Hatch, the Operations shift supervisor is the head of the fire brigade, which is comprised of Operations personnel. During response to fire events, the shift supervisor and his brigade members are equipped with fire protection clothing, breathing apparatus, portable lighting, and such communication device as radio. In addition, maintenance and engineering backup personnel may also be available at their disposal. If a local fire mitigation action needs to be performed near the fire location, it is certainly feasible for the shift supervisor and his brigade members to complete the required actions even with the presence of some smoke.

Due to the above considerations, it was concluded that the fire scenarios considered do not prevent access to the area or significantly increase the failure probability for the performance of the local operator actions modeled. As such, the analysis of CCDPs in the Hatch IPEEE for these fire scenarios used the same HEP values as those used for the internal events analysis in the IPE (see Table 3.3-16 and Section 3.3.3.2 in the Plant Hatch Individual Plant Examination submittal dated December 11, 1992, for their numerical values). In the Hatch IPE, most of these HEPs were analyzed with detailed evaluation of the following seven performance shaping factors: preceding and concurrent actions, indications and plant interface, task complexity, adequacy of time, procedures, training and experience, and stress.

Table 1. Unit 1 Screened Fire Scenarios and Impact of Fire on Operator Actions Performed Outside of Control Room

Fire Scenario	Description of Fire Location	YHEEPD Realign DG fuel oil pumps to diesel with failed pumps	YHEXN2 Hook up N2 bottles to drywell pneumatic header	YHEXP2 /OWE Crosstie RB PSW headers on loss of Division I PSW	YHEXP5 Rotate clogged PSW strainers to restore SW flow	YHEXR1 Open RHRSW valves F068A/B using handwheels	RSREC2 RHRSW pump motor cooling recovery upon loss of 1 PSW division	QRA Recovery of containment heat removal	HIA1/B1/D1 HIA2/B2/D2 Recovery of high pressure injection start failures	Part of VM Realign swing 600-V MCC 1R24-S029 to 600-V Bus C
		DG (switches in E & G rooms)	1RB 130' (just open N2 bottles)	1RB 130'	PSW Intake Structure	1RB 87'	PSW Intake Structure	Mostly MCR; 1TB for some condenser recovery cases	Mostly MCR; 1RB 87', RCIC overspeed trip reset	CB 180'
0007B-L	U1 Water Analysis Room (CB 112')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
0028-L	LPCI Inverter Room (CB 147')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
0101XX-L	Turbine Building 0101A, B, C, D & J (1TB 164')	NSI	NSI	NSI	NSI	NSI	NSI	Minor impact for condenser recovery & NSI for other options	NSI	NSI
0201A-L	Refueling Floor (1RB 228')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
0201B-L	Refueling Floor (2RB 228')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1005-L	Station Battery Room 1B (CB 112')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1008-L	U1 AC Inverter Room (CB 112')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1019-L	Transformer Room (CB 130')	NSI	NSI for primary route and minor smoke for secondary route	NSI for primary route and minor smoke for secondary route	NSI	NSI for primary route and minor smoke for secondary route	NSI	NSI	NSI for primary route and minor smoke for secondary route	NSI
1023-L	Oil Conditioning Room (CB 130')	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI	NSI for primary route and smoke in secondary route	NSI

Table 1. Unit 1 Screened Fire Scenarios and Impact of Fire on Operator Actions Performed Outside of Control Room

Fire Scenario	Description of Fire Location	YHEEPD Realign DG fuel oil pumps to diesel with failed pumps	YHEXN2 Hook up N2 bottles to drywell pneumatic header	YHEXP2 /OWE Crosstie RB PSW headers on loss of Division I PSW	YHEXP5 Rotate clogged PSW strainers to restore SW flow	YHEXR1 Open RHRSW valves F068A/B using handwheels	RSREC2 RHRSW pump motor cooling recovery upon loss of 1 PSW division	QRA Recovery of containment heat removal	HIA1/B1/D1 HIA2/B2/D2 Recovery of high pressure injection start failures	Part of VM Realign swing 600-V MCC 1R24-S029 to 600-V Bus C
		DG (switches in E & G rooms)	1RB 130' (just open N2 bottles)	1RB 130'	PSW Intake Structure	1RB 87'	PSW Intake Structure	Mostly MCR; 1TB for some condenser recovery cases	Mostly MCR; 1RB 87', RCIC overspeed trip reset	CB 180'
1203I-L	RB Stairwell 158, 185, 203, & 228' elevations (1RB)	NSI	Minor smoke and alternate stairwell available	Minor smoke and alternate stairwell available	NSI	NSI to very minor Smoke	NSI	NSI	Minor smoke and alternate stairwell available	NSI
1205I-L	RB Working Floor North – Water Curtain (1RB 158')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1205L-L	RWCU Heat Exchanger Room (1RB 158')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1205Q-L	Standby Gas Filter Room (1RB 164)	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1604B-L	U1 Nitrogen Storage Tank (Yard 129')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
2408-L	U2 Switchgear Room 2F (DG 130')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI

Table 1. Unit 1 Screened Fire Scenarios and Impact of Fire on Operator Actions Performed Outside of Control Room

Fire Scenario	Description of Fire Location	YHEEPD Realign DG fuel oil pumps to diesel with failed pumps	YHEXN2 Hook up N2 bottles to drywell pneumatic header	YHEXP2 /OWE Crosstie RB PSW headers on loss of Division I PSW	YHEXP5 Rotate clogged PSW strainers to restore SW flow	YHEXR1 Open RHRSW valves F068A/B using handwheels	RSREC2 RHRSW pump motor cooling recovery upon loss of 1 PSW division	QRA Recovery of containment heat removal	HIA1/B1/D1 HIA2/B2/D2 Recovery of high pressure injection start failures	Part of VM Realign swing 600-V MCC 1R24-S029 to 600-V Bus C
		DG (switches in E & G rooms)	1RB 130' (just open N2 bottles)	1RB 130'	PSW Intake Structure	1RB 87'	PSW Intake Structure	Mostly MCR; 1TB for some condenser recovery cases	Mostly MCR; 1RB 87', RCIC overspeed trip reset	CB 180'
2409-L	U2 Switchgear Room 2G (DG 130')	Heat and smoke impact in one SWGR room, control available in other SWGR rooms	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI

Legend:
CB- Control Building
DG- Diesel Generator Building
MCR- Main Control Room
1RB- Unit 1 Reactor Building
1TB- Unit 1 Turbine Building
NSI- No Significant Impact

Note: Impact of fire on operator actions performed outside of control room includes impact on the access route from MCR to the location where the operator action is performed.

Table 2. Unit 2 Screened Fire Scenarios and Impact of Fire on Operator Actions Performed Outside of Control Room

Fire Scenario	Description of Fire Location	YHEEPD Realign DG fuel oil pumps to diesel with failed pumps	YHEXN2 Hook up N2 bottles to drywell pneumatic header	YHEXP2 /OWE Crosstie RB PSW headers on loss of Division I PSW	YHEXP5 Rotate clogged PSW strainers to restore SW flow	YHEXR1 Open RHRSW valves F068A/B using handwheels	YHEL1D Restore drywell cooling following trip on LOCA signal	RSREC2 RHRSW pump motor cooling recovery upon loss of 1 PSW division	QRA Recover containment heat removal	HIA1/B1/D1 HIA2/B2/D2 Recover high pressure injection start failures	Part of VM Realign swing 600-V MCC 2R24-S029 to 600-V Bus C
		DG (switches in E & G rooms)	2RB 130' (just open the N2 bottles)	2RB 130'	PSW Intake Structure	2RB 87'	DG (reset a lockout device at 4kV bus)	PSW Intake Structure	Mostly MCR; 2TB for some condenser recovery cases	Mostly MCR; 2RB 87', RCIC overspeed trip reset	CB 180'
0007A-L	East Corridor (CB 112')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
0014A-L	RC Lab (CB 130')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
0014G-L	HP Hallway (CB 130')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
0028-L	LPCI Inverter Room (CB 147')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
1104-L	U1 East Cableway (CB 130')	NSI	NSI for primary route and smoke and heat in secondary route	NSI for primary route and smoke and heat in secondary route	NSI	NSI for primary route and smoke and heat in secondary route	NSI	NSI	NSI	NSI for primary route and smoke and heat in secondary route	NSI
2005-L	Station Battery Room 2B (CB 112')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
2006-L	U2 Water Analysis room (CB 112')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
2019-L	Transformer Room (CB 130')	NSI	NSI for primary route and minor smoke in secondary route	NSI for primary route and minor smoke in secondary route	NSI	NSI for primary route and minor smoke in secondary route	NSI	NSI	NSI	NSI for primary route and minor smoke in secondary route	NSI

Table 2. Unit 2 Screened Fire Scenarios and Impact of Fire on Operator Actions Performed Outside of Control Room

Fire Scenario	Description of Fire Location	YHEEPD Realign DG fuel oil pumps to diesel with failed pumps	YHEXN2 Hook up N2 bottles to drywell pneumatic header	YHEXP2 /OWE Crosstie RB PSW headers on loss of Division I PSW	YHEXP5 Rotate clogged PSW strainers to restore SW flow	YHEXR1 Open RHRSW valves F068A/B using handwheels	YHEL1D Restore drywell cooling following trip on LOCA signal	RSREC2 RHRSW pump motor cooling recovery upon loss of 1 PSW division	QRA Recover containment heat removal	HIA1/B1/D1 HIA2/B2/D2 Recover high pressure injection start failures	Part of VM Realign swing 600-V MCC 2R24-S029 to 600-V Bus C
		DG (switches in E & G rooms)	2RB 130' (just open the N2 bottles)	2RB 130'	PSW Intake Structure	2RB 87'	DG (reset a lockout device at 4kV bus)	PSW Intake Structure	Mostly MCR; 2TB for some condenser recovery cases	Mostly MCR; 2RB 87', RCIC overspeed trip reset	CB 180'
2021-L	Switchgear Hallway Enclosure (CB 130')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
2023-L	Oil Conditioning Room (CB 130')	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI for primary route and smoke in secondary route	NSI	NSI for primary route and smoke in secondary route	NSI
2203B-L	RB NE Corner Room – RHR Pump (2RB 87')	NSI	NSI	NSI	NSI	Heat and smoke; only one of two valves affected	NSI	NSI	NSI	NSI	NSI
2205C-L	RB SW Corner Room – CRD Pump (2RB 87')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
2205L-L	RWCU Heat Exchanger Room (2RB 158')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
2402-L	Battery Room 2A (DG 130')	Very minor smoke	NSI	NSI	NSI	NSI	Very minor smoke	NSI	NSI	NSI	NSI
2406-L	Battery Room 2C (DG 130')	Very minor smoke	NSI	NSI	NSI	NSI	Very minor smoke	NSI	NSI	NSI	NSI

Table 2. Unit 2 Screened Fire Scenarios and Impact of Fire on Operator Actions Performed Outside of Control Room

Fire Scenario	Description of Fire Location	YHEEPD Realign DG fuel oil pumps to diesel with failed pumps	YHEXN2 Hook up N2 bottles to drywell pneumatic header	YHEXP2 /OWE Crosstie RB PSW headers on loss of Division I PSW	YHEXP5 Rotate clogged PSW strainers to restore SW flow	YHEXR1 Open RHRSW valves F068A/B using handwheels	YHEL1D Restore drywell cooling following trip on LOCA signal	RSREC2 RHRSW pump motor cooling recovery upon loss of 1 PSW division	QRA Recover containment heat removal	HIA1/B1/D1 HIA2/B2/D2 Recover high pressure injection start failures	Part of VM Realign swing 600-V MCC 2R24-S029 to 600-V Bus C
		DG (switches in E & G rooms)	2RB 130' (just open the N2 bottles)	2RB 130'	PSW Intake Structure	2RB 87'	DG (reset a lockout device at 4kV bus)	PSW Intake Structure	Mostly MCR; 2TB for some condenser recovery cases	Mostly MCR; 2RB 87', RCIC overspeed trip reset	CB 180'
2603-L	U2 Condensate Storage Tank/Pump (CST 130')	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI

Legend:
CB- Control Building
DG- Diesel Generator Building
MCR- Main Control Room
2RB- Unit 2 Reactor Building
2TB- Unit 2 Turbine Building
NSI- No Significant Impact

Note: Impact of fire on operator actions performed outside of control room includes impact on the access route from MCR to the location where the operator action is performed.

NRC Request No. 2:

NUREG-1407, Section 4.2 and Appendix C, and GL 88-20, Supplement 4, request that documentation be submitted with the IPEEE submittal with regard to the fire risk scoping study (FRSS) issues, including the basis and assumptions used to address these issues, and a discussion of the findings and conclusions. NUREG-1407 also requests that evaluation results and potential improvements be specifically highlighted. Control system interactions involving a combination of fire-induced failures and high probability random equipment failures were identified in the FRSS as potential contributors to fire risk.

The issue of control systems interactions is associated primarily with the potential that a fire in the plant (e.g., the main control room (MCR)) might lead to potential control systems vulnerabilities. Given a fire in the plant, the likely sources of control systems interactions could happen between the MCR, the remote shutdown panel (RSP), and shutdown systems. Specific areas that have been identified as requiring attention in the resolution of this issue include:

(a) Electrical independence of the remote shutdown control systems: The primary concern of control systems interactions occurs at plants that do not provide independent remote shutdown control systems. The electrical independence of the RSP and the evaluation of the level of indication and control of remote shutdown control and monitoring circuits need to be assessed.

(b) Loss of control equipment or power before transfer: The potential for loss of control power for certain control circuits as a result of hot shorts and/or blown fuses before transferring control from the MCR to remote shutdown locations needs to be assessed.

(c) Spurious actuation of components leading to component damage, loss-of-coolant accident (LOCA), or interfacing systems LOCA: The spurious actuation of one or more safety-related to safe-shutdown-related components as a result of fire-induced cable faults, hot shorts, or component failures leading to component damage, LOCA, or interfacing systems LOCA, prior to taking control from the RSP, needs to be assessed. This assessment also needs to include the spurious starting and running of pumps as well as the spurious repositioning of valves.

(d) Total loss of system function: The potential for total loss of system function as a result of fire-induced redundant component failures or electrical distribution system (power source) failure needs to be addressed.

Please describe your remote shutdown capability, including the nature and location of the shutdown station(s), as well as the types of control actions, which can be taken from the remote panel(s). Describe how your procedures provide for transfer of control to the remote station(s). Provide an evaluation of whether loss of control power due to hot shorts and/or blown fuses could occur prior to transferring control to the remote shutdown location and identify the risk contribution of these types of failures (if these failures are screened, please provide the basis for the screening). Finally, provide an evaluation of whether spurious actuation of components as a result of fire-induced cable faults, hot shorts, or component failures could lead to component damage, a LOCA, or an interfacing systems LOCA prior to taking control from the RSP (considering both spurious starting and running of pumps as well as the spurious repositioning of valves).

SNC Response:

(a) Electrical Independence

The plant can be safely shut down from outside the main control room using controls and indication from the remote shutdown panels in conjunction with local manual operation of equipment and local indications of required parameters. A description of the controls and indications for remote shutdown are discussed in the Description of Remote Shutdown Capability for Unit 1 and Unit 2 below. The results of the cable analysis in the safe shutdown analysis was used as inputs into the IPEEE analysis.

(b) Loss of Control Power Due to Hot Shorts and/or Blown Fuses

The normal control power to equipment which may be controlled from the remote shutdown panels may be lost due to hot shorts and/or blown fuses prior to transferring to the remote shutdown panels. However, operation of the transfer switches connects alternate control power and fusing which will be unaffected by fires in the control room. Thus, the risk contribution of these failures are screened from consideration.

(c) Evaluation of Spurious Actuation of Components

The affects of spurious actuation of components due to fire-induced cable faults has been analyzed. The analysis has shown that there are no conductor-to-conductor faults which could lead to motor operated valve (MOV) damage due to operation of the valve without limit or torque switch protection. Also, the Hi/low pressure interface analysis has shown that a LOCA can not occur due to fire-induced cable faults since both valves within the high/low pressure boundary could not be opened simultaneously.

(d) Potential for a Total Loss of System Function

The potential for a total loss of system function as a result of fire-induced redundant component failures or electrical distribution system failure is extremely remote. Analysis has shown that, due to the remote shutdown capability, one train of equipment needed for high pressure injection (Reactor Core Isolation Cooling, RCIC) and one train needed for low pressure injection (Residual Heat Removal, RHR Loop B) will be available for shutdown following a fire. All necessary manual actions needed to isolate the equipment from the main control room and operate the equipment locally have been identified and included in the appropriate procedures. The evaluation of the on-site emergency diesel generators and electrical distribution system for fire-induced cable failures has determined all necessary manual actions needed to isolate the equipment from the main control room and operate the equipment locally are also included in the appropriate procedures.

Furthermore, because of the electrical separation requirements of redundant trains and the configuration/arrangement of the control panels and logic cabinets located in the control room, it is highly unlikely that both trains of the same system (e.g., core spray) would be affected due to fire-induced damage in the MCR. The separation requirements defines the distances required between redundant trains and provides alternate methods to assure both trains are not affected by the same fire for areas where these requirements are not attainable.

Description of Remote Shutdown Capability

Unit 1

The Unit 1 remote shutdown capability for Plant Hatch consists of remote shutdown panels and local control panels (1H21-P173, 1H21-P175, 1H21-P176, 1H21-P177, 1C82-P001, and 1C82-P002). These panels have transfer switches to transfer control of equipment from the Control Room to the panels, with alternate control power and fusing which will be unaffected by fires in the control room. The Division I remote shutdown panel contains controls for RCIC which is used for high pressure injection (see Table 1). The Division II remote shutdown panel contains MOV controls for loop B of RHR which is used for low pressure injection and suppression pool cooling and control for one SRV (see Table 2). A third remote shutdown panel contains indication for RPV level and pressure, RHR, RHR service water, and RCIC flow, drywell and torus pressure and temperature, and control for an additional SRV (see Table 3). The hot shutdown control panel contains controls for the Division II plant service water pump B, RHR service water pumps B and D, and RHR B pump (see Table 4). The CRD control panels contain controls for two CRD pumps (see Tables 5 and 6). In addition to these control panels, operation of equipment from switchgear or motor control centers, local manual operation of valves using the handwheels, or failing equipment to its required position by removing power, is also utilized for system operation outside the control room or to achieve a remote shutdown. Also, remote shutdown procedures are available for system operation from outside the control room for HPCI, condensate, standby gas treatment, reactor building ventilation, area cooling, and drywell cooling.

Table 1

RSD panel 1C82-P001 is located on elevation 158'-0" in the Unit 1 reactor building at RE/R10. It contains the following controls:

MPL #	Function
1E11-F009	RHR SDC suction valve control
1E51-C002-1	RCIC barometric condenser condensate pump control
1E51-C002-2	RCIC barometric condenser vacuum pump control
1E51-F007	RCIC steam supply inboard isolation valve control
1E51-F008	RCIC steam supply outboard isolation valve control
1E51-F013	RCIC pump inboard discharge valve control
1E51-F045	RCIC turbine steam supply valve control
1E51-F046	RCIC turbine cooling water valve control
1E51-F524	RCIC turbine trip and throttle valve control

Table 2

RSD panel 1C82-P002 is located on elevation 158'-0" in the Unit 1 reactor building at RH/R05. It contains the following controls:

MPL #	Function
1B21-F013C	LLS / manual relief SRV control
1B31-F023B	Recirc pump suction valve control
1E11-F004B	RHR torus suction valve control
1E11-F006B	RHR shutdown cooling valve control
1E11-F007B	RHR min flow valve control
1E11-F008	RHR SDC suction valve control
1E11-F015B	RHR inboard injection valve control
1E11-F017B	RHR outboard injection valve control
1E11-F024B	RHR full flow test line valve control
1E11-F027B	RHR torus spray valve control
1E11-F028B	RHR torus spray or test valve control
1E11-F048B	RHR heat exchanger bypass valve control

Table 3

RSD panel 1H21-P173 is located on elevation 130'-0" in the Unit 1 reactor building at RL/R03. It contains the following instrumentation and controls:

MPL #	Function
1B21-F013G	Steam line manual relief SRV control
1B21-R070	RPV water level indication
1C32-R070	RPV pressure indication
1E11-R070	RHR flow indication
1E11-R071	RHR heat exchanger service water flow indication
1E51-R070	RCIC pump flow indication
1T47-R070	Dome temperature indication
1T47-R071	Sacrificial shield exit temperature indication
1T47-R072	Upper sphere temperature indication
1T47-R073	CRD cavity temperature indication
1T48-R070	Torus water level indication
1T48-R071	Drywell pressure indication
1T48-R072	Torus water temperature indication
1T48-R073	Torus air temperature indication

Table 4

Hot shutdown control panel 1H21-P175 is located on elevation 130'-0" in the diesel generator building at F03. It contains the following controls:

MPL #	Function
1E11-C001B	RHR service water pump control
1E11-C001D	RHR service water pump control
1E11-C002B	RHR pump control
1P41-C001B	Plant service water pump control

Table 5

CRD feed pump control panel 1H21-P176 is located on elevation 130'-0" in the diesel generator building at D03. It contains the following controls:

MPL #	Function
1C11-C001A	CRD pump control

Table 6

CRD feed pump control panel 1H21-P176 is located on elevation 130'-0" in the diesel generator building at E03. It contains the following controls:

MPL #	Function
1C11-C001B	CRD pump control

Description of Remote Shutdown Capability

Unit 2

The Unit 2 remote shutdown capability for Plant Hatch consists of a remote shutdown panel, shutdown instrument panel, and local instrument racks (2H21-P004, 2H21-P005, 2H21-P173, and 2C82-P001). These panels have transfer switches to transfer control of equipment from the Control Room to the panels, with alternate control power and fusing which will be unaffected by fires in the control room. The remote shutdown panel contains controls and instrumentation for RCIC (which is used for high pressure injection), controls and instrumentation for loop B of RHR (which is used for low pressure injection and suppression pool cooling), controls for two SRVs, controls for a recirc pump suction valve, and instrumentation for vessel level and pressure (see Table 1). The shutdown instrument panel contains indication for RPV level and pressure, RHR, RHR service water, and RCIC flow, drywell and torus pressure and temperature, and control for a CRD and plant service water pump (see Table 2). In addition to these control panels, operation of equipment from switchgear or motor control centers, local manual operation of valves using the handwheels, or failing equipment to its required position by removing power, is also utilized for system operation outside the control room or to achieve a remote shutdown.

Table 1

Remote shutdown panel 2C82-P001 is located on elevation 130'-0" in the Unit 2 reactor building at RA/R16. It contains the following instrumentation and controls:

MPL #	Function
2B21-F013B	LLS / manual relief SRV control
2B21-F013F	LLS / manual relief SRV control
2B31-F023B	Recirc pump suction valve control
2C82-R001	RCIC flow indicating controller
2C82-R003	RCIC turbine speed indication
2C82-R004	RHR flow indication
2C82-R005	Reactor vessel level indication
2C82-R006	Reactor vessel pressure indication
2E11-C001B	RHR service water pump 2B control
2E11-C001D	RHR service water pump 2D control
2E11-C002B	RHR pump 2B control
2E11-F003B	RHR heat exchanger discharge valve control
2E11-F004B	RHR torus suction valve control
2E11-F006A	RHR SDC suction valve control
2E11-F006B	RHR shutdown cooling valve control
2E11-F006C	RHR SDC suction valve control
2E11-F006D	RHR shutdown cooling valve control
2E11-F007B	RHR min flow valve control
2E11-F008	RHR SDC suction valve control
2E11-F009	RHR SDC suction inboard containment valve control
2E11-F011B	RHR heat exchanger to torus valve control
2E11-F015B	RHR inboard injection valve control
2E11-F016B	Containment spray outboard isolation valve control
2E11-F017B	RHR outboard injection valve control
2E11-F023	Reactor head spray isolation valve control
2E11-F024B	RHR full flow test line valve control
2E11-F026B	RHR heat exchanger to RCIC valve control
2E11-F027B	RHR torus spray valve control
2E11-F028B	RHR torus spray or test valve control
2E11-F047B	RHR heat exchanger inlet valve control
2E11-F048B	RHR heat exchanger bypass valve control
2E11-F073B	RHR service water to RHR cross-tie valve control
2E51-C002-1	RCIC barometric condenser condensate pump control
2E51-C002-2	RCIC barometric condenser vacuum pump control
2E51-F007	RCIC steam supply inboard isolation valve control
2E51-F008	RCIC steam supply outboard isolation valve control
2E51-F010	RCIC pump suction from CST valve control
2E51-F012	RCIC pump outboard discharge valve control

Table 1 (Cont'd)

MPL #	Function
2E51-F013	RCIC pump inboard discharge valve control
2E51-F019	RCIC minimum flow valve control
2E51-F022	RCIC pump test bypass to CST valve control
2E51-F029	RCIC pump suction from torus valve control
2E51-F031	RCIC pump suction from torus valve control
2E51-F045	RCIC turbine steam supply valve control
2E51-F046	RCIC turbine cooling water valve control
2E51-F524	RCIC turbine trip and throttle valve control

Table 2

Shutdown instrument panel 2H21-P173 is located on elevation 130'-0" in the Unit 2 reactor building at RA/R16. It contains the following instrumentation and controls:

MPL #	Function
2C11-C001B	CRD pump control
2E11-R071	RHR heat exchanger service water flow indication
2P41-C001B	Plant service water pump control
2T47-R070	Dome temperature indication
2T47-R071	Sacrificial shield exit temperature indication
2T47-R072	Upper sphere temperature indication
2T47-R073	CRD cavity temperature indication
2T48-R070	Torus water level indication
2T48-R071	Drywell pressure indication
2T48-R072	Torus water temperature indication
2T48-R073	Torus air temperature indication

Transfer of Control to Remote Shutdown Panels

There are numerous remote shutdown procedures for conditions where the control room may be uninhabitable. These procedures provide for reactor shutdown or system operation from outside the main control room and include the following:

- Reactor shutdown from outside the control room
- Reactor shutdown from outside the control room following a fire in the control room
- CRD operation from outside the control room
- HPCI operation from outside the control room
- RCIC operation from outside the control room
- Condensate system operation from outside the control room
- Drywell cooling operation from outside the control room
- Reactor building ventilation and area cooling operation from outside the control room

- SBGT operation from outside the control room
- Electrical restoration while performing shutdown outside the control room

The evacuation of the control room is at the discretion of the shift supervisor who provides the direction for the operators to report to the remote shutdown panel. Prior to leaving the control room, the operators will scram the reactor and trip the main turbine if possible. If not, the remote shutdown procedures provide instructions for the scram and operation of the remote shutdown panel transfer switches.

NRC Request No. 3:

The previous question addresses the potential for hot shorts due to fires in the MCR. Fires in other areas of the plant can also result in hot shorts that result in adverse conditions. Hot shorts in control cables can simulate the closing of control switches leading, for example, to the repositioning of valves, spurious operation of motors and pumps, or the shutdown of operating equipment. These types of faults might, for example, lead to a LOCA, diversion of flow within various plant systems, deadheading and failure of important pumps, premature or undesirable switching of pump suction sources, or undesirable equipment operations. In instrumentation circuits, hot shorts may cause misleading plant readings potentially leading to inappropriate control actions or generation of actuation signals for emergency safeguard features. From the submittal, it cannot be determined to what extent the licensee has considered hot shorts as a failure mode for control of instrumentation cables. In particular, hot short considerations should include the treatment of conductor-to-conductor shorts within a given cable.

Discuss to what extent these issues have been considered in the IPEEE. If they have not been considered, please provide an assessment of how inclusion of potential hot shorts would impact the quantification of the fire risk scenarios in the IPEEE.

SNC Response:

The safe shutdown equipment and cable listing used in the safe shutdown analysis for Plant Hatch was used as an input to the IPEEE analysis. In addition, cables for additional equipment were identified, routed, and analyzed. Equipment failure modes which could result from fire-induced cable failures were considered in the IPEEE. This includes failures which could result from hot shorts, open circuits, and shorts-to-ground. The resultant failure modes included the repositioning of valves, spurious operation of motors and pumps, and the shutdown of operating equipment. These failure modes could cause diversion of flow, deadheading of pumps, LOCA, etc. They were examined for any area of the plant which contained cables relevant to the accident mitigation functions of the shutdown systems. The likelihood of different kinds of fire-induced cable faults and their impacts on the various system functions were evaluated to determine the risk significance. The impact of most of the fire-induced cable failure modes with significant probability of occurrence is bounded by the effects of open circuit failures which would lead to the loss of the related component function. As such, loss of component functions is typically modeled as the impact of fire damage. However, impacts more severe than the loss of component function were also identified and modeled. For example, stuck-open Safety Relief Valve (SRV) caused by fire damage to control cables was modeled in the Hatch IPEEE fire analysis for a number of fire scenarios. Due to the number of SRVs available for the vessel pressure relief function, open circuit failures which would cause the loss of relief function for a subset of the SRVs have less severe impact on risk compared to hot-shorts leading to a stuck open SRV.