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## ENCLOSURE

### RESPONSE TO IE INFORMATION NOTICE 79-22

#### Introduction

TVA has performed a systematic (matrix) evaluation of the environmental effects resulting from high energy pipe breaks inside and outside containment upon nonsafety-related systems. Specifically, safety features required to mitigate the consequences of high energy pipe break and those required to obtain and maintain a safe shutdown following such an event were evaluated to determine if a single inappropriate actuation of an interfacing nonsafety-related system could unacceptably affect the required safety feature. TVA's conclusion is that although there is a possibility for disruptive signals to be generated, these are in every case acceptable because the operator will always have sufficient indication and time to take corrective action. Where appropriate, operating instructions have been modified as an additional precaution to preclude the event or to alert the operator to the possibility of the event.

#### Methodology

The following approach was used in analyzing the potential for disruption of required safety features by the consequential inappropriate actuation of interfacing nonsafety systems.

1. Required safety features for LOCA, main steam and feedwater, and other postulated high energy pipe rupture events were identified from the appropriate safe shutdown logic diagram. These required features were screened against a list of plant systems to determine if, functionally, sufficient interface existed between the required feature and the system to merit further evaluation. That is, without regard for the credibility of the event a single spurious actuation was postulated to occur anywhere within the system under consideration. As this spurious actuation was postulated, the question was asked, is there sufficient interfact between the system and the required safety feature so that functionally there is potential for an unacceptable condition to exist. (See figure one, screening matrix.)
2. All cases identified as potentially unacceptable in step one were subjected to an individual evaluation for credibility and acceptability. All nontrivial cases are discussed in the results.

#### Results

##### RCS Inventory and Pressure Control

The pressurizer PORV's might be subject to inappropriate opening due to environmental effects which could exist from high energy pipe breaks inside containment. Such inappropriate opening has been judged to be acceptable because (1) adequate annunciation is provided to alert the operator to the

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Plant System	Required Safety Feature							
	RCS Inventory and Pressure Control	SG Inventory and Pressure Control	ECCS Response	Reactivity Control	Long Term Heat Removal	Contain. Isol.	Control Rm. & Aux. Habitab. (HVAC)	EGTS Response
main and Reheat Steam		X						
extraction Steam		X						
main and Auxiliary Feedwater		X						
condensate		X						
water Drains and Vents								
chemical and Volume Control	X		X					
residual Heat Removal			X	X				
safety Injection			X					
ice Condenser Refrigeration								
auxiliary Boiler								
tube Oil								
primary Water								
chemical Cleaning								
radiation Waste Disposal			X					
condenser Circulating Water								
raw Water								
potable Water								
fuel Oil						X		
land Seal								
insulating Oil								
carbon Dioxide								
essential Raw Cooling Water	X		X			X	X	
service Air								
control Air								
hydrogen								
fire Protection								
station Drainage								
fuel Pool Cooling and Cleaning						X		
demineralized Water								
condenser Tube Cleaning								
component Cooling Water								
sampling								
heating, Ventilating, and Air-Conditioning								
							X	

Figure One - Screening Matrix - Systems marked "X" functionally have the potential to interact with required safety features. These systems have been further evaluated to determine the existence of unacceptable environmentally-induced control system actuations.

event, (2) adequate time is available for operator action, and (3) the control system design is such that operator action is possible.

RCS inventory and pressure control could also be jeopardized by inappropriate control circuit actuations which would lead to a reactor coolant pump (RCP) seal failure. Control system modifications have been made to both the component cooling water system, which supplies cooling to the pumps thermal barrier and to the chemical and volume control system (CVCS), which supplies seal injection water to assure seal integrity in the presence of fire-induced spurious control system actuations. In that these modifications would also render the seals immune to damage due to pipe break induced inappropriate actuations, this feature was judged to be assured without further evaluation.

#### Steam Generator Inventory and Pressure Control

The control system for the SG power operated relief valves (PORV's) could be affected by high energy pipe breaks in the main steam valve room. This inappropriate opening is considered to be acceptable because (1) adequate annunciation is provided to alert the operator to the event, (2) adequate time is available for operator action, and (3) the control system design assures that the operator can override the inappropriate open signal.

An inappropriate opening of a main steam isolation valve bypass valve would defeat steam generator isolation. The potential for this event has been identified and resolved during the Sequoyah Nuclear Plant fire evaluation by requiring the operator to deenergize the control circuit to these valves once they are closed during plant startup.

#### ECCS Response

An inappropriate actuation of the reactor building auxiliary flow and equipment drain sump pump could jeopardize long term ECCS response by pumping water out of the ECCS active sump. This actuation is considered to be acceptable because (1) adequate indication is provided to alert the operator to the event, (2) adequate time is available for operator action, and (3) control system design is such that operator action is possible.

A number of other control circuits whose inappropriate actuation has the potential to disrupt ECCS response have been modified or deenergized in compliance with FSAR Question 7.51. In that this action would also prevent environmentally induced inappropriate actuations, these control systems were not evaluated further.

#### Other Safety Features

Inappropriate control system actuations within the essential raw cooling water (ERCW) system has the potential to disrupt a number of required

Safety features. This system had been previously evaluated for unacceptable fire-induced inappropriate actuation. A number of cases were discovered where an inappropriate actuation would cause unacceptable load imbalance within the system. The modifications taken to preclude such fire-induced actuations would also make the control systems immune to pipe break environmental effects. Hence, the system was considered to be acceptable without further evaluation.

#### Additional Considerations

The study thus far has considered the system being evaluated as a target in the zone of influence of the postulated high energy pipe break. There are two cases where this evaluation has made use of previous efforts to control the zone of influence of the postulated event. The events, which are identified in the SQN pipe break analysis, are a RHR break in the 690 ft. el. of the auxiliary building, and a break along the route of the auxiliary boiler steam line in the auxiliary building. Trainized temperature sensors have been provided to alert the operator of an adverse environment within the RHR pipe chase. Similarly trainized temperature switches (9 per train) have been located along the route of the auxiliary boiler steam line. These switches will automatically terminate steam flow via two series isolation valves.

#### Conclusion

The conclusion of this evaluation is that a safe shutdown can be achieved at SQN even if a postulated accident is compounded by environmentally induced inappropriate control system actuation.

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## Figure One - Screening Matrix

Systems marked "X" functionally have the potential to interact with required safety features. These systems have been further evaluated to determine the existence of unacceptable environmentally-induced control system actuations.

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