TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

December 2, 1982

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

In response to item 4 of your letter to H. G. Parris dated November 12, 1982, enclosed is additional information on items associated with the Sequoyah fire protection program.

If you have any questions concerning this matter, please get in touch with Charlie Mills at FTS 858-2694.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 2nd day of Dec 1982

Paulette F. White
Notary Public
My Commission Expires 9-5-84

Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

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4. In many instances, one control/actuation signal will cause the actuation of several functional components. Verify that the depressurization of the primary side via interfacing system will not occur due to the actuation of system components resulting from the fire induced generation of spurious signals from associated circuitry. Your discussion should include the means of preventing RHR isolation valve actuation, uncontrolled letdown, pressurizer PORV actuation, or operation of any valve or component which would prevent the system(s) from performing its functional objectives.

TVA Response

The following discussions identify potential depressurization paths and address how each path is protected from fire generated spurious signals.

I. Reactor Vessel Head Vent System Letdown

The reactor vessel head vent systems (RVHVS) may become a RCS leakage path in the event of undesirable actuations of system components resulting from the fire-induced generation of spurious signals from associated circuitry. This path is blocked by normally-closed solenoid valves. However, if the valves were to spuriously open, due to the postulated fire, a 3/8-inch flow restrictor in the system piping would limit the flow to within the charging capability of the chemical volume control system (CVCS) see FSAR Section 15.3.1.1. In the long term, flow may be terminated through the RVHVS by manually removing power from the valve solenoids. This action can be accomplished from outside containment.

CVCS charging is assured if either the positive displacement charging pump or one of the redundant centrifugal charging pumps and the associated charging flow control valve, FCV-62-93 is available to allow flow to the RCS. Protective measures to assure these functions in the event of fire are discussed in TVA's response to NRC ASB question 1 (see RCS inventory control discussion) submitted to the NRC by letter from L. M. Mills to L. S. Rubenstein dated October 23, 1979.

Hence, TVA is taking credit for the CVCS charging units to be available for making up the loss of reactor coolant by the RVHVS. Thus, depressurization of the RCS would not occur.

II. RHR Letdown Path

The RHR letdown line has motor-operated flow control valves FCV-74-1 and FCV-74-2 arranged in series. If both of these isolation valves were to spuriously open due to signals produced by the postulated fire at power operations, the RCS could depressurize through the RHR system.

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TVA's operating instructions and 20-foot separation criteria for the circuits of these isolation valves will prevent this path from depressurizing the RCS. When the plant starts up from a shutdown condition, existing procedures call for the operator to close FCV-74-1 and FCV-74-2. The operator will then open the circuit breaker located between the motor starter and the valve motor 480 volt circuit. This breaker will be locked in the open position with a pad lock at any time the unit is operating at power. The circuit breaker will not be reclosed until the RHR system is required for use. Therefore, during times when the RHR system is not to be used, the valves will be protected against spurious actuations in the control circuit, motor control station, junction box, 480V supply and the manual control switches in the MCR or ACR.

Also the power cables to the isolation valves meet the 20 feet separation criteria for their routing between the locked-out circuit breakers and the valve motors. Consequently, both valves cannot be affected by any single fire event.

Therefore, it is not credible to assume depressurization of the RCS by this path.

III. RCS Letdown Paths

The RCS normal and excess letdown paths potentially could become depressurization paths due to undesirable openings of various combinations of letdown valves resulting from fire-induced generation of spurious signals in associated circuitry. Flow within each letdown path is regulated by a series of air-operated flow control valves. An investigation was implemented to determine if RCS depressurization could occur within either or both letdown paths by a single fire. The investigation indicated areas do exist where combinations of letdown valves may be affected by the postulated fire resulting in reactor coolant loss through one letdown path.

TVA considers that it is very unlikely for multiple spurious valve openings to occur in these paths as a result of fire-induced shorts. In the circuit for any particular valve there are two or three possible single shorts that would cause the valve to open, whereas there are at least twice as many possible single shorts that would disable the circuit regardless of any other shorts and very many other single shorts that do nothing. Considering the relatively small number of single shorts and combinations of shorts that cause valve opening in relation to the relatively large number of single shorts and combinations of shorts that prevent valve opening, it is unlikely that any particular valve will spuriously open and even less likely for a particular group of fail-closed type of valves to all spuriously open due to a common fire. In reference to particular

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possible depressurization paths, either the normal RCS or excess letdown path must have at least three separate valves to be opened simultaneously. It is therefore very unlikely that either of these RCS letdown paths will become open due to fire-caused spurious actuations.

However, should this unlikely event occur, adequate RCS makeup will be available. A single fire cannot cause the loss of RCS makeup (using the CVCS centrifugal charging pumps) and spuriously open a RCS letdown path. The charging of one centrifugal charging pump (CCP) is capable of limiting RCS depressurization for one open letdown path. (Neither letdown path, in the worst case, will pass more than about 200 gpm; from FSAR Figure 15.2-41, one CCP will maintain the RCS near normal pressure for this flow rate.) Additional makeup capability will be provided by the redundant centrifugal charging pump or the CVCS positive displacement pump. A discussion with regard to RCS makeup, RWST suction, and ECCS charging paths has been provided in the SQN safe shutdown submittal dated October 1, 1981. In the longer term, flow may be terminated in the letdown paths following manual actions by the operators.

Therefore, it is not credible for significant RCS depressurization to occur through the letdown paths.

IV. RCP Seal Integrity

In the event of loss of RCP seal cooling, rupture of the seals could occur and result in depressurization of the RCS through the seals. Maintaining the RCP seal's integrity is identified as a necessary function on the fire shutdown logic diagram (FSLD). Therefore, TVA is assuring that the RCP seal's integrity will be maintained by way of the chemical volume control system (CVCS) or the component cooling water system (CCS) as described below.

RCP seal integrity is maintained by the CVCS if either the positive displacement charging pump or one of the redundant centrifugal charging pumps and the associated charging flow control valve, FCV-62-93 is available to provide coolant to the seals. This arrangement will assure adequate coolant to the seals during normal operations. A discussion of CVCS seal cooling is provided in TVA response to NRC ASB Question 1 - submitted to the NRC by letter from L. M. Mills to R. S. Rubenstein dated October 23, 1979.

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An alternate method of maintaining the RCP seal's integrity can be accomplished by providing coolant to the RCP thermal barriers with the CCS. The CCS supplies coolant to the RCP's thermal barriers during normal operation with the redundant set of thermal barrier booster pumps. Each booster pump is capable of supplying adequate flow to the RCP thermal barriers to maintain the integrity of the seals. A discussion of RCP thermal barrier cooling is provided in TVA's response to NRC ASB Question 1.

The components and their associated circuitry for the CVCS and CCS seal cooling paths discussed above, are located in the plant in a manner which will prevent one fire from terminating the function of both RCP seal cooling paths. Consequently, it is not credible to lose RCP seal cooling due to the postulated fire, thus preventing RCS depressurization by this path.

Note: The CVCS's and CCS's RCP seal cooling subsystems both function during normal operations of the plant.

V. Pressurizer Relief Paths

The pressurizer power-operated relief valves (PORVs) potentially could open RCS depressurization paths in the event of undesirable opening of these components resulting from fire-induced generation of spurious signals in associated circuitry. The pressurizer has two parallel, power-operated relief paths. Each path has a normally closed, PORV and an upstream, normally open flow control valve (FCV). Should a PORV open due to the effects of a fire, the operator can terminate the event if either valve in the path is capable of being closed.

An investigation was implemented to determine if the controls and wiring for the valves in each relief path comply with the 20-foot fire separation criteria. Unacceptable interactions were found to exist between the PORV and FCV in each letdown path. TVA will correct this condition by rerouting the portions of wiring that do not comply to the 20-foot separation criteria, so no fire affecting this path will be capable of causing a RCS depressurization which cannot be isolated.