

ENCLOSURE
SAFETY EVALUATION
WOLF CREEK GENERATING STATION
DOCKET NO. 50-482
RHRS LTOPS MODIFICATION

Introduction

The staff has imposed the following license conditions on the owner of the Wolf Creek nuclear plant, the Kansas Gas & Electric (KG&E) Company:

13) Low Temperature Overpressure Protection (Section 15 SSER #3)

By June 1, 1985, KG&E shall submit for NRC review and approval a description of equipment modifications to the residual heat removal system (RHRS) suction isolation valves and to closure circuitry which conform to the applicable staff requirements (SRP 5.2.2). Within one year of receiving NRC approval of the modifications, KG&E shall have the approved modifications installed. Alternately, by June 1, 1985, KG&E shall provide acceptable justifications for reliance on administrative means alone to meet the staff's RHRS isolation requirements; or otherwise, propose changes to Appendix A to this license which remove reliance on the RHRS as a means of low temperature overpressure protection.

To resolve the above license condition, KG&E submitted for staff review certain system and procedural modifications by a letter from G. L. Koester, KG&E Company to H. R. Denton, NRC, dated May 22, 1985. These modifications are described and evaluated below.

Evaluation

For the low temperature overpressure protection (LTOP) of the Reactor Coolant System (RCS), the plant relies on either two power operated relief valves (PORVs) or two residual heat removal (RHR) suction relief valves. The RHR relief valves are located at the suction of the RHR pumps downstream of the RHR suction valves. The two RHR pumps take suction separately from the RCS via two motor operated valves (MOV) in series (see attached schematic). The MOVs closest to pumps A and B are 8701A and 8701B respectively. The MOVs closest to the RCS are 8702A and 8702B. Both MOVs 8701A and B receive their auto close interlock signal from a single pressure transmitter, while the other two MOVs 8702 A and B receive their signal from another pressure transmitter.

The Wolf Creek Technical Specifications (TS) restrict plant operation when the reactor coolant is 368°F or colder, such that no more than one centrifugal charging pump may inadvertently start, and such that an idle reactor coolant pump may not be started if the steam generator water temperature is more than 50°F hotter than that of the reactor coolant.

When the LTOP protection to the plant is provided by the RHR suction relief valves, all four RHR suction MOVs are opened to provide the required redundancy of the pressure relieving capacity. However, a single failure in one pressure transmitter could actuate the auto close interlock, thus isolating both RHR trains, causing an overpressure event by the loss of the letdown flow, and defeating the LTOP protection. To eliminate this single failure and render the LTOP a single-failure-proof system KG&E proposes the following.

On decreasing RCS temperature and pressure to the RHRS entry conditions, when relying on RHRS for LTOP protection, the licensee proposes to open the four suction MOVs, then remove and lock out the power to MOVs 8702 A and 8701 B. Valve opening and power removal are specified in the plant's Technical Specifications.

Removing power to these two valves (defeating the interlocks) not only protects the RCS from single failure causing isolation of both RHRS suction relief valves (loss of LTOPS), but also provides protection for both RHR pumps, when in operation, from a loss of suction due to a single pressure transmitter failure. Inadvertent isolation of the RHR suction valves has been a concern at other plants and has resulted in damage to a RHR pump.

On increasing pressure and temperature in addition to the normal RHRS isolation procedures, KG&E proposes to add the following:

- (a) Administrative procedures to verify that power is restored to valves 8702A and 8701B and the valves are closed prior to exceeding the RHRS suction relief setpoint (this administrative procedure has already been implemented at the plant).
- (b) Add an alarm circuit to the valves with the power locking feature, namely 8702A and 8701B, such that if any of these valves are open or do not have power available and the interlock activation setpoint is reached, the alarm would initiate on the main control board. If

the alarm initiates an annunciator alarm response, procedure would require closing or verifying closure of the affected RHR suction isolation valves.

The existing auto close interlock has no visual indication in the control room (other than valve position indication). Therefore, if a signal is generated to close the valve and the valve fails to close, the operator would not be alerted. With the addition of the proposed alarm circuit, if the valve is open or if power is not available and the pressure setpoint is reached, an alarm is generated in the control room giving the operator positive indication. Therefore, protection is afforded if the operator fails to restore power or if the interlock actuates and the valve fails to close. Additionally, alarm response procedures would provide positive operator actions.

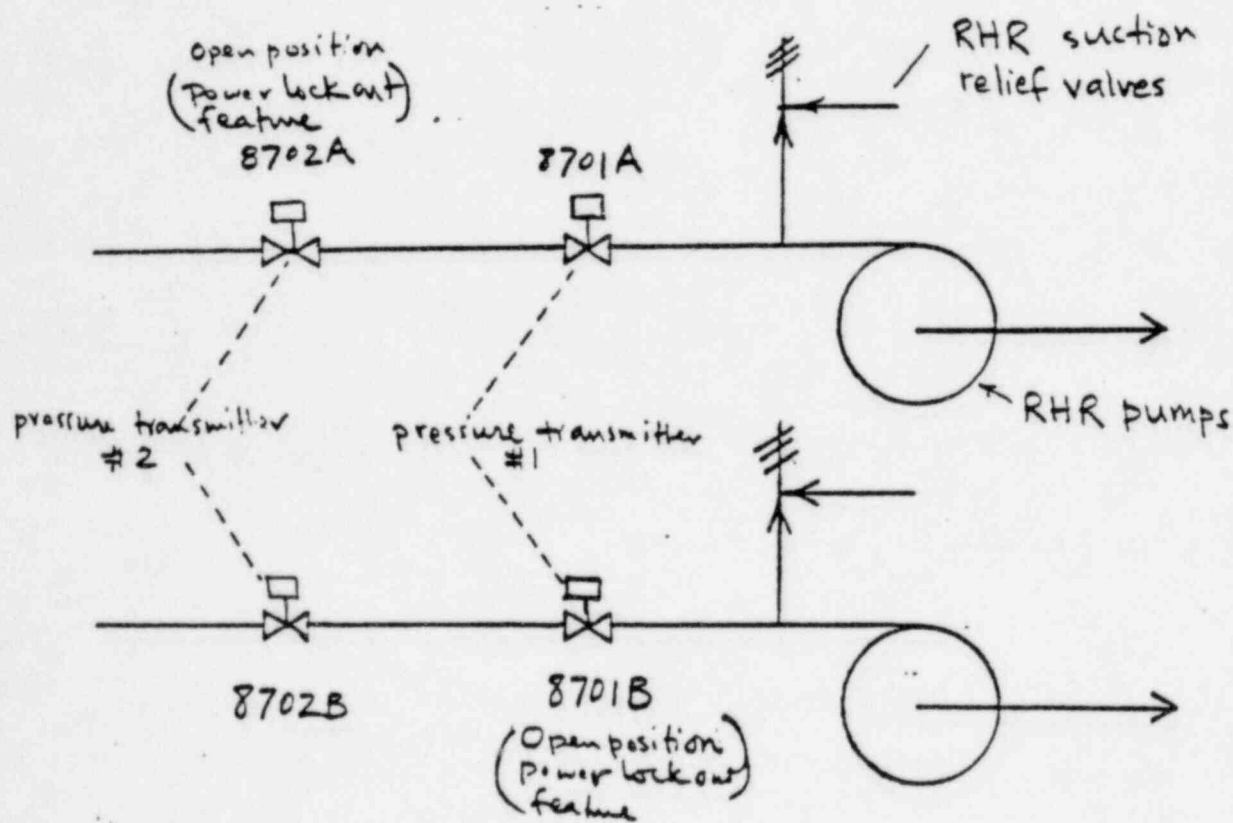
On increasing pressure and temperature, if both series suction MOVs in one or more RHR trains were inadvertently left open, it would be difficult to continue pressurization. Furthermore, it would be highly unlikely for such a situation to go undetected during a normal startup due to indications such as relief valves lifting, pressurizer relief tank level, and pressure and temperature alarms. These indications would alert the operator to take action to rectify the situation. If the reactor system pressure rises to the interlock setpoint despite the relief valve lifting, the operator would be alerted by an alarm.

If only one suction MOV is inadvertently left open while the other series MOV is closed, then when the reactor system pressure rises to the interlock set-point the open valves would be closed by the auto-close interlock and an alarm would sound in the control room.

With respect to the ability to isolate the RHR system, should there be a break in the RHR system or a stuck open safety valve, it should be noted that one valve in each flowpath will have power available. Therefore, the operators will retain the ability to isolate the system should the need arise.

Conclusion

The staff has reviewed the licensee's proposed system and procedural modifications to the Wolf Creek LTOP system and has reviewed the plant's Technical Specifications and concludes that in light of the plant's TS these modifications are acceptable and that the LTOP reliance on the RHRS suction relief valves meets the intent of the Standard Review Plan sections 5.2.2 and 5.4.7 and their associated Branch Technical Positions 5-2 and 5-1 respectively. Therefore, we conclude that the requirements of License Condition (13) have been met.



Schematic
RHR Suction Relief Valves