DAVIS BESSE UNIT NO. 1

Safety Evaluation of Pressurizer Heater Interlocks
and Power Removal to DHR Valves

In a meeting with the staff on February 17, 1977, the applicant proposed to lock out power to the decay heat removal system valves DH-11 and -12 while in the DHR mode of operation. The purpose for locking out power to the DHR valves was to reduce the likelihood of inadvertent closure of either DHR isolation valve during DHR operation and not compromise the residual heat removal capability. Secondly, with the DHR valves open and power removed to them, the safety valve located in the DHR suction line would provide overpressure protection for the reactor coolant and DHR systems.

We previously rejected this proposal because, by removing power to the DHR isolation valves, the automatic closure feature of these valves on high reactor coolant system pressure (above 280 psig) would be compromised. This occurs since a failure to restore power to one or both valves would not allow the automatic closure of the valve(s). Branch Technical Position EICSB-3 and Section 5.4.7 of the USNRC Standard Review Plan require an automatic closure of these valves on high primary system pressure.

In April 1977 the applicant submitted a revised proposal describing a pressurizer heater interlock design and responses to staff questions on locking out power to the DHR isolation valves and overpressure protection. The applicant's proposed interlock design would trip off the pressurizer heaters whenever the primary system pressure would exceed 280 psig and one, or both, DHR isolation valves (DH-11 and -12) are not fully closed. The automatic closure feature of the DHR isolation valves on high reactor coolant system pressure would be maintained when electrical power is restored to these valves.

The addition of the pressurizer heater interlock design will allow removal of power on the DHR isolation valves during the decay heat removal mode of operation. This feature will preclude the reactor going to full power in

the heatup mode whenever one or both valves are not properly closed. Also, the pressurizer heater trip interlock logic is redundant. We find the above proposed design to be acceptable.

With regard to the automatic closure of the valves, independent and diverse controls are provided to automatically close the valves when the reactor coolant system pressure is above 280 psig. This design has been accepted in the past and remains unchanged. Thus, with power restored to the DHR isolation valves the interface criteria of having two valves in series to separate the high pressure from the low pressure boundary will be met.

As stated previously, the removal of power from the DHR isolation valves during shutdown cooling allows credit for a protection device not vulnerable to a single active component failure (RHR safety valve) and which could accommodate an inadvertent overpressure transient. The safety valve has been sized for the pressure surge resulting from actuation of two HPI pumps. The safety valve set point pressure is 320 psig. Also, the applicant has stated that this safety valve will be tested to assure operability and proper set pressure during each refueling outage. (Our preference would be for setpoint testing of this safety valve as installed in lieu of a bench test.) We have reviewed the applicant's evaluation of pressure transients and based on these analyses, conclude that an inadvertent actuation of the HPI pump would cause the worst credible pressure transient conditions while the reactor is starting up or shutting down and, therefore, conclude that the applicant's sizing requirements are conservative.

The pressure transients have been evaluated for the cases of having power removed and restored to the DHR isolation valves. Water-solid conditions were not assumed because a nitrogen blanket or a steam bubble is to be maintained in the pressurizer during cold conditions. The applicant has shown that the reactor coolant system pressure for reactor coolant temperatures greater than 280^{o}F will not exceed the Appendix G limit (effective for the first five full power reactor years) following an overpressure event with the DHR isolation valves in a closed position. For the case of having the DHR isolation valves in an open position, and power removed, the integrity of the decay heat removal system following an overpressure event will be maintained by the DHR safety valve.

Since the pressure-temperature limit curves have been proposed for only the first five full power reactor years, the adequacy of the overpressure protection during shutdown conditions must be reevaluated at the end of five full power years.

We note that removal and restoration of electric power to valves DH-11 and DH-12 will be accomplished from a breaker at the motor control center outside the control room. It is our judgment that this action be performed from the control room. Accordingly, we require that this capability be incorporated prior to second cycle operation. We conclude that the pressurizer heater interlock design is acceptable for installation in the Davis Besse Nuclear Power Station Unit No. 1, and that removal of power to valves DH-11 and DH-12 while in the decay heat removal mode is a permissible procedure to reduce the likelihood of inadvertent valve closure.

In addition, the staff concludes that sufficient administrative controls exist to minimize the likelihood of an overpressure event.