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February 28, 1986

Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
NUREG-0737 Item II.K.3.28
Qualification of ADS Accumulators
NRC Docket Nos. 50-237/249 and 50-254/265

Dear Mr. Denton:

This letter is provided in response to questions raised during telecons with Roby Bevan of your staff regarding closure of the subject TMI item. We were requested to provide additional information supporting our previous position that the Automatic Depressurization Systems (ADS) at Dresden and Quad Cities are acceptable in terms of Item II.K.3.28 requirements. Specifically, we were requested to address scenarios where ADS operation would be required, the necessary duration of ADS operability and other systems available to control reactor pressure and level including reactor depressurization.

The attachment to this letter summarizes the environmental qualification of the ADS valves and describes the scenario whereby ADS valves would be required to function under harsh environmental conditions. Only scenarios involving coolant or steam release to the primary containment are addressed since other events would not produce the harsh or hostile environment relevant to Item II.K.3.28. In addition to establishing that the existing qualification of the ADS valves is adequate, the attachment identifies alternate systems available for pressure and level control and describes provisions of the Emergency Operating Procedures (EOP's) in this area. The information regarding the EOP's is provided only to illustrate the available pressure and level control alternatives and the manner in which they are invoked. These procedures, as with all other procedures, are subject to future changes.

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We believe the attached information in conjunction with our previous submittals, should be sufficient to close this issue for Dresden and Quad Cities.

One signed original and five (5) copies of this letter and the attachment are provided for your use.

If there are any further questions regarding this matter, please contact this office.

Very truly yours,

J. R. Wojnarowski
Nuclear Licensing Administrator

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Attachment

cc: R. Bevan - NRR
R. Gilbert - NRR
Dresden Resident Inspector
Quad Cities Resident Inspector

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ATTACHMENT

References: (a) D.L. Peoples letter to J.G. Keppler dated January 18, 1980

(b) D.L. Peoples letter to J.G. Keppler dated January 25, 1980

The purpose of the Automatic Depressurization System (ADS) is to backup the High Pressure Coolant Injection System (HPCI) and depressurize the vessel for small breaks, where the break size is not large enough to depressurize the reactor. The system consists of four electromatic relief valves and one Target Rock Safety Relief valve, which relieve vessel pressure to the torus via discharge piping. The electromatic relief valve and Target Rock safety valve solenoids have been environmentally qualified in accordance with reports DCN-6035-426 and CQD 15003 respectively. The qualification of the Target Rock safety relief valve accumulator has been addressed in the above references.

The valve actuators are qualified for 10 hours with a peak temperature of 340°F, 76.7 psia in an environment of 100% relative humidity and 5.0 E07 rads TID. These environmental parameters are based on the worst case LOCA event which would produce high containment temperature and pressure. The qualification of the ADS valve actuators is conservatively based on this higher temperature also.

Relevant events to be considered in assessing the adequacy of the ADS qualification are limited to small break scenarios inside primary containment. Large break LOCA's do not require ADS actuation and breaks outside the drywell will not result in a harsh environment in the vicinity of the ADS valves. A worst case LOCA would produce temperatures of 340°F in containment, where small breaks of .01 ft^2 would produce peak temperatures of 280°F in containment.

With a small break inside the drywell, the operator will detect an increase in drywell pressure and drywell temperature. The station operating abnormal procedures state that drywell pressure will increase .03 psig for a 2 gpm leak and 1°F for a 2 gpm increase. The drywell environmental parameters are readily available to the operator through the use of his panel indicators, computer, and back panel meters. Annunciators will indicate the elevated temperature and pressure in the drywell above the normal operating conditions. In addition, an increase in the frequency of pumping of the drywell floor drain sumps will be detected by the operator. Coolant leakage monitoring requirements are specified in section 3.6 of the Technical Specifications and require shutdown of the reactor if excessive unidentified leakage is observed. The variety of instrumentation available to the operator as described above provides for early detection of a potential pipe break and subsequent reactor shutdown.

As drywell pressure increases to +2 psig the Reactor Protection System will automatically scram the reactor. The +2 psig drywell pressure is an entry condition into the Emergency Operating Procedures. The operator is provided with the following precaution regarding the use of the EOP's "If an entry condition for a EOP occurs, enter that EOP irrespective of whether that EOP has been or is presently being executed. When it is determined that an emergency no longer exists, enter the applicable operating procedure." For a small break scenario, the operator would enter the procedures for Reactor level control and Reactor pressure control simultaneously. These procedures are provided as follows:

RPV Pressure Control

1. Monitor RPV pressure

2. Verify that no ADS valve is cycling

3. Verify torus temperature and level is within limits to assure stable steam condensation for an ADS blowdown

4. Verify adequate core cooling

5. Control RPV pressure with the turbine bypass valves

Note: If AC power is available, reactor level will be controlled by the feedwater level control system through the use of the reactor feed pumps.

If AC power is not available, the operator is directed to the Reactor level Control procedure (see following page) to stabilize level between +8 and +40 inches.

6. If bypass valves are not available, control pressure with one or more of the following systems:

   - Isolation Condenser or RCIC (Quad Cities)
   - HPCI
   - ADS valves if Torus level is above the top of the T-quenchers
   - IF MSIV's are open leave auxiliary steam loads in service: SJAE, Gland Seal Steam, Max REcycle Reboiler, etc.
   - RWCU (Recirculation Mode), only if boron has not been injected into the RPV
   - Main steam line drains
   - RWCU (Blowdown Mode), only if boron has not been injected into the RPV

7. Once pressure is being controlled and the Reactor is shutdown, the operator continues to depressurize and cooldown the Reactor at the rate of 100F/hr.

8. When Reactor temperature is below 350°F, the shutdown cooling system is used for additional cooldown to cold shutdown condition.-

Reactor Level Control

1. Monitor reactor water level

2. Confirm automatic initiation of any of the following:

   - MSIV isolation
   - Group 2 through 5 isolations
   - High Pressure Coolant Injection
   - Core Spray
   - Low Pressure Coolant Injection (Residual Heat Removal)
   - Diesel Generators

3. Restore and Maintain Water Level using One or More of the Following Systems:

   - reactor feed pumps
   - control rod drive pumps
   - high pressure coolant injection
   - condensate pumps
   - core spray
   - low pressure coolant injection (Residual Heat Removal)
   - RCIC (Quad Cities Only)
   - Safe shutdown pump (Quad Cities only)

4. Maintain RPV water level above the top of the active fuel.

5. If RPV water level can be maintained above the top of the active fuel then prevent actuation of the ADS valves.

6. Continue efforts to restore RPV water level between +8 and +40.

The operators response time to the event is minimal. Following the scram and the operators immediate actions following the scram, the operator will monitor the reactor parameters of level, pressure, and power. Power will be under control due to insertion of the control rods while reactor pressure and level will be controlled by following the steps of the above procedures. According to the reactor pressure control procedure, steps 1 through 4 require no operator action except to monitor his indications. At step 5, the operator will verify whether the condenser is still available as a heat sink. This is to confirm whether he may use the turbine bypass valves. If a group I isolation has occurred and the condenser is not available due to closure of the mainsteam isolation valves, the operator then proceeds through step 7 with a cooldown rate of 100°F/hr and when temperature decreases to less than 350°F, the shutdown cooling system would be used. The reactor level control procedure directs the operator to use the systems available to him for level control. Level control will be performed simultaneously with the steps of the RPV pressure control procedure.

With the initial reactor conditions of 1000 psig and 550°F, the scenario would require availability of the ADS valves for approximately 3 hours. The majority of this time would be used in step 7 of the RPV Pressure Control Procedure with the ADS valves open. Should the operator cooldown at a faster rate, the ADS valves required operability time would be much shorter.

The present qualification of the electromatic relief valves more than envelopes the small break conditions which the valve actuators would be exposed to during the above scenario. The electromatic relief valves are qualified for a worst case LOCA condition which produces the harsh temperature and pressure conditions in the drywell. The above scenario outlines the operator steps to cooldown the reactor from a high pressure situation with HPCI and Isolation Condenser (RCIC) unavailable. In the unlikely event that this scenario would be extended for a longer period of time, the peak temperature conditions of 280°F for a small break are much less than 340°F temperature at which the valve actuators are qualified for 10 hours. Using the Arrhenius Methodology, it could be shown that the ADS valves are qualified for a longer time period at the lower temperature conditions.

Based on the above discussion, it was shown that the ADS valves required operating time is enveloped by the qualified life, as shown in the environmental qualification report.

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