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Docket No. 50-346

MEMORANDUM FOR: D. B. Vassallo, Assistant Director for LWRs, DPM

THRU: T. M. Novak, Chief, Reactor Systems Branch, DSS

FROM: G. R. Mazetis, Section Leader, Reactor Systems Branch, DSS

SUBJECT: DAVIS BESSE UNIT NO. 1 OVERPRESSURE PROTECTION

Plant Name:	Davis Besse Unit No. 1
Docket Number:	50-346
Licensing Stage:	OL
Responsible Branch and Project Manager:	LWR-1 L. Engle
Systems Safety Branch Involved:	Reactor Systems Branch
Review Status:	Additional Information Requested

Enclosure 1 contains a review of the proposed solutions to the over-pressurization issue. The applicant must provide additional information before the staff can resolve this issue.

In addition, enclosure 2 presents the staff position on the applicant's proposal to remove power from the DHR isolation valves during DHR operation.

Original signed by:

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Enclosures:
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ENCLOSURE 1

REVIEW OF OVERPRESSURIZATION FOR DAVIS BESSE UNIT NO. 1

Summary

The applicant submitted a proposal in a letter dated December 7, 1976 on the matter of overpressurization of the reactor vessel during a startup or shutdown. The basic proposal is that a relief valve in the RHR suction line is to be provided for protection against the worst-case postulated overpressure event for the first five years of operation.

The staff does not accept the removal of power from the DHR suction line valves during shutdown and startup operation (see Enclosure 2). Therefore, the DHR relief valve may not be available to provide protection for the Appendix G limits in the station Technical Specifications. Accordingly, the applicant must submit an alternate proposal to preclude exceeding Appendix G limits.

During the interim, the applicant must provide assurance that sufficient administrative controls will be employed to minimize the likelihood of overpressure events. The applicant must submit additional information before the staff can resolve this issue.

INTERIM SOLUTION

(First fuel cycle)

1. Describe all design and operational features or procedures for Davis Besse Unit No. 1 that will minimize the likelihood of violating 10 CFR Part 50, Appendix G limits. Your letter to NRC, dated December 7, 1976, did not adequately address such procedures.

2. Provide assurance that the startup of a reactor coolant pump will not cause an Appendix G violation by virtue of circulating cold water into the secondary system (steam generator) and increasing temperature with a resultant significant change in pressure. What administrative procedures are employed to prevent inadvertent reactor coolant pump startup? What are the consequences of an inadvertent reactor coolant pump startup?

3. Discuss how the safety features actuation system (SFAS) precludes single spurious signals or operator error from initiating high pressure injection (HPI) pumps.

4. Provide the basis for the initial temperature of 280°F and the initial pressure of 235 psig assumptions used in the inadvertent HPI startup transient.

5. How sensitive is the pressure excursion event to the assumption that the DHR pumps are operating?

6. The staff considers it essential that all plant operators be made aware of the details of the overpressure events which have taken place at all facilities. Formal discussions should be held to review the causes of past overpressure transients, the plant conditions at the time, the mitigating action that could have been or was taken, and the preventive measures that could have been taken to avoid the event and the steps taken to prevent similar further occurrences. Identifying plant similarities and distinctions, and discussing how these relate to plant startup, shutdown, and testing operations are also necessary. Provide a schedule for conducting the above discussions.

7. (a) Provide a pressure-temperature diagram for the primary system indicating:

   -- Cut-in point of DHR system (operator action)

   -- Isolation point of DHR system (operator action)

   -- Cut-in point of RC pumps

   -- Shut-off point of RC pumps

   -- Setpoint of RHR relief valve

   -- Automatic isolation setpoint of DHR

   -- Isolation of core flooding tanks

   -- Isolation of ECCS

   -- Initiation of nitrogen bubble in the pressurizer

   -- Initiation of steam bubble in the pressurizer

   (b) Provide operator instructions relative to actuating and deactivating the RHR system and reactor coolant pumps.

8. (a) Provide the operator instructions for performing the isolation of the ECCS equipment.

   (b) Provide the operator instructions for activating the ECCS equipment.

   (c) Discuss the safety significance of having ECCS equipment locked-out of service during startup, cooldown, and refueling. Describe what alarms are available to alert the operator to an accident situation during this period. Discuss the time available to activate the ECCS if required.

   (d) Discuss the position indication and status signals which could be lost as a result of deenergizing of components. Discuss the safety impact as a result of losing this information.

9. Several Appendix G violations have occurred during component or systems tests while in cold or shutdown conditions.

   (a) What components or systems that could cause overpressure transients are routinely tested while in cold shutdown conditions?

   (b) What extra measures are taken to prevent an overpressure event during these tests?

10. The staff requires that a high pressure alarm be used during low reactor coolant system temperature operations to attract the operator's attention to a transient in progress. Although this would not be a mitigating device, the staff requires that it be installed. Provide the following information:

   (a) Your method to provide the alarm, and associated time schedule.

   (b) A synopsis of system modifications that are necessary.

   (c) The alarm setpoint, mode of annunciation, and sensor.

   (d) Your means to assure the alarms availability during cold shutdown conditions.

11. Reactor coolant systems (RCS) heatups, resulting from improper operation of the reactor coolant pumps while in cold shutdown and water-solid conditions have been responsible for a number of RCS overpressure events. Since Davis Besse Unit No. 1 does not intend to operate in the water-solid condition, provide an analysis to show what margin in time is gained by using the nitrogen blanket and steam bubble in the pressurizer during cold conditions. The staff will require that adequate procedures be used to prevent RCS pump starts during shutdown conditions unless necessary. In those cases where RCP starts cannot be avoided, appropriate steps should be taken to determine and minimize temperature differences between primary and secondary system.

   Provide the following information:

   (a) What are the temperature limits before the first RCP can be started in a cold RCS?

   (b) Specify the instruments used to determine the RCS temperature profile.

   (c) Provide the necessary schematics and procedural description that show your actions to bring the RCS to an isothermal condition.

   (d) Specify any other measures you take to reduce RCS pressure spikes during RCP starts (i.e., open all letdown orifice isolation valves, stop makeup flow, etc.).

12. To prevent an overpressurization incident due to CFT actuation, the applicant has noted that procedures will instruct the operator to close and remove power from the motor-operated isolation valve in each CFT. The staff notes that a further reduction in the likelihood of a CFT overpressure event would exist if the operator depressurized the CFT's to a pressure below the maximum allowed by the P-T limits. He would then close and remove power from the isolation valves. Discuss the feasibility of adopting such a procedure.

13. If any administrative control for overpressurization during a startup or shutdown presented above would compromise plant safety, discuss why and consider whether the procedure could be improved.

LONG-TERM SOLUTION

1. Submit an alternate proposal for modifications which will provide protection for overpressure transients during startup or shutdown. The long-term solution should satisfy the following requirements.

   (a) Credit of Operator Action - No credit can be taken for operator action until 10 minutes after the operator is aware that a pressure transient is in progress.

   (b) Single Failure Criteria - The pressure protection system should be designed to protect the vessel given a single failure that initiates the pressure transient. In this area, redundant or diverse pressure protection systems would be considered as meeting the single failure criteria.

   (c) Testability - The equipment design should include some provision for testing on a schedule consistent with the frequency that the system is used for pressure protection.

   (d) Seismic Design and IEEE 279 Criteria - Ideally, the pressure protection system should meet both seismic Category I and IEEE 279 criteria. The basic objective, however, is that the system should not be vulnerable to an event which both causes a pressure transient and causes a failure of equipment needed to terminate the transient.

2. The rationale for analyzing ECCS actuation, but excluding an analysis of CFT actuation, does not appear consistent. It would appear that bounding calculations for both events are warranted. Please clarify.

3. Include a discussion of makeup pump potential for causing overpressure events and the rationale for the contention that these high head pumps would not be worst-case.

ENCLOSURE 2

STAFF POSITION ON LOCKING OUT POWER TO DHR ISOLATION VALVES

The staff requested that the applicant provide information to show that the inadvertent closure of either DHR isolation valve during DHR operation would not compromise the heat removal capability. In response, the applicant proposes to remove power from both valves during DHR operation. This proposal is not acceptable since, by removing power to these valves, an automatic feature is removed which provides additional assurance that both isolation valves would be closed during power operation. Branch Technical Position EICSB-3 and Section 5.4.7 in the USNRC Standard Review Plan require that these valves receive a signal to close automatically whenever the primary system pressure reaches a high value. An option which could be considered is to raise the automatic closure setpoint of the DHR isolation valves above the setpoint of the relief valve to a value consistent with upset limits.

It is the staff's position that an alternate proposal to locking out power to DHR 11 and 12 be submitted with regard to the concern relating to inadvertent DHR isolation during shutdown. Such a proposal must assure that an inadvertent isolation would allow time for operator action to maintain the heat removal capability.