TOLEDO EDISON

RICHARD P. CROUSE
Vice President
Nuclear
(419) 259 5221

License No. NPF-3
Docket No. 50-346
Serial No. 969
August 2, 1983

Mr. John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Stolz:

This is in response to your letter dated June 1, 1983, requesting for the additional information on natural circulation cooldown. Attachment I provides Toledo Edison's response to your letter as relating to the Davis-Besse Nuclear Station Unit 1.

Very truly yours,

RPC:FRM:HA

cj a/10

cc:
DB-1 NRC Resident Inspector

A001
1/1

ATTACHMENT I TO TOLEDO EDISON LETTER TO THE NRC
ON NATURAL CIRCULATION COOLDOWN

Item 1: Provide a detailed description of your natural circulation cooldown procedure and its basis (it should include guidance on possibility, prevention and mitigation of upper head voiding and natural circulation interruption due to hot leg voiding).

Response: The present plant procedure (PP. 1102.10) for cooldown on natural circulation calls for a cooldown rate of the reactor coolant system (RCS) at approximately 20°F per hour. However, B&W has recently performed an analysis on reactor vessel (RV) head steam bubble formation on natural circulation cooldown with and without a continuous RV head vent (see B&W report sent to John F. Stolz on 4/15/83, serial No. 935). This analysis determined that the RCS could be cooled down at 1½°F/hr. without any RV head void formation and no head vent. This number is further backed up in Boman and Tally reports (referenced in your letter of June 1, 1983). However, the RCS can be cooled down at 22°F/hr. with the continuous RV head vent line proposed in our letter to John F. Stolz, dated 4/15/83.

Until the issue of the continuous head vent installation is resolved and except in the event of steam generator tube rupture, the maximum allowed cooldown rate during natural circulation in our procedure will be changed to less than 1½°F/hr. after the RCS has been depressurized to the saturation pressure that corresponds to the hot leg temperature prior to the tripping of reactor coolant pumps. In the event of steam generator tube rupture, the RCS cooldown rate (per existing emergency procedure EP 1202.57) will be much higher (maximum 100°F/hr.) until the RCS has been depressurized to approximately 1000 psig. At this cooldown rate a steam bubble would form in the RV head.

In addition, this procedure also requires:

a) to maintain at least 50°F subcooling margin at core outlet,
b) to periodically vent steam from the pressurizer as RCS temperature decreases to lower system pressure and
c) to monitor pressurizer level and makeup tank level

Further this procedure describes what operator actions are required if a steam void formation in the RV head occurs during natural circulation. These actions are:

1) Stop depressurizing and cooldown.
2) Increase makeup by starting the second makeup pump.

3) Monitor core outlet thermocouples. A constant core outlet temperature shows natural circulation heat removal is effective. Monitor subcooling margin. If subcooling margin is less than 50°F, initiate high pressure injection (HPI) until 50°F subcooling is attained.
4) Maintain pressurizer level constant between 100" and 200" as RCS pressure increases. Repressurization will compress the steam bubble in the head and decrease pressurizer level.
5) Continue until an increase in RCS pressure does not decrease pressurizer level.

Toledo Edison feels that the existing procedure is sufficient to minimize void in the RV head and even if a void situation does occur, there is enough procedural guidance given to the operators to take proper action to recognize its formation and to prevent it from interfering with natural circulation. We feel confident that the procedures used are adequate to safely cooldown on natural circulation at 1 to 1½°F/hr. with proper recognition and corrective actions in case of a void formation.

Item 2: Demonstrate that use of the procedure will not result in upper head voiding (demonstration based on analyses by Boman and Tally is acceptable).

Response: See response to Item 1.

Item 3: Confirm and provide the basis for the conclusion that your procedures will not allow any voiding at the hot leg elevation.

Response: See response to Item 1.

Item 4: Provide an analysis that shows that there is sufficient condensate supply to support a conservative estimate of the time to reach the Decay Heat Removal System entry conditions.

Response: Toledo Edison has performed the analysis and concluded that the technical specification required condensate water capacity can support natural circulation cooldown for 34 hours. Both CSTs have high and low level alarms, and normal CST levels are kept above the low level alarm set point. Assuming that the CSTs levels are at low level alarm set point, the condensate water cooling capacity is 72 hours for natural circulation.

CSTs is not a safety grade system. If water in CSTs is depleted, suction to the auxiliary feed water pump can either be transferred manually to fire protection system or automatically to service water system. The water supply available from the service water system is infinite (from Lake Erie).

At the cooldown rate of 1½°F/hr., the time required to bring the primary coolant to decay heat removal system entry condition is approximately 150-200 hours. Since service water supply is available indefinitely, sufficient cooling is available till off-site power is restored and reactor coolant pumps are restarted. This will restore RCS forced circulation to facilitate normal cooldown.

cj a/10