TOLEDO EDISON

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Docket No. 50-346

License No. NPF-3

Serial No. 534

August 8, 1979

Director of Nuclear Reactor Regulation
Attention: Mr. Darrell G. Eisenhut
Division of Operating Reactors
United States Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Eisenhut:

This letter is in response to Mr. Stello's letter of May 25, 1979 related to the feedwater lines at Davis-Besse Nuclear Power Station, Unit 1 (DB-1). The requested items relating to design information as well as the two asterisked items under fabrication history were submitted on June 19, 1979 (Serial No. 518).

The remainder of the information you requested is attached.

Yours very truly,

Lowell E Roe

LER:TJM

Attachment

cc:

J. G. Keppler, Regional Director
Region III
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

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INFORMATION REQUESTED ON PWR FEEDWATER LINES

FABRICATION HISTORY

Question 3: Provide the NDE performed during and after fabrication of the weld joints requested in Question 2.

Response: The information on NDE was provided in Attachments 12 and 13 of our letter No. 518 dated June 19, 1979.

Question 4: Provide the Code edition to which the feedwater piping system was fabricated.

Response: Feedwater piping from isolation valve to the feedwater ring header was fabricated to ASME Section III, 1971 Edition, including Summer 1971 Addenda.

Feedwater ring header and risers were fabricated to Power Piping Code, USAS B31.1.0-1967 with Errata dated March, 1969.

The feedwater spray nozzles which are bolted to the steam generator were fabricated to ASME Code Section III, 1968 Edition through Summer 1968 Addenda.

Question 5: State the fracture toughness requirements, if any, for the feedwater piping system.

Response: Feedwater piping from isolation valve to the feedwater ring header was charpy impact tested at 10°F.

The balance of the piping did not receive any charpy impact testing.

PRESERVICE/INSERVICE INSPECTION AND OPERATING HISTORY

Question 1: State whether the feedwater system welds received a preservice inspection in accordance with ASME B&PV Code, Section XI.

Response: Preservice examination was performed on the feedwater system per the applicable construction code to which the system was designed; pre-service inspection on Class 2 systems and components under ASME Section XI was not required to be performed when the plant was constructed.

Question 2: Provide the extent of inservice inspection performed on the feedwater pipe to steam generator nozzle welds. Include the results of the examinations, any corrective actions taken and causes of any failures.

Response: The steam generators at Davis-Besse Unit 1 do not have nozzles, as the main feedwater system attaches to the steam generator by means of bolted connections. Auxiliary feedwater piping is connected to the steam generator by a welded nozzle connection with an internal ring header used. Portions of the inservice inspection have been performed on the auxiliary feedwater and reported to NRC Regional Office with the remainder to be performed during the first refueling outage as specified by our reply to NRC IE Bulletin 79-13 (Serial No. 1-80, dated July 13, 1979).

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PRESERVICE/INSERVICE INSPECTION AND OPERATING HISTORY (Continued)

Question 3: Provide the schedule and extent of inservice inspection for the feedwater system for the next inspection interval.

Response: The feedwater system will be inspected in accordance with the ASME B&PV Code Section XI, 1977 Edition thru the Summer 1978 Addenda, to the extent that is practicable within design physical limitations and geometry of construction.

Question 4: Provide any history of water hammer or vibration in the feedwater system and design changes and/or actions taken to prevent these occurrences.

Response: The only water hammer which has been observed in the feedwater system within containment has occurred during startup under one specific condition. This condition occurs when a small feedwater flow (minifeed) is used, bypassing the startup control valves, to keep the steam generator (SG) nozzles flooded, at a feedwater temperature of approximately 200°F, and when the reactor coolant system (RCS) temperature is less than 180°F. In this instance, when a vacuum is applied to the main steam system, flashing occurs in the SG nozzles. To preclude this problem of water hammer, the small feedwater flow is now initiated only if the RCS temperature is greater than 180°F. Should the RCS temperature be less than 180°F at the time that the flow is to be initiated the minifeed is delayed until the RCS reaches 180°F. Therefore the feedwater hammer problem is minimized by procedure through proper application and sequencing of feedwater flow, RCS heatup, and condenser vacuum.

Question 5: Provide a description of feedwater chemistry controls and a summary of chemistry data.

Response: The limitations on secondary feedwater cation conductivity minimizes the degradation of the steam generator tubes and the potential for steam generator tube leakage or failure due to stress corrosion. Contamination of the steam generator secondary coolant increases the potential of tube degradation and impairment of tube integrity. Generally, two major sources of contamination exist. One source of contamination results from condenser in leakage of impurities that may enter the secondary side of the steam generators if breakthrough of the condensate polishing demineralizers occurs. Continuous monitoring of the secondary feedwater by cation conductivity at Davis-Besse is an effective means of monitoring condensate polishing demineralizer breakthrough and minimizing the introduction of contaminants to the steam generator. During operation, the most common contaminants found in the demineralizer effluent will be at concentrations sufficiently low to be soluble in the superheated steam and will not accumulate or concentrate in the steam generators.

PRESERVICE/INSERVICE INSPECTION AND OPERATING HISTORY (Continued)

Question 5: (continued)

Response: Another major source of secondary feedwater contamination results from concentration of impurities in the feedwater due to the moisture separator drains being pumped forward in the cycle, bypassing the condensate polishing demineralizers. This problem is overcome at Davis-Besse by breaking the "concentration loop" by routing 50% of the moisture separator drains to the condenser, and hence the condensate polishers, 100% of the time during operation.

The minimum quality specification to which feedwater should conform during normal power operation are given below:

Max total solids (dissolved and suspended), ppb	50
Max cation conductivity, umho/cm	0.5
Max dissolved oxygen, ppb	7
Max total silica (as SiO_2), ppb	20
Max total iron (as Fe), ppb	10
Max total copper (as Cu), ppb	2
pH at 77F (adjusted with ammonia)	9.3 to 9.5
Total hardness	(a)
Organics	(b)
Lead	0[c]

(a) Care is taken to eliminate hardness constituents due to possible steam generator deposition problems.

(b) Organic contamination is avoided in condensate polished systems to prevent possible resin fouling.

(c) Lead contamination of the feedwater is avoided in view of reported problems with Inconel 600 in water containing lead.

Maintaining the secondary feedwater within the limits of this specification will control the introduction of potentially corrosive impurities into the steam generators and minimize tube degradation.

Typical operating chemistry data for Davis-Besse, based on the operation to date, is listed below and is seen to be within the limits noted above.

pH	9.4	
Cat.Cond.	0.25	umhos/cm
Sodium	2	ppb
Silica	5	ppb
Iron	10	ppb
Oxygen	5	ppb
Hydrazine	40	ppb
Copper	0	ppb
Lead	0	ppb

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PRESERVICE/INSERVICE INSPECTION AND OPERATING HISTORY (Continued)

Corrosion of the steam generators, as well as other condensate and feedwater system components is limited by the addition of hydrazine to maintain a controlled residual of hydrazine after the last set of feedwater heaters. Further, an alkaline pH of the feedwater is maintained to inhibit corrosion of the condensate and feedwater system materials of construction by the addition of ammonia to maintain pH within controlled limits. Continuous and/or scheduled grab samples, obtained from selected system sample locations are analyzed to assure the control limits of these chemical additions are maintained. This monitoring provides reasonable assurance that the conditions in the steam generators minimize the potential for tube degradation during all conditions of operation and postulated accidents, as a measure of protection of the steam generator tubing which is an essential part of the reactor coolant pressure boundary.