ENCLOSURE 3

Battelle
Columbus Division
505 King Avenue
Columbus, Ohio 43201-2693
Telephone (614) 424-6424
Telex 24-5454

February 14, 1986

Dr. B. D. Liaw
Chief, Engineering Branch
Division of BWR Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Dr. Liaw:

Battelle staff and Dr. E. C. Rodabaugh attended a meeting on January 24, 1986 with NRC-NRR personnel (List of attendees provided in Attachment A) for the purpose of discussing the structural integrity of the Nine Mile Point Unit 2 downcomer design. This design is characterized by the lack of lateral support at the free ends of the downcomers. A submittal to the NRC by Niagara Mohawk Power Corporation, titled "Review of Structural Adequacy of BWR Mark II Downcomers for the Nine Mile Point 2 Nuclear Power Station" provided the basis for this meeting. For the purpose of our evaluation, the NRC staff provided the following guidance:

a. No significant errors exist in the new calculations documented in the submittal cited above

b. The 800 - series chugging loads are applied by the Applicant in a manner acceptable to the staff

From the review and evaluation performed at this meeting, we concluded the design meets licensing criteria for upset and emergency conditions. We further concluded that the analysis review did not acceptably demonstrate compliance of the design with faulted conditions. While the downcomer design meets the ASME Code faulted condition stress criteria, buckling of the downcomer during application of faulted condition loading is of concern and is discussed further in Attachment B.

In spite of this situation, we shared the consensus reached by this group that the NRC staff should continue to proceed with issuance of an operating license on the condition that by the first refueling outage compliance with faulted condition criteria be demonstrated by the applicant and any required handware modifications be accomplished during the first refueling outage. Our basis for this position is that:

a. The main recirculation piping is 316 NG stainless steel which is considered much less susceptable to IGSCC than other steels; hence the probability of a major rupture of the primary piping is very low

b. The probability of the simultaneous occurrence of a LOCA and SSE is very unlikely during the life of the plant and even smaller during the first fuel cycle. Therefore, operation of the plant through the first fuel cycle poses no undue threat to the public health and safety

Please don't hesitate to call me at FTS 976-5294 if you wish to discuss this or require additional information.

Sincerely,

B. F. Saffell
Program Manager
Advanced Materials Department

BFS/tj

cc: Y. C. Li
E. C. Rodabaugh

Attachments

Attachment A

List of Attendees

R. Bernero (Part-time)

B. D. Liaw

Y. C. Li

C. P. Tan

M. Hartzmann

R. Wichman

G. Larnas (Part-time)

E. C. Rodabaugh (E. C. Rodabaugh Associates)

G. M. Wilkowski (Battelle's Columbus Division)

B. F. Saffell (Battelle's Columbus Division)

R. Mesloh (Battelle's Corporate Development Corporation)

Attachment B

During the review meeting of January 24, 1986, R. Mesloh of Battelle and Y. C. Li of the NRC staff compared estimates of bucking strength of the downcomers D/t = 64, at temperature. For SA 312 (304 SS) the specified minimum yield, S_y = 22.75ksi @ 290° F. Based on this value, it is understood that the NRC's calculations, following those of a paper by Belke, gave a buckling moment

$$M_b = 5118 \text{ in-kips.}$$

Mr. Mesloh's estimation was based on extrapolating previously developed experimental data to suit the above yield value, strain hardening and expected strain at buckling. He estimates that buckling would occur at approximately 92% of the calculated maximum moment,

$$M_m = D^2 t \; S_y = 4915 \text{ in-kips}$$

or at a moment

$$M_b = 4520 \text{ in-kips.}$$

He further estimates a bending strain of

$$\varepsilon_b = 0.6 \text{ to } 0.7 \%$$

and ovalization (flattening) of the pipe of

$$F \sim 1.5 \text{ to } 2 \%$$

at buckling.

He cautions that these are estimated to "ball park" the anticipated buckling strength. On this basis he concurs that the design is marginal and that bucking is incipient at the estimated applied combined moment loadings (LOCA and SSE) of

$$M_a = 4912 \text{ in-kips.}$$

However, he also believes that the only "good" way of determining the actual buckling value is through experimental tests - either model or full scale with 304 stainless steel material exhibiting the same stress - strain characteristics as the downcomer material, and simulating the cantilever end condition.