Con Edison

Consolidated Edison Company of New York, Inc.
Indian Point Station
Broadway & Bleakley Avenue
Buchanan, New York 10511-1099

December 23, 1987

Re: Indian Point Unit No. 2
Docket No. 50-247

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Steam Generator Inservice Inspection: Response to Questions on Girth Weld Concerns

By letter dated December 11, 1987, Con Edison noted that, in the routine inservice inspection conducted during the current refueling outage, ultrasonic reflectors were detected on the inside weld circumference of the Indian Point Unit No. 2 Steam Generator #22.

Attached to that letter was a report entitled "Stress and Fatigue Analysis and Grindout Guidelines" which had been prepared to establish the acceptability of the final weld configuration after grindout repairs. This analysis was presented and discussed at a meeting on December 14, 1987 among Con Edison, the NRC and Westinghouse. Subsequent to that meeting, further information pertaining to the analysis was discussed in telephone conversations held on December 17, 1987.

The Attachment to this letter documents these discussions in a question and answer format.

Should you have any further questions, please contact us.

Very truly yours,

Steph Bram

Stephen Bram
Vice President
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ATTACHMENT A

RESPONSE TO INDIAN POINT UNIT NO. 2 STEAM GENERATOR
GIRTH WELD QUESTIONS

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
INDIAN POINT UNIT NO. 2
DECEMBER, 1987

RESPONSE TO IP2 GIRTH WELD QUESTIONS

QUESTION: What provisions exist if 3Sm is exceeded?

RESPONSE: The structural analysis was performed consistent with the requirements of the ASME Code. For the consideration of maximum range of primary plus secondary stress intensity, the following requirements apply:

1) The maximum range of primary plus secondary stress intensity is compared to 3Sm.

2) If the 3Sm limits is exceeded, then a simplified elastic-plastic fatigue analysis may be performed. This requires that a) the range of primary plus secondary membrane plus bending stress intensity, excluding thermal bending, be $\leq$ 3Sm, and b) the alternating stress value for entering the design fatigue curve is multiplied by a K_e factor.

   The K_e factor is a function of the primary plus secondary stress intensity (S_n), and ranges from a value of 1.0 for $S_n \leq 3S_m$, to a value of 5.0 for $S_n \geq 6S_m$ for the corresponding shell material.

For the present analysis, the criteria of item 2) above have been applied in the case where $3S_m$ has been exceeded.

For those locations where the maximum range of primary plus secondary stress intensity are close to the 3Sm limit, but do not exceed this limit, the criteria of item 2) are not applied per the code. It should be noted that the analysis utilizes a very conservative range of primary plus secondary stress for the Reactor Trip from Full Power transient, which is the maximum stress condition. The boundary conditions assume that an abnormally low water level exists such that the shell is contacted directly by the incoming cold water without any mixing. The IP-2 design specification does not provide curves defining the steam and feedwater flow rate as a function of time for the Reactor Trip transient. Using curves for this transient which have been developed for later model steam generators, however, shows the steam flow stops prior to the termination of the main feedwater flow. This indicates that the water level prior to the initiation of auxiliary feed flow will be well above the girth weld region. Therefore, the resulting maximum range of primary plus secondary stress for the girth weld region is conservative.

Additional conservatism exists in the comparison of the maximum range to the 3Sm limit through the use of minimum strength properties for the material in establishing the stress limits per the requirements of the ASME Code. Note that the code minimum properties are not degraded by the operating environment or by the fabrication process.

QUESTION: In the evaluation of uniform grinding, has mechanical loading been considered? Has any other loading been considered? If so, what?

RESPONSE: The structural analysis considered mechanical (load controlled) loads on the grind region due to internal pressure. Consideration was also given to seismically induced loads. The seismic loads as specified in the design specification for an OBE event are 0.19g in the horizontal direction and 0.12g in the vertical direction. These loads are small and it has been concluded that they would not introduce any significant load into the grind region.

With regard to the seismic loads as they might affect the maximum range of primary plus secondary stress intensity, the maximum range presently exists between the Reactor Trip transient and cooldown to cold shutdown. The seismic loads which would be combined with steady-state pressure would fall within the present maximum range, and would therefore not affect the reported values.

For the SSE seismic load, the applicable accelerations are 0.37g and 0.25g in the horizontal and vertical directions, respectively. This is essentially a factor of more than 2.0, which therefore compensates for the increase in acceleration levels. Thus, the SSE loads are judged to be acceptable. It should however be noted that the SSE loads, because they are classified as faulted, do not enter into either the maximum range calculation or the fatigue analysis.

QUESTION: Have we analyzed for local grinding superimposed on uniform grinding?

RESPONSE: Local grindouts superimposed on uniform grinding were analyzed. A combination of finite element analysis and calculation of stress concentration factors was used in analyzing the local grindouts superimposed on uniform grindouts. Two such cases were considered - one each for the 0.75 in. and the 1.0 in. deep grindout profiles. The superimposed local grindouts considered in both cases were 0.25 in. deep with a 0.5 in. rounding radius and 2:1 taper.

In both cases, it was determined that the maximum stress concentrations at the discontinuity of the uniform grindout configurations were more severe compared to the local grindout within the flat portion of the uniform grindout zone. Therefore, local grindouts of the type considered in our evaluation are permissible within the flat portion of the uniform grindout zone and meets the AMSE Code requirements.