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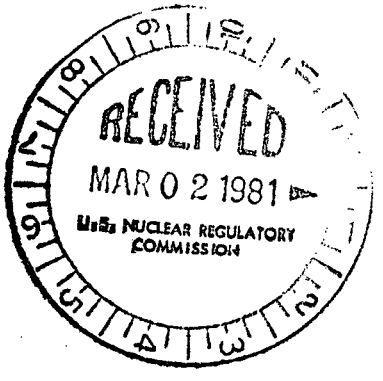
Letter No. 81-34

February 20, 1981

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



Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

ATTN: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Dear Mr. Varga:

By letter dated April 25, 1980, Consolidated Edison submitted for NRC Regulatory Staff review an Indian Point Unit No. 2 ECCS/LOCA reanalysis for plant operation with steam generator tube plugging levels up to 12%. This reanalysis was performed for the existing limiting case break size (i.e., DECLG-C_D=0.6).

During recent discussions with members of the Staff regarding our reanalysis , they requested additional information demonstrating that the limiting break size for the 12% tube plugging case was unchanged from the existing limiting break size (i.e., for the plugging levels up to 6%). This additional information is provided in Attachment A to this letter.

Should you or your staff have any further questions, please contact us.

Very truly yours,

John D. O'Toole

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ATTACHMENT A

ECCS/LOCA Reanalysis-
Limiting Break Case Evaluation

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
February, 1981

The existing limiting break case for Indian Point Unit No. 2 is the C_D=0.6 double ended cold leg guillotine (DECLG) case. This is based on the complete break spectrum analysis (Indian Point Unit No. 2 December 1978 ECCS/LOCA Analysis) for 6% steam generator tube plugging (SGTP), which demonstrated the C_D=0.6 case to be limiting, and the small change in tube plugging in going to 12% SGTP (Indian Point Unit No. 2 April 1980 ECCS/LOCA Analysis). In particular:

(1) The effects of SGTP have been shown to have a moderate effect on the peak clad temperature (PCT) during the reflood phase of the transient (hereafter called "reflood node") and a smaller effect on PCT during the blowdown phase of the transient (hereafter called "burst node").

(2) In the 6% SGTP analysis, the reflood node for the C_D=0.6 case exhibited a PCT approximately 100°F higher than for the next closest reflood node case (C_D=1.0).

(3) For the C_D=1.0 burst node, the F_Q reduction in going from 6% to 12% SGTP would result in a large decrease in PCT.

(4) Comparison of the C_D=0.6 cases analyzed, which differ only in the amount of tube plugging and total peaking factor (SGTP=6% and F_Q=2.31 vs. SGTP=12% and F_Q=2.25), yields very similar transients with no significant impact on the nature of the transients (such as reflood rate, timing or degree of downcomer water content at time of accumulator injection).

Based on the above considerations, it was not necessary to analyze more than the limiting case presented in our April 25, 1980 submittal. This is consistent with submittals previously accepted by the NRC Regulatory Staff when SGTP was increased. However, to provide additional clarification/basis, the following information is being supplied.

The generic sensitivity values used by Westinghouse for the reflood node are:

$$\frac{\partial PCT}{\partial SGTP} \cong \frac{10°F}{1\%\ SGTP} \quad ; \quad \frac{\partial PCT}{\partial F_Q} \cong \frac{10°F}{0.01\ F_Q}$$

Thus, decreasing F_Q by 0.06 and increasing SGTP by 6% as proposed would be expected to have a negligible effect on PCT; that is,

$$\Delta PCT \cong \frac{\partial PCT}{\partial SGTP} \times \Delta SGTP + \frac{\partial PCT}{\partial F_Q} \times \Delta F_Q \qquad \text{(Eqn. 1)}$$

$$\cong \frac{10°F}{1\%\ SGTP} \times (6\%) + \frac{10°F}{0.01\ F_Q} \times (-0.06)$$

$$\cong 60 - 60 \cong 0$$

In fact, this prediction was confirmed by the results of the 6% and 12% SGTP cases where for C_D=0.6, the PCT actually increased by only 9.5°F (from 2172.5°F to 2182°F).

In the past, Westinghouse evaluations have developed Indian Point Unit No. 2 sensitivity values (using the February 1978 ECCS Evaluation Model) as opposed to the generic sensitivity values for the effect of total peaking factor change on PCT. Evaluations previously performed for the Indian Point Unit No. 2 C_D=1.0 case with 6% SGTP yield:

Reflood Node:
$$\frac{\partial PCT}{\partial F_Q} = \frac{6.3°F}{0.01\ F_Q} \qquad \text{(Eqn. 2)}$$

Burst Node:
$$\frac{\partial PCT}{\partial F_Q} = \frac{30.5°F}{0.01\ F_Q} \qquad \text{(Eqn. 3)}$$

When the above reflood node sensitivity ($6.3^{\circ}F/0.01F_Q$) and the PCT change actually calculated for the C_D=0.6 cases (with 6% and 12% SGTP) are substituted into Equation (1), the resulting Indian Point Unit No. 2 plant specific sensitivity to SGTP is determined to be:

Reflood Node: $$\frac{\partial PCT}{\partial SGTP} = \frac{8^{\circ}F}{1\% SGTP}$$ (Eqn. 4)

The above Indian Point Unit No. 2 evaluations further demonstrate the small sensitivity of SGTP on PCT and the appropriateness of the Westinghouse generic values. The attached Table 1 contains the results of calculations based on the sensitivities developed above.

As can be seen from Table 1, minor variations in SGTP will not alter the limiting break case as C_D=0.6. In fact, for the $2.25F_Q$-12% SGTP evaluations, Table 1 shows that the next highest PCT to the C_D=0.6 case value of $2182^{\circ}F$ is the C_D=0.8 case value of $2088^{\circ}F$, almost $100^{\circ}F$ less.

In conclusion, the C_D=0.6 analysis performed for plant operation with SGTP levels up to 12% and a total peaking factor (F_Q) of 2.25 represents the limiting case for Indian Point Unit No. 2.

Table 1

Indian Point Unit No. 2
Comparison of ECCS Analyses/PCT's

C_D	Node		PCT (^oF)	
	Burst	Reflood	F_Q=2.31 (1) SGTP=6%	F_Q=2.25 SGTP=12%
1.0	✓		2137	1954 (2)
1.0		✓	2065	2075 (3)
0.8		✓	2078	2088 (3)
0.6		✓	2172.5	2182 (4)
0.4		✓	1684	1674 (3)

Notes:

(1) From December 1978 Indian Point Unit No. 2 ECCS/LOCA Analysis.

(2) Calculated using equation (3).

(3) Calculated using equations (1), (2) and (4).

(4) From April 1980 Indian Point Unit No. 2 ECCS/LOCA Analysis.