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April 10, 2001

Re: Indian Point Unit No. 2  
Docket No. 50-247  
NL 01-040

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Stop P1-137  
Washington, D.C. 20555-0001

Subject: Indian Point Unit 2 - 30 Day and Annual 10 CFR 50.46 Report

Reference: 1) Con Edison Letter to NRC dated July 7, 2000

In accordance with 10 CFR 50.46(a)(3)(ii), Consolidated Edison Company of New York, Inc. (Con Edison) hereby submits the attached reports pertaining to the emergency core cooling system (ECCS) evaluation models that affect the peak cladding temperature (PCT) for the limiting transients. Pursuant to 10 CFR 50.46(a)(3)(ii), this letter provides both the 30-day report for changes in PCT greater than 50F, and the annual report.

Con Edison's vendor for performing the large and small break loss of coolant accident (LOCA) analyses, Westinghouse Electric Company, has reviewed the year 2000 analyses for Indian Point Unit 2 (IP2) and has advised Con Edison of changes which have been made to the calculation of ECCS performance. A previous outstanding issue (Reference 1) relative to the potential effect of differences in the as-built and analyzed ECCS accumulator piping configurations has been determined to have no impact on PCT.

The current large break LOCA PCT is 2188F. A discussion of the changes to the large break LOCA PCT is provided in Attachment 1. The current small break LOCA PCT is 2116F. A discussion of the changes to the small break LOCA PCT is provided in Attachment 2. In addition, during the course of our review, an oversight regarding a previous reporting requirement was discovered and is discussed in Attachment 2.

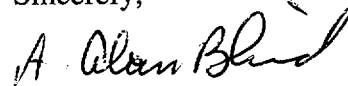
The values provided in this report are a result of plant specific evaluations and sensitivity studies and demonstrate that the current PCT penalty and peak clad temperatures are within acceptable limits. No proposed schedule for reanalysis is provided since these IP2 specific evaluations have now been completed. As an enhancement to our current small break LOCA analysis of record, we intend to submit a best estimate small break LOCA model applicable to Indian Point 2 for evaluation later this year.

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No new regulatory commitments are made by Con Edison in this correspondence.

Should you or your staff has any concerns regarding this matter, please contact Mr. John F. McCann, Manager, Nuclear Safety and Licensing, at (914) 734-5074.

Sincerely,

A handwritten signature in cursive script that reads "A. Alan Blair".

Attachments

C: Mr. Patrick D. Milano  
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ATTACHMENT 1

10 CFR 50.46 Report

Best Estimate Large Break Loss of Coolant Accident

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

## Best Estimate Large Break Loss of Coolant Accident

### Background

The license-basis Best-Estimate Large Break Loss of Coolant Accident (BE LBLOCA) analysis for Indian Point Unit 2 (IP2) was performed using the 1996 Westinghouse Best-Estimate LBLOCA Evaluation Model with WCOBRA/TRAC. The analysis assumed a reactor core power level of 3216 MWt, core peaking factors of  $F_Q^T = 2.50$  and  $F_{\Delta H}^N = 1.72$ , and a uniform steam generator tube plugging (SGTP) percentage of 25 percent. The licensed power level is 3071.4 MWt.

### Missing Fuel Assembly Alignment Pin

During the Cycle 14/15 reload operations, a fuel assembly alignment pin located at core location A-8 was severed. As such, there is a potentially larger inter-assembly gap, which may result in a local increase in the peaking factors. This increase in the inter-assembly gap has been conservatively modeled by assuming that both alignment pins in core location A-8 have been severed. The operation of IP2 with two missing fuel assembly alignment pins at peripheral location A-8 was evaluated for impact on the LOCA analyses. This resulted in a 5F PCT penalty on the BE LBLOCA analysis.

### Reduced Power in Peripheral Assemblies

The reduction in average power in the peripheral core fuel assemblies was evaluated to determine its effects on LOCA analyses. This evaluation showed that because the total core power remains constant, reducing the power in the lower power assemblies shifts more power to the other assemblies. This resulted in a 4F penalty on the BE LBLOCA analysis.

### Replacement Steam Generators

An evaluation was performed to determine the impact of replacement of the original Model 44 steam generators with Model 44F steam generators. The evaluation of the impact on the existing BE LBLOCA analysis of record was based on peak clad temperature sensitivities that were IP2 plant-specific. Using these sensitivities, the Model 44F steam generators result in a 7F penalty on PCT.

### Changes to Containment Pressure Calculation Assumptions

Changes affecting the LOCA containment analysis assumptions were made as discussed herein. The containment spray flow was increased, initial containment temperature limit was reduced, containment fan cooler heat removal performance was increased, and containment passive heat sinks were evaluated to be increased. Changes to containment spray flow, initial containment temperature, containment fan cooler performance, and heat sink data can affect the calculated LBLOCA containment pressure. Decreases in containment pressure tend to have a negative effect on calculated LBLOCA PCT. The combined effect of these changes on the IP2 LBLOCA

analysis of record containment pressure was calculated. Using established sensitivities, the effect of the change in containment pressure on LBLOCA PCT was a penalty of 11F.

Reduction in  $F_{\Delta H}$ , Reduction in Steam Generator Tube Plugging, from 25% to 20% and MONTECF Decay Heat Uncertainty Error

It was determined that an error existed in the calculation of decay heat uncertainty in the Monte Carlo code used for calculation of the 95<sup>th</sup> percentile PCT for BELOCA. To assess the decay heat uncertainty error, the limiting case was re-run using an updated code version that corrected the decay heat uncertainty error. A PCT penalty of 24F was assigned to the MONTECF error. To maintain margin to the limits in 10 CFR 50.46, the limiting case was also run using the reduced  $F_{\Delta H}$  of 1.70. A PCT benefit of 8F and 4F for Reflood 1 and Reflood 2, respectively, were obtained as a result of the evaluation. Furthermore, to maintain margin to the 10 CFR 50.46 limits, a plant-specific evaluation reducing maximum steam generator tube plugging from 25 percent to 20 percent was performed. PCT benefits of 15F and 43F for Reflood 1 and Reflood 2, respectively, were obtained as a result of the evaluation. Since Reflood 1 is the limiting condition, only the penalties and benefits to this portion of the analysis are credited.

Increase in Maximum Accumulator Pressure

To account for instrument uncertainty while allowing for an acceptable operating band for the safety injection system accumulators, the analytical upper limit for accumulator pressure was increased. This is an input to the BE LBLOCA and was evaluated to result in a maximum increase in peak clad temperature of 4F.

Westinghouse LOCA Peak Clad Temperature Summary For Best Estimate Large Break

	<u>Clad Temp (°F)</u>
LICENSING BASIS	
Analysis-Of-Record PCT	2152
MARGIN ALLOCATIONS (Delta PCT)	
A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS	
1. Total- previously reported	4
B. 10 CFR 50.59 SAFETY EVALUATIONS	
1. Missing Fuel Assembly Alignment Pin	5
2. Reduced Power in Peripheral Assemblies	4
3. Replacement Steam Generators (44 to 44F)	7
4. Changes to Containment Pressure Calculation Assumptions	11
5. Reduction in F delta H from 1.72 to 1.7	-8
6. Reduction in SGTP from 25% to 20%	-15
C. 2000 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessments of PCT Margin)	
1. MONTECF Decay Heat Uncertainty Error	24
D. TEMPORARY ECCS MODEL ISSUES	
1. None	0
E. OTHER	
1. Increase in Maximum Accumulator Pressure	4
LICENSING BASIS PCT + MARGIN ALLOCATIONS	2188

ATTACHMENT 2

10 CFR 50.46 Report

Small Break Loss of Coolant Accident

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

## Small Break Loss of Coolant Accident

### Background

The license-basis Small Break Loss of Coolant Accident (SBLOCA) analyses for Indian Point Unit 2 (IP2) was performed using NOTRUMP. The analysis assumed a reactor core power level of 3071.4 MWt, core peaking factors of  $F_Q^T = 2.50$  and  $F_{\Delta H}^N = 1.70$ , and a uniform steam generator tube plugging (SGTP) percentage of 25 percent.

### Annular Blankets

A generic PCT penalty of 10F was placed on the SBLOCA analysis to account for the introduction of enriched annular blankets.

### Accumulator Minimum Pressure Evaluation

The accumulator minimum pressure was reduced by 2 psi to ensure consistency among large break, small break and technical specifications. The beginning-of-life PCT effect was determined to be a penalty of 5F

### NOTRUMP - Mixture Level Tracking/Region Depletion Errors

Several closely related errors have been discovered relative to how NOTRUMP deals with node boundaries. Several aspects of these errors are not tied to erroneous coding; rather, they are a direct result of modeling choices made and documented in the original code development/licensing. These errors resulted in a 13F PCT penalty.

### Burst and Blockage/Time in Life

This assessment is a function of the Base PCT plus permanent margin allocation and as such, will increase or decrease with margin allocation changes. Components of the change in this parameter are allocated to the annular blankets, the accumulator minimum pressure evaluation, and a computer program (SPIKE) correlation error of 90F when the code was revised to reflect more recent data generated using the current Small Break LOCA Evaluation Model and methodology. The current total penalty is 184F. Following a detailed review (during the preparation of this report) of Information Notice 97-15 as supplemented April 23, 1999, the computer program correlation error of 90F met the requirements for reporting in March of 2000. The annual 50.46 report (Reference 1) provided last year only reported changes to the limiting design basis transient (large break LOCA). Previous reports have covered a 52F PCT penalty for this margin allocation.



Westinghouse LOCA Peak Clad Temperature Summary For Small Break

	<u>Clad Temp (°F)</u>
LICENSING BASIS	
Analysis-Of-Record PCT	1766
MARGIN ALLOCATIONS (Delta PCT)	
A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS	
1. Total – Previously reported	12
B. 10 CFR 50.59 SAFETY EVALUATIONS	
1. Previously reported	121
2. Annular Blankets	10
3. Accumulator Minimum Pressure Evaluation	5
C. 2000 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessments of PCT Margin)	
1. NOTRUMP - Mixture Level Tracking/Region Depletion Errors	13
D. TEMPORARY ECCS MODEL ISSUES	
1. None	0
E. OTHER	
1. Tavg Uncertainty- Previously reported	5
2. Burst and Blockage/Time in Life	184
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LICENSING BASIS PCT + MARGIN ALLOCATIONS	2116