



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

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March 3, 1999

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**Subject: Questions You Raised to the NRC Regarding the Condition of the Steam Generators at Indian Point Unit 2**

This letter refers to your letter to David Vito dated January 24, 1999, in which you raised questions regarding the condition of the steam generators at Indian Point Unit 2. In response to your questions, we discussed the substance of your questions with Con Edison as well as reviewed previous submittals to the NRC by Con Edison on this subject. The questions you posed and our response follows:

- 1) With 100% being perfect, what percentage of Unit 2's steam generator tubes have been plugged because of cracking?

The steam generator (S/G) tubes at Indian Point 2 have experienced a number of types of degradation (including cracking) which have necessitated the plugging of affected tubes. These degradation mechanisms include, among others, tube sheet crevice, sludge pile and support plate eddy current testing indications, tube denting and wastage. As a result of these degradation mechanisms, a total of 10.2% of all of the tubes in the four steam generators have been plugged since the S/Gs were fabricated.

- 2) With 100% being perfect, what percentage of bad generator tubes make the steam generator inefficient in its heat exchange functions?

In theory, any reduction in the number of tubes available for heat exchange in a steam generator reduces its efficiency. However, steam generators are provided with a substantial number of additional tubes to permit future plugging and yet still allow the plant to operate at full power. At this time, the plant is capable of operating at full power with 10.2% of the S/G tubes plugged. Should the plant be forced to plug a much larger percentage of S/G tubes in the future (i.e., estimated at 25% or higher), the plant may have to run at a power level slightly below 100% to maintain the minimum steam pressure required by the turbine-generator.

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- 3) If the steam generator tube cracking is progressively reducing the good number of tubes, will this shortcoming stress any systems at present or future?

*At the present time, the plugging of steam generator tubes has not caused any significant stresses on plant systems. However, as stated previously, if there is a very high percentage of tube plugging, the plant may not be able to operate at 100% power due to lowered steam pressure to the turbine-generator. Turbine-generator operation at lower steam pressures can result in increased wear on the turbine blading due to excessive moisture carryover. Therefore, operating at less than 100% power would allow turbine operation with less moisture carryover. On a periodic basis, the turbine blading is inspected for wear. If excessive wear occurs, then Con Edison would have to repair or replace the affected turbine blading.*

- 4) With increasing levels of contamination spreading to the secondary system, the turbine HP section/control valves, moisture separators and associated cross under piping, ...does this condition pose...an acceptable risk?

*The NRC license for Indian Point 2 permits a very small amount of leakage from the primary reactor coolant system into the secondary system due to the impracticality of continuously maintaining zero leakage across all of the S/G tubes. Once this leakage limit is exceeded, the plant is forced to shutdown and repair the source of the leakage. While Indian Point 2 has operated at a small fraction of the Technical Specification allowed S/G leakage, this leakage has resulted in the need for workers to use radioactive contamination controls when portions of certain secondary side equipment are opened. This small amount of primary system leakage, while posing a burden on outage workers who must use contamination controls in areas which would normally be radiologically clean, does not pose a risk to the public. Moreover, since the secondary system contamination levels are low and continue to decrease as a result of the full reactor coolant system decontamination performed in 1995 and recent reductions in primary to secondary leakage, the radiation dose incurred by workers performing secondary plant maintenance is very low.*

- 5) Who makes the call to stop and replace defective generators when the time comes when the generators no longer work as designed?

*Con Edison is licensed by the NRC to operate Indian Point 2 with up to 25% of the steam generator (S/G) tubes plugged. Once the plant reaches this level of tube plugging, NRC review and approval will be necessary to continue plant operations with higher levels of tube plugging. However, the decision on whether to ultimately replace the steam generators or to shut the plant down due to S/G tube degradation rests with Con Edison and is largely a matter of the economics of such a project. Please note that Con Edison purchased replacement S/Gs in the late 1980's which are currently stored onsite; no decision has been made to install these replacement S/Gs due to the satisfactory condition of the existing S/Gs and the high cost of installation.*

EX 6

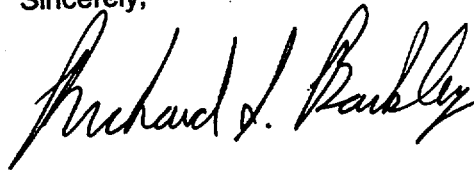
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- 6) (Supplemental Question provided on February 7, 1999 - Paraphrased as needed) Did Westinghouse maintenance crews perform the steam generator tube plugging performed during the 1997 refueling outage or was this plugging performed by in-house maintenance personnel? Could the procedure for plugging bad steam generator tubes have been discontinued and, if so, for what reason?

*Con Edison has historically used Westinghouse maintenance personnel and Westinghouse procedures for the installation of S/G tube plugs. Con Edison house maintenance personnel are only used to set up the work site in preparation for S/G tube plug installation. Neither the NRC nor Con Edison is aware of any significant problem with the implementation of the S/G plugging procedure during the 1997 RFO.*

We trust that we have answered your questions in this matter. Please note that multiple avenues exist for you to get the information you have requested beyond direct correspondence with this office. Attached to this letter is a booklet on acquiring information from the NRC. As stated to you in my last letter, the NRC has a Web page which you can access from home that may contain the information you need. In addition, the Electric Power Research Institute (EPRI) maintains a Website which also contains information on the condition of the steam generators at all of the pressurized water reactors (PWRs) in this country as well as many of the PWRs in other countries. Their Website is WWW.EPRI.COM and a copy of their steam generator progress report for Indian Point 2 is attached. Finally, if you have any additional questions in this matter, please feel free to call me or Richard Barkley of my staff at (610) 337-5065 as we would appreciate the opportunity to answer your questions promptly via phone.

Sincerely,



for. John F. Rogge, Chief  
Projects Branch 2  
Division of Reactor Projects

Enclosures: As Stated

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Distribution w/enclosures:

D. Vito, ORA

R. Temps, SRI - Indian Point 2

R. Barkley, DRP