August 15, 2001

Mr. David A. Lochbaum
Nuclear Safety Engineer
Union of Concerned Scientists
1707 H Street NW, Suite 600
Washington, DC 20006-3919

Dear Mr. Lochbaum:

SUBJECT: LOSS OF SPENT FUEL POOL COOLING EVENT AT INDIAN POINT UNIT 3

This letter is in response to your letter to Mr. Hubert Miller, dated May 23, 2001, regarding the temporary loss of spent fuel pool (SFP) cooling event at Indian Point Unit 3 (IP3) on May 8, 2001. You raised the following concerns with the event: (1) the effect of high SFP temperature on operator performance; (2) the adequacy of the backup cooling system; and, (3) the capability to recover from a loss of SFP cooling. Separately, in an e-mail message to Mr. Curt Cowgill, dated May 10, 2001, you expressed concern regarding the SFP administrative controls at IP3, noting that the NRC had identified that unit as one of four units with low SFP heat removal capability.

As you are aware, the NRC conducted a special inspection of the May 8, 2001, temporary loss of SFP cooling event at IP3. The inspection identified three findings regarding management oversight of the operation of the Backup Spent Fuel Pool Cooling System (BUSFPCS) for the given plant conditions (including not taking appropriate actions to minimize the risk associated with loss of the BUSFPCS), the adequacy of procedures, and the implementation of 10 CFR 50.59. Using the NRC reactor oversight program's (ROP) Significance Determination Process, the three findings were determined to be of very low safety significance (Green). The last two findings involved violations of NRC requirements and were treated as non-cited violations. A copy of the inspection report is attached to this letter and it addresses many of your concerns in detail. The following paragraphs provide a summary of our findings relative to your concerns.

Regarding operator performance, we noted that during fuel handling, the licensee maintained SFP temperature at about 110 degrees Fahrenheit (^{o}F) using the normal and BUSFPCSs concurrently. While all irradiated fuel was stored in the SFP, the licensee initiated maintenance affecting both trains of component cooling water, which supplies cooling water to the normal SFP cooling system heat exchanger. The normal SFP cooling system was secured to support this maintenance and the SFP was being cooled by the BUSFPCS. The expected equilibrium temperature of the SFP was about 150^{o}F. The licensee maintained the fuel storage building air temperature significantly lower by continuously operating the fuel storage building ventilation system. However, the higher SFP water temperature did create a light fog in the fuel storage building, between the roof and the SFP surface, which affected visibility. Though not related to visibility, two work activities were delayed due to high SFP temperature. Repair work on the rod cluster control assembly change tool was stopped due to the effect of the elevated temperatures on the tool and the spent fuel top nozzle inspections were stopped since the underwater viewing camera seal was not designed for operation above 120^{o}F. Work activities

were resumed later when the normal SFP cooling system was returned to service and operated concurrently with the BUSFPCS to reduce SFP temperature. The condition otherwise did not affect operator performance and was within the licensing and design basis of the SFP.

We determined the BUSFPCS, as designed and operated, was not adequately reliable for the function the licensee intended it to perform during the 2001 refueling outage. The BUSFPCS loss was caused by a temporary loss of makeup water to the system's cooling tower basin. At the decay heat rate present on May 8, 2001, the cooling tower basin inventory could support no more than 20 minutes of operation without makeup. The normal source of makeup water to the cooling tower was provided from a trailer-mounted contractor water treatment system, which was not designed as a reliable, continuous supply of water. The backup source of makeup water to the cooling tower basin from the fire water system was staged and ready, with approved operating procedures. However, the licensee's scope of review in its safety evaluation was too narrow to identify the effect the use of the contractor water treatment system would have on the reliability of the BUSFPCS. In addition, despite a previous loss of the BUSFPCS due to loss of makeup, the licensee did not implement sufficiently rigorous controls to ensure adequate cooling tower basin inventory could be maintained following interruption of the normal makeup water flow. In the attached inspection report these issues were identified as a violation of 10 CFR 50.59 and as a separate finding categorized as Green per the ROP.

During the inspection, we found that the design of the BUSFPCS, along with insufficient maintenance of SFP-related operating, alarm response, and off-normal procedures, complicated recovery of the BUSFPCS following a loss of the system. The design of the BUSFPCS made the system more vulnerable to failure at elevated SFP temperatures because the primary loop pump could lose net positive suction head at a SFP temperature of about 196^{o}F. Procedural deficiencies involved changes to the alarm response procedure for high SFP temperature, which rendered the alarm ineffective, and incomplete updates to the off-normal procedure for loss of the BUSFPCS. In the attached report, the design issue was included in the violation of 10 CFR 50.59, and the procedural issues were identified as a violation of Technical Specifications covering maintenance of procedures.

Notwithstanding these problems, we found that the licensee had a high likelihood of maintaining safe storage conditions for irradiated fuel following a loss of SFP cooling. The NRC determined the licensee had the necessary evaluations, equipment, and procedures in place to provide sufficient water to the SFP to make up for any loss of SFP level due to boiling. This ensured adequate cooling of the spent fuel to prevent fuel damage and sufficient water over the spent fuel for shielding purposes. Also, the licensee could have restored the component cooling water system, which supplies cooling water to the normal SFP cooling heat exchanger, and then placed the normal SFP cooling system back in service to reduce SFP temperature even if the SFP had reached 212^{o}F, since the normal SFP cooling is designed to operate with the SFP temperature at saturation conditions. Further, we determined that the licensee had the capability to provide makeup during a station blackout event using their diesel fire pump and the capability to operate the BUSFPCS using its dedicated portable diesel generator.

As you pointed out, IP3 was one of four plants identified in a July 26, 1996, memorandum from Mr. James M. Taylor to the Commission discussing resolution of spent fuel storage pool action plan issues, as having limited SFP decay heat removal capability. Subsequent to that July 1996 memorandum, the staff reviewed, on a sampling basis, the SFP administrative controls at three of those facilities; IP3 was not selected for review at that time. The results of that review

were documented in a September 30, 1997, memorandum from Mr. L. Joseph Callan to the Commission.

During the inspection of this event, we determined that, while there were problems associated with the BUSFPCS, the licensee had implemented administrative controls to manage decay heat removal and procedures to address off-normal conditions in the SFP. Specifically, the licensee had established administrative controls associated with decay time to maintain the decay heat rate within the design limits of the normal spent fuel cooling system and the BUSFPCS, and within the limits specified in the plant's Final Safety Analysis Report Update. Procedures were in place to provide operators with guidance and direction to correct SFP cooling system off-normal conditions should they occur.

If you have any further questions, please contact me.

Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

Enclosure: NRC Special Inspection Report No. 05000286/2001-006

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