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October 8, 1982

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:

Subsequent to the submission of the Indian Point Probabilistic Safety Study (IPPSS) to the Commission on March 5, 1982, Con Edison determined to explore means of reducing the risk associated with seismic and fire initiated events. Modifications to the control building and the Alternate Shutdown System (ASDS), respectively, were considered, and it was recently decided that such modifications would be made to the unit prior to its return to service from a scheduled refueling outage in late 1982.

The purpose of this letter is to present the effect on risk, as determined by our IPPSS consultants, of adding two new features to Unit No. 2: seismic bumpers for the control building, and additional transfer switches in the alternate shutdown system.

Section 8.3.1 of IPPSS showed that the risk from injuries and latent cancers comes almost entirely from release category 2RW. Moreover, approximately 85% of the frequency of 2RW results from events initiated by fires or earthquakes (IPPSS Table 8.3-2). Seismic and fire events also account for almost three-fourths of all core melt frequencies (IPPSS Table 8.3-2 and Figure 8.3-5).

The results of the seismic analysis in Section 7 of IPPSS indicate that the dominant contributor to seismically initiated core melt and release is the failure of the Unit 2 control building. This building has a seismic acceleration capacity with a median value of 0.27g, (IPPSS Section 7.9.3). The control building has the lowest seismic capacity of all the key plant structures and equipment. This building contains the control room, cable spreading room, DC batteries and panels for control power to safety related equipment, and switchgear supplying AC power to critical equipment.

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The control building is adjacent to the Unit 1 superheater building. At the control building roof line there is about a 1-1/2-inch space between the two buildings (see Figure 1, attached) and about a 3-1/2-inch space between the roof framing of the two buildings.

During an unprecedented seismic event with ground accelerations exceeding 0.27g, the flexibility of the upper story of the Unit 2 control building could result in deflections that would close these gaps at the roof line. The resulting impact loads at the roof structure could cause distortion of the Unit 2 steel roof and decking at ground accelerations much less than those that would fail other portions of the building. Such roof line impacts could conceivably cause the steel roof structure and decking to fall into the top story which contains the control room. The plant logic indicates that the loss of the control room leads to loss of control power and eventual core melt.

Because of the risk reduction which would accompany improvement in Unit 2 control room fragilities, a change is being made to increase control building seismic capacity. The 1-1/2-inch roof gap is being increased to at least 3 inches and rubber material is being provided in a portion of the gap to absorb the shock of the impact as shown in Figure 2. An analysis of the control building acceleration capacity was performed for this modification. The results of the analysis are documented in a report by Structural Mechanics Associates, Inc. (Appendix A). The analysis indicates that the modification will increase the control building median acceleration capacity to approximately 1.0g.

This modification replaces component ② in the Booleans and in IPPSS Table 7.2-3 by component ②$_m$ which has the parameters: a = 1.0g, $\beta_R = 0.3$, $\beta_U = 0.3$.

In Indian Point 2, the major contributors to fire related risks are fires originating in two zones: the switchgear room and the electrical tunnel (IPPSS Section 7.3.1). Accordingly, a modification was evaluted which allows routing of power to vital plant components without passing through these two zones. The modification involves installing additional transfer switches in the already existing ASDS and relocating the existing pneumatic indicators of steam generator levels and pressurizer level and pressure to a point outside the containment. These changes will allow quicker connection of a train of component cooling, charging, and service water pumps to a backup power source (Unit 1 switchgear).

The dominant fire scenario was loss of the component cooling system (CCS), due to power cable failure, and loss of the containment safeguard systems. A small LOCA via reactor coolant pump (RCP) seal failure results from the CCS failure.

The additional transfer switches will allow the operators to transfer the power source for these pumps to the ASDS within the first half hour of an accident that disables the component cooling and charging pumps. Figure 3 shows the transfer switch which is already installed as part of the

ASDS is basically a second power cable and power source for one auxiliary feedwater pump, two service water pumps, a component cooling pump, and a charging pump. The power cables will be routed through areas independent of the control room, cable spreading room, switchgear room, and the electrical tunnel. The ASDS also includes penumatic indicators for the steam generator levels and pressurizer pressure and level near the containment airlock. These indicators will be relocated outside of the containment as part of the modification.

The modification addresses those fire scenarios originating in the electrical tunnel or switchgear room which contain cables to many vital components. The details of the fire modifications analysis is given in Appendix B. The modification will reduce the contribution from the electrical tunnel, switchgear room, and containment spray pump area.

The frequency of seismically-initiated off-site releases subsequent to the above-described seismic modification is shown in Figure 4. These figures show the frequency of the various release categories, resulting from seismic events, after the modification. The modification reduces the frequency of seismically initiated melt by almost two orders of magnitude. The same reduction is achieved in category 2RW since it is the dominant type of seismic release. A reduction is also evident in the early overpressure release type Z-1. Category Z1-Q, which is caused by failure of the containment structure, is unchanged. Categories 8A and 8B become slightly more frequent, reflecting the fact that some seismically initiated melts which would previously have resulted in release 2RW or Z-1 are now, because of the modification, converted to the less deleterious categories 8A or 8B. The mean frequency of core melt from seismic events is reduced from 1.4×10^{-4} to 7.9×10^{-6} after the modification. The mean frequency of 2RW release from seismic events is reduced from 1.4×10^{-4} to 6.9×10^{-6} after the modification.

The frequency of fire-initiated releases subsequent to the above-described ASDS modification is seen in Figure 5. Core melt frequency due to fires is reduced by almost an order of magnitude, and the release category 2RW is reduced by approximately two orders of magnitude. The less significant 8A category is down by about a factor of 30, and 8B is unchanged. The mean core melt frequency from fire is reduced from 2.0×10^{-4} to 2.2×10^{-5} after this modification. The mean frequency of 2 RW release from fire is reduced from 1.4×10^{-4} to 6.7×10^{-6} after this modification.

With the two features combined, the release category frequencies are as shown in Figure 6. The contributions of the various types of initiating events to core melt frequency after installation of the described features is shown in Figure 7.

The effect of these features on public health risk is shown in Figure 8. As expected, the early fatalities risk curves are only slightly affected

since most of this type of damage results from release categories Z1-Q and 2, which are unaffected by the features. The other four damage indices, however, result mainly from 2RW and are thus affected noticeably on the logarithmic scale shown. With both features present, the total mean frequency of core melt is reduced from 4.7×10^{-4} to 1.7×10^{-4}. With both features present, the total mean frequency of 2RW release is reduced from 3.3×10^{-4} to 5.7×10^{-5}.

The foregoing risk, frequency and consequence data were prepared by our IPPSS consultants using the same methodologies and procedures employed in IPPSS.

In addition to the Unit 2 seismic and fire modification described above, certain amendments to IPPSS (which our consultants have determined will not have any significant effect upon risk) have been suggested by our consultants and others who have reviewed IPPSS subsequent to its submission on March 5. It is the licensees' intention to prepare and submit revision materials to IPPSS fully reflecting these developments in the near future, after presently ongoing analysis is completed. However in the interim, we consider it important that NRR in its ongoing review of IPPSS be advised of the two referenced modifications to Unit 2, and their significance to risk.

If you have any questions, please feel free to contact me.

Very truly yours,

John D. O'Toole

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