John D. O'Toole
Vice President

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March 15, 1984

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 November 29, 1982, we responded to your letter of October 4, 1982 requesting additional information concerning "PWR Main Steam Line Break with Continued Feedwater Addition, IE Bulletin No. 80-04." In response to question A.1 of your letter, we indicated that no single failure would preclude main feedwater isolation under conditions of a design basis steam line break event. To further assure that the FSAR analyses concerning both containment pressure and core reactivity response during a main steam line break event have been conservatively determined, we committed to perform an analysis assuming failure of a fast acting main feedwater regulating valve to close on demand.

Attachment 1 to this letter summarizes that analysis. Based on the analytical results, we conclude that the containment pressure and core reactivity response remain within FSAR acceptance criteria assuming the most limiting single active failure of a fast acting main feedwater regulating valve.

This concludes our response to IE Bulletin No. 80-04. Should you or your staff have any additional questions, please contact us.

Add: Reg File

Very truly yours,

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Attachment 1

IE Bulletin No. 80-04
Steam Line Break with Continued Feedwater Addition

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
March, 1984

IE Bulletin No. 80-04, Steam Line Break with Continued Feedwater Addition

Indian Point Unit No. 2 is provided with redundant means of automatic main feedwater isolation. Accordingly, no single failure will preclude feedwater isolation. Although feedwater isolation, assuming the occurrence of a single failure, is assured, the effect of such a failure during the time between the initial demand for and completion of feedwater isolation was not considered in the steam line break analysis contained in the Indian Point Unit No. 2 FSAR. Accordingly, an analysis has been performed to determine the effect of feedwater addition on the containment pressure and core reactivity response for a steam line break inside containment assuming the occurrence of the most limiting main feedwater single failure.

Figure 1 (attached) is a schematic representation of the condensate and boiler feedwater system for Indian Point Unit No. 2.

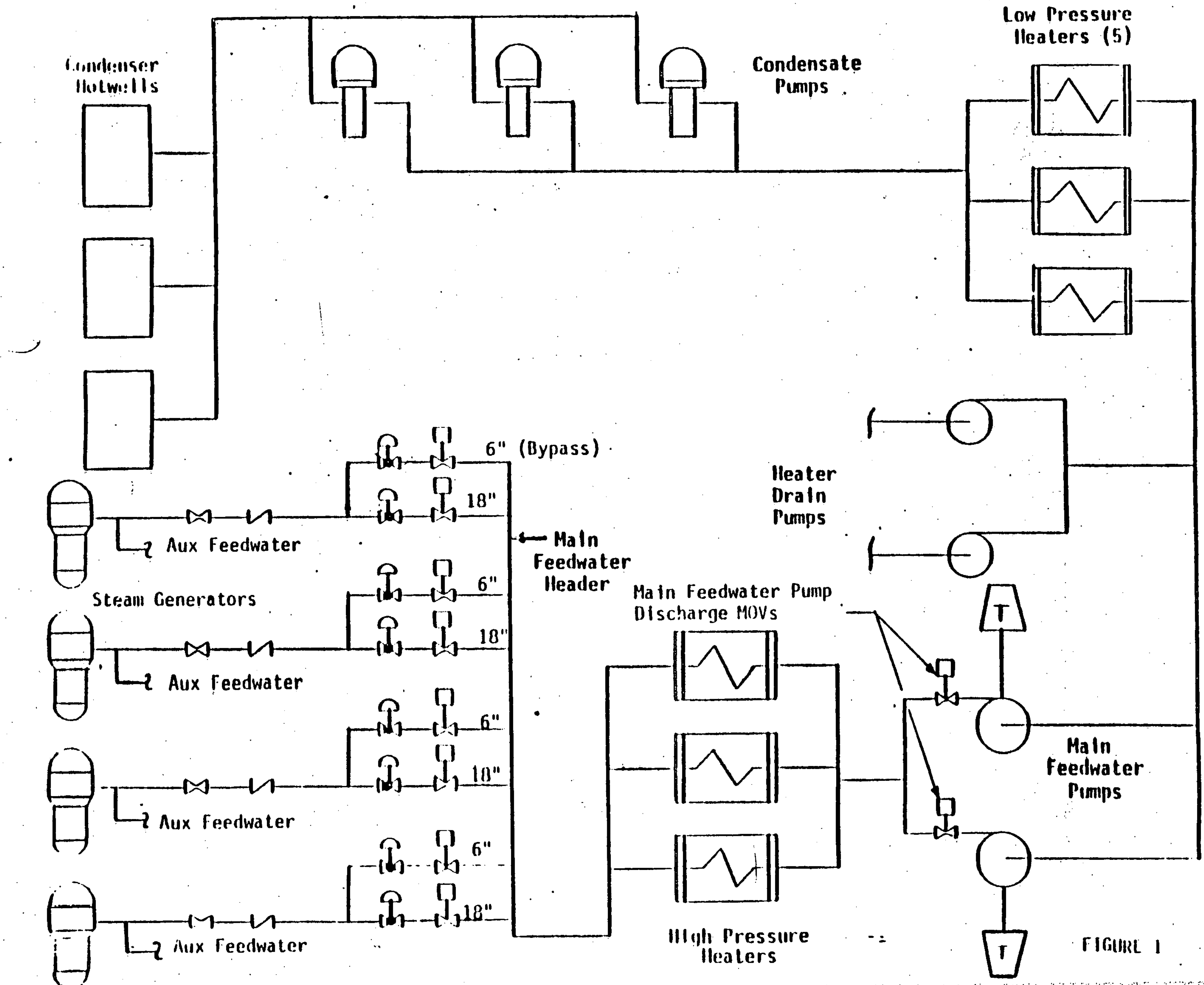
A main steam line break will initiate a safety injection signal via the steam line break protection circuitry. The safety injection signal will isolate main feedwater by automatically closing the air-operated main and low flow bypass feedwater regulating valves and closing both motor operated main boiler feedwater pump discharge valves, thus redundantly isolating both main boiler feedwater pumps from the steam generators. This action will also cause tripping of the main boiler feedwater pumps both by normal pump protection features (dead head protection) and by a direct trip from limit switches associated with each main boiler feedwater pump discharge valve. In addition, if off-site power is available, closure of the series motorized block valves associated with each main and low flow bypass feedwater regulating valve will be effected by the safety injection signal. The limiting single failure has been taken as failure of one of the fast acting feedwater regulating valves to close. These valves are designed to fail closed in approximately 8 seconds (5 sec ± 3 sec) whereas the motor operated main boiler feedwater pump discharge valves are designed to close in 60 seconds. Thus failure of the fast acting feedwater regulating valve, which is assumed to fail open, will result in maximizing the additional feedwater contribution. This single failure is assumed to occur in the feedwater line supplying the steam generator with the faulted steam line.

A single failure in the main feedwater system results in the maximum continued feedwater addition when the reactor is initially at full power. Therefore, a full power steam line break analysis was performed. The initial steam generator inventory was assumed to be at the high steam generator level trip setpoint thereby maximizing the inventory contribution. All three condensate pumps, the two heater drain tank pumps and both main boiler feedwater pumps were assumed to be operating upon initiation of the transient. The three condensate pumps and both heater drain tank pumps were assumed to continue feeding the steam generators, even after the main boiler feedwater pumps tripped off and coasted down. Feedwater flow from these sources was assumed terminated upon completion of feedwater isolation (i.e., complete closure of main boiler feedwater pump discharge valves after 60 seconds).

Auxiliary feedwater was assumed to initiate early in the transient automatically upon receipt of the safety injection signal. No operator action was assumed to throttle auxiliary feedwater flow for a period of ten minutes from transient initiation, at which time auxiliary feedwater flow to the faulted steam generator was assumed to be terminated. No credit was taken for the throttling effect introduced by the main boiler feedwater pump discharge valves during the process of valve closure nor was any credit taken for the resistance introduced by the main feedwater pumps during and following coastdown. As for the FSAR steambreak cases, the maximum containment pressure for this analysis was determined using FSAR Figure 14.3.4.3. This is very conservative in that peak pressure is determined strictly as a function of the total energy added to containment (obtained from the MARVEL code runs). Containment safeguards (i.e., fan coolers and containment sprays), containment passive heat sinks and condensation of water from the steam released to containment are not credited in such an analysis even though these would all act to lower the maximum calculated containment pressure. The calculation was ended at 650 seconds into the transient. The maximum containment pressure for this analysis was 40 psig. This compares with the containment design pressure of 47 psig.

In order to bound the steamline break accident with continued feedwater addition due to the limiting single failure, a second case was analyzed starting from hot zero power. This case was investigated since it has been the limiting steambreak case in the FSAR and to determine the effect of the additional secondary side inventory available in the steam generators at hot zero power. The assumptions concerning maximization of feedwater flow used in that analysis were the same as those used in the hot full power case providing additional conservatism since the speed and number of pumps operating at hot zero power is necessarily less than that which would be operating at hot full power. The maximum containment pressure reached for the hot zero power case was 39 psig.

DNB analyses were performed for both steamline break cases; in both analyses the DNBR remained above 1.30.


Low Pressure
Heaters (5)
Condenser
Hotwells
Condensate
Pumps
6" (Bypass)
18"
Aux Feedwater
Main
Feedwater
Header
Heater
Drain
Pumps
Steam Generators
6"
18"
Aux Feedwater
Main Feedwater Pump
Discharge MOVs
6"
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Main
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Pumps
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High Pressure
Heaters
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FIGURE 1