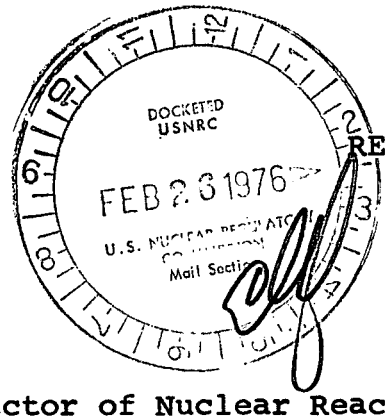
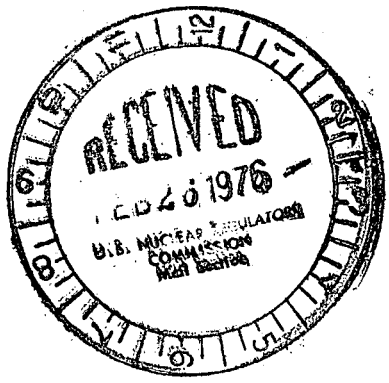
William J. Cahill, Jr.
Vice President

Consolidated Edison Company of New York, Inc.
4 Irving Place, New York, N Y 10003
Telephone (212) 460-3819



February 19, 1976

RE: Indian Point Unit No. 2
Docket No. 50-247
Facility Operating
License No. DPR-26



Director of Nuclear Reactor Regulation
ATTN: Mr. Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Reactor Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

By letter from Mr. George Lear, dated June 18, 1975, the Commission requested certain information and analyses pertaining to ECCS performance at Indian Point Unit No. 2. This submittal will address the potential for submerged valves within containment following a LOCA and will complete our response to that letter.

Following a postulated loss-of-coolant accident, the maximum water level rise inside containment has been calculated to reach El. 50'-1". This flooding level is based on the contents of the Refueling Water Storage Tank, the Spray Additive Tank, the four Accumulators and approximately 2/3 of the reactor coolant system being emptied into containment. Details of the calculation of the water level inside containment during the post-LOCA period are presented in Attachment A.

A survey of the containment building was conducted to identify those remotely operated valves that may be submerged at the maximum flood level of El. 50'-1" following a postulated loss-of-coolant accident. The results of this survey indicated that a total of 32 valves may become submerged during the post-LOCA period. These valves and the consequences of their being flooded con-

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sidering both short-term and long-term ECCS functions, containment isolation and other safety functions are presented in Attachment B. Only three of these valves could potentially be required to operate following an accident. These valves (856A, B, and D) will be relocated so that their motor operators will be above the calculated maximum flood level.

During the injection phase following a postulated loss-of-coolant accident, all of the cold leg injection lines must be open (Valves 856A, C, D and E) and the hot leg injection lines closed (Valves 856B and F) to assure that the flow required by the ECCS analysis is delivered to the core assuming a single failure. In order to assure this mode of operation, the cold leg valves are maintained in the open position. The hot leg valves are maintained in the closed position and are de-energized at their motor control center.

At approximately 24 hours after the postulated loss-of-coolant accident, hot leg recirculation will be initiated in order to assure that boric acid concentration in the core does not reach unacceptable levels. To establish hot leg recirculation in each high-head safety injection train, one of the two cold leg injection paths in that train must close and the corresponding hot leg injection path open.

Therefore, in order to withstand a single failure and assure the realignment of injection paths after 24 hours, Valves 856A, 856D and 856B will be relocated so that their motor operators will remain above the maximum flood level following a LOCA. The planned relocation of these valves will be performed during the upcoming refueling outage presently scheduled to begin April 1, 1976.

During the interim, safe operation of the facility is not adversely affected since several hot leg injection paths are available to prevent high concentrations of boric acid

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in the core region. These paths are as follows:

1. Injection through the high head safety injection system utilizing either the internal or external recirculation system.

2. Injection through the charging system (two paths to the charging system) utilizing either the internal or external recirculation system.

3. Injection through the RHR system (the residual heat removal system which is normally used to cool the reactor core during plant shutdown) utilizing either the internal or external recirculation system.

A simplified line diagram depicting the several hot leg injection schemes is provided in Attachment C.

In summary, alternate hot leg injection paths are available during the post-LOCA period should the path containing Valve 856B become unavailable. Therefore, the continued operation of Indian Point Unit No. 2 until the refueling outage does not create a safety problem nor does it present an undue risk to the health and safety of the public.

Very truly yours,

William J. Cahill, Jr.
Vice President

encl.
mp

ATTACHMENT A

The water level within the IP2 containment as a consequence of the postulated LOCA has been determined in two parts. Part I considers available water sources that could potentially spill from broken RCS piping during the post-LOCA injection phase; this spilled fluid is calculated to be 422,479 gallons. The second part determines a water level above containment floor elevation 46'-0" for various amounts of spilled water as well as the change in water volume per inch of depth at any elevation inside containment.

The data presented in Part II represents the water volume inside containment calculated for Indian Point Unit No. 3. This IP3 data is a conservative assessment of the free volume at the lower elevations of the Indian Point Unit No. 2 containment building and is, therefore, valid for our analyses.

For the 422,479 gallons determined in Part I, the water level reaches approximately elevation 50'-1" (i.e., 4'-1" water depth above floor elevation 46'-0"). At this elevation, approximately 6,750 gallons of water would be required to raise the containment water level an additional one inch.

I. Water Sources (Indian Point Unit No. 2)

a.	Refueling Water Storage Tank (RWST)	350,000 gallons
b.	Spray Additive Tank	5,100
c.	Accumulators (4) Tank and Piping Volume = 815 ft^3 Amount of Acc. Spilled (815 ft^3 x 7.48 gal/ft^3 x 4)	24,385
d.	Reactor Coolant System (RCS) Total RCS Inventory = 504,640 lbs. including Pressurizer (62% Full) Pressurizer Surge Line Piping (4 Loops) Pumps (4) SG Primary (4) Reactor Vessel (Full)	
	Less Water Remaining in Reactor Vessel (3000 ft^3 @ 50 lbs/ft^3) = 150,000 lbs.	
	Amount of RCS Spilled (0.12 gals/lbs. x 354,650 lbs)	42,994
	Maximum Amount of Water on Containment Floor at end of Changeover to Recirculation Phase	422,479 gallons

Discussion:

(a) The 350,000 gallons listed for the RWST is a conservative assessment of the maximum available water from this tank when filled to overflowing.

(b) The 5100 gallons listed for the Spray Additive Tank represents the full tank condition. For conservative estimates of water sources to containment, this tank is assumed to have been emptied by the spray system eductors during operation of the containment spray pumps.

(c) The 24,385 gallons listed for the four (4) accumulators represents maximum water when operating within Technical Specification limits. All four of these tanks are assumed to have delivered their contents to the R.C.S. during the LOCA. The inventory of these four tanks is delivered to the R.V. for core recovery during the injection phase.

(d) The 42,994 gallons listed as RCS spillage to the containment floor assumes conditions in the RCS in accordance with the Indian Point Unit No. 2 ECCS Appendix K analysis, that is, 100% power with pressurizer 62% full and total RCS inventory of 504,640 pounds. For the purpose of calculating RCS spillage to the containment floor, the Reactor Vessel is assumed to remain

filled to the bottom of the Reactor Vessel nozzle. This assumption is in agreement with ECCS performance evaluated by the Appendix K analysis using the NRC approved Westinghouse ECCS evaluation model. As part of this ECCS evaluation model, core recovery and reflood is accomplished during the post-LOCA injection phase, thus assuring that the Reactor Vessel is filled.

II. Containment Water Levels

Water Level	Water Volume
El. 48'-0"	247,921 gal.
48'-1"	254,871
48'-2"	261,822
48'-3"	268,772
48'-4"	275,723
48'-5"	282,673
48'-6"	289,623
48'-7"	296,952
48'-8"	304,280
48'-9"	311,609
48'-10"	318,938
48'-11"	326,267
49'-0"	333,596
49'-1"	340,725
49'-2"	347,854
49'-3"	354,983
49'-4"	362,112
49'-5"	369,241
49'-6"	376,370
49'-7"	383,499
49'-8"	390,249
49'-9"	396,999
49'-10"	403,749
49'-11"	410,499
50'-0"	417,249
50'-1"	423,999
50'-2"	430,749
50'-3"	437,499
50'-4"	444,249
50'-5"	450,999
50'-6"	457,749

In calculating these water volumes, the following was considered:

a) Crane wall and openings
b) Refueling canal
c) Refueling canal concrete beginning at El. 49'-8"
d) Wall of recirculation sump
e) Recirculation pump sump
f) Containment sump
g) Trenches
h) Reactor shield and reactor
i) Other concrete structures
j) Accumulator tanks beginning at El. 49'-1"
k) Reactor cavity

ATTACHMENT B

Indian Point Unit No. 2
Submerged Valve Operators Within Containment
(Based on Post-LOCA Maximum Flood Level at Elevation 50'-1")

Valve	Function	Valve Position During Plant Operation	Assumed Consequences to ECCS Performance Due to Flooding of Valve Operator		Containment Isolation or Other Safety Related Functions	Design Change Proposed
			Short-Term*	Long-Term**		
856A	Supply Hi-Head Safety Injection Flow to RCS Cold Leg During Post-LOCA Period (Loop #1).	Open per requirements of IP 2 Tech. Specs.	None	Valve Operator Malfunctions (e.g., fails to close). Consequently, this injection path may not close during initiation of hot leg recirculation.	None	Relocate valve and motor operator.
856D	Ditto (Loop #2)	Ditto	None	Ditto	None	Ditto

* Short-Term Injection Phase of LOCA

** Recirculation Phase of LOCA

ATTACHMENT B
(Continued)

Valve	Function	Valve Position During Plant Operation	Assumed Consequences to ECCS Performance Due to Flooding of Valve Operator		Containment Isolation or Other Safety Related Functions	Design Change Proposed
			Short-Term*	Long-Term**		
856B	Supplies Hi-Head Safety Injection Flow to RCS Hot Leg During Post-LOCA Period (Loop #3).	Closed and De-energized per Requirements of the IP2 Tech. Specs.	None	Valve Operator Malfunction (e.g., fails to open). Consequently, this injection path may not be available during initiation of hot leg recirculation.	None	Relocate valve and motor operator.
123	Excess Letdown Control - CVCS	Open	None - No requirement for Operation.	None - No requirement for Operation.	None	No
200A	Letdown Orifice Isolation Valve #21 - CVCS	Open (Intermittent).	None - No requirement for Operation.	None - No requirement for Operation.	None	No

ATTACHMENT B
(Continued)

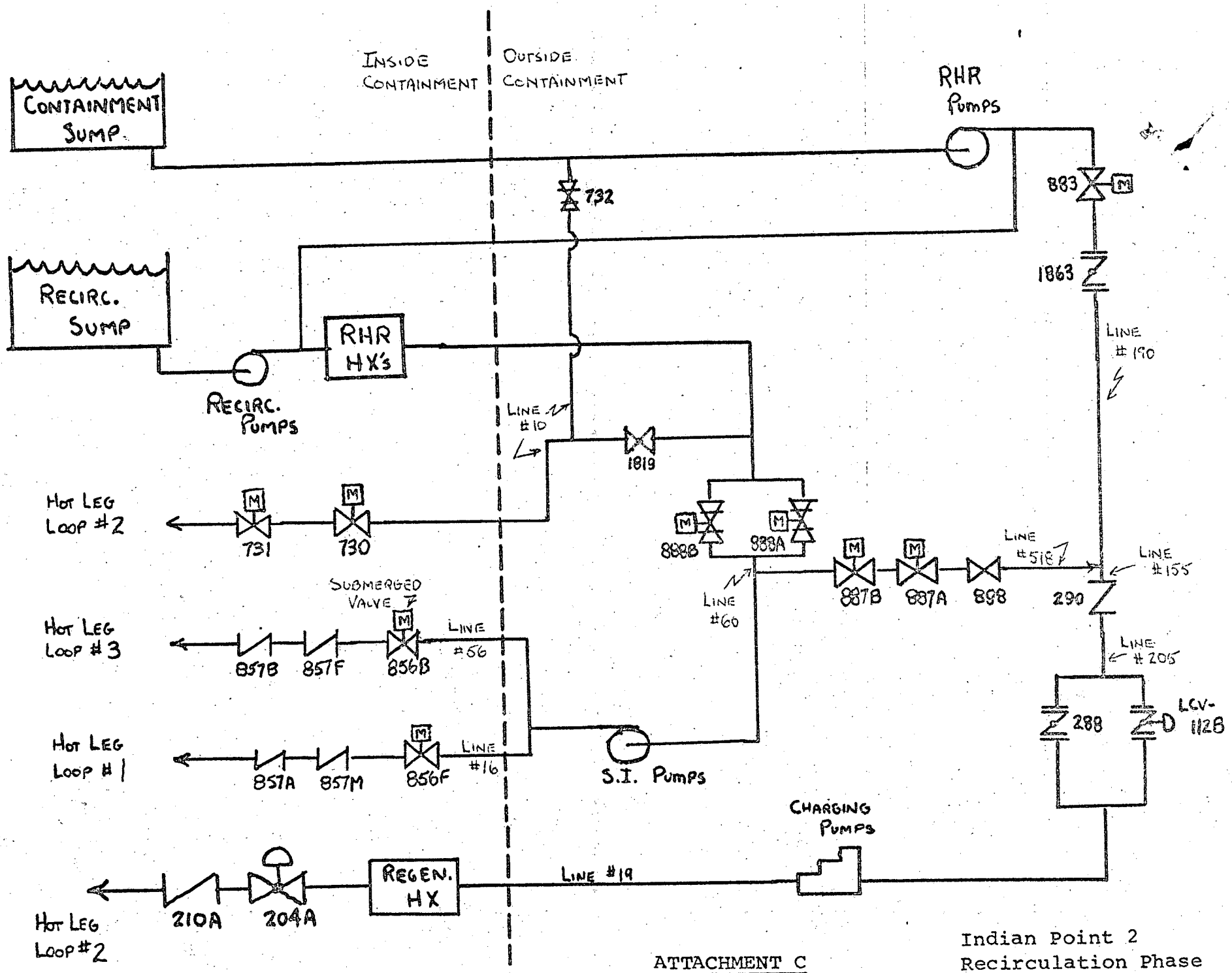
Valve	Function	Valve Position During Plant Operation	Assumed Consequences to ECCS Performance Due to Flooding of Valve Operator		Containment Isolation or Other Safety Related Functions	Design Change Proposed
			Short-Term*	Long-Term**		
200B	Letdown Orifice Isolation Valve #22 - CVCS	Open (Intermittent)	None - No requirement for Operation.	None - No requirement for Operation.	None	No
200C	Letdown Orifice Isolation Valve #23 - CVCS	Ditto	Ditto	Ditto	None	No
212	Auxiliary Spray Valve - CVCS	Ditto	Ditto	Ditto	None	No
890A	Accumulator #21 Fill Valve	Closed	Ditto	Ditto	None	No
890B	Accumulator #22 Fill Valve	Ditto	Ditto	Ditto	None	No
890C	Accumulator #23 Fill Valve	Ditto	Ditto	Ditto	None	No
890D	Accumulator #24 Fill Valve	Ditto	Ditto	Ditto	None	No
891A	Accumulator #21 N_2 Fill Valve	Ditto	Ditto	Ditto	Cont. Isol.	No
891B	Accumulator #22 N_2 Fill Valve	Ditto	Ditto	Ditto	Ditto	No
891C	Accumulator #23 N_2 Fill Valve	Ditto	Ditto	Ditto	Ditto	No

ATTACHMENT B
(Continued)

Valve	Function	Valve Position During Plant Operation	Assumed Consequences to ECCS Performance Due to Flooding of Valve Operator		Containment Isolation or Other Safety Related Functions	Design Change Proposed
			Short-Term*	Long-Term**		
891D	Accumulator #24 N_2 Fill Valve	Closed.	None - No requirement for Operation.	None - No requirement for Operation.	Cont. Isol.	No
894C	Accumulator #23 Discharge Isolation Valve	Open and de-energized per requirements of IP2 Tech. Specs.	Ditto	Ditto	None	No
896A	Accumulator #21 Drain Valve - WDS	Closed.	Ditto	Ditto	None	No
896B	Accumulator #22 Drain Valve - WDS	Ditto	Ditto	Ditto	None	No
896C	Accumulator #24 Drain Valve - WDS	Ditto	Ditto	Ditto	None	No
896D	Accumulator #24 Drain Valve - WDS	Ditto	Ditto	Ditto	None	No
955D	Accumulator #22 Sample Valve	Ditto	Ditto	Ditto	None	No
955E	Accumulator #23 Sample Valve	Ditto	Ditto	Ditto	None	No

ATTACHMENT B
(Continued)

Valve	Function	Valve Position During Plant Operation	Assumed Consequences to ECCS Performance Due to Flooding of Valve Operator		Containment Isolation or Other Safety Related Functions	Design Change Proposed
			Short-Term*	Long-Term**		
955F	Accumulator #24 Sample Valve	Closed.	None - No requirement for Operation.	None - No requirement for Operation.	None	No
1003A	RCDT Level Control Valve WDS	Open (Intermittent)	Ditto	Ditto	None	No
1003B	Ditto	Ditto	Ditto	Ditto	None	No
1163	RCFC Condensate Weir Drain Valve - WDS	Ditto	Ditto	Ditto	None	No
1164	Ditto	Ditto	Ditto	Ditto	None	No
1165	Ditto	Ditto	Ditto	Ditto	None	No
1166	Ditto	Ditto	Ditto	Ditto	None	No
1167	Ditto	Ditto	Ditto	Ditto	None	No
1609	PRT Drain Valve - WDS	Ditto	Ditto	Ditto	None	No



ATTACHMENT C

Indian Point 2
Recirculation Phase
Hot Leg Injection Paths