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DESCRIPTION:

Ltr. Re our ltr. of 3-14-75 & 6-13-75.. & their Ltr. of 4-19-75...... w/attachments.......

PLANT NAME: Three Mile Island # 1

ENCLOSURES:

Re-evaluation of ECCS cooling performance calculated in accordance with an acceptable evaluation model ......

(1 cy. Encl. Rec'd)

FOR ACTION/INFORMATION — VCR 7-16-75

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ECCS 1

METROPOLITAN EDISON COMPANY SUBSIDIARY OF GENERAL PUBLIC UTILITIES CORPORATION

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July 9, 1975
GQL 1255

50-289

RECEIVED
JUL 12 1975
U.S. ATOMIC ENERGY COMMISSION
Mail Section

Director
Division of Reactor Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Pursuant to the Commission's Order for Modification of License for Three Mile Island Nuclear Station Unit 1 (TMI-1) dated December 27, 1974, a re-evaluation of Emergency Core Cooling System (ECCS) cooling performance calculated in accordance with an acceptable evaluation model which conforms with the provisions of 10CFR50, Section 50.46, has been completed. However, the proposed changes to the Technical Specifications made necessary as a result of this re-evaluation are not included in this submittal in that they are still in required committee review. Met-Ed will operate TMI-1 within the most restrictive and conservative limits of the proposed Technical Specification supplied to us by Babcock and Wilcox (B&W) and our present Technical Specification limits. Met-Ed will submit within 30 days a completed Technical Specification change request consistent with the re-evaluation.

The evaluation model utilized in performing the re-evaluation of ECCS cooling performance is described in B&W non-proprietary Topical Report BAW-10104, "B&W's ECCS Evaluation Model". The results of the evaluation for B&W 177 fuel assembly units with a lowered-loop arrangement are described in non-proprietary Topical Report BAW-10103, "ECCS Evaluation of B&W's 177 Fuel Assembly Lowered Loop NSS". The analysis presented in BAW-10103 for the B&W 177 fuel assembly units with a lowered-loop configuration is generic in nature since the parameters used in this analysis are conservative for TMI-1. The parameters associated with TMI-1 are bounded by those utilized in the generic analysis, and thus BAW-10103 provides a conservative evaluation of ECCS performance for TMI-1.

The results presented in BAW-10103 demonstrate the conformance of TMI-1 to the criteria of 10CFR50, Section 50.46, under the operating conditions specified in the proposed Technical Specifications which will be submitted within 30 days.

In addition to the above and in accordance with your letter of June 13, 1975, the following information is also provided.

1. Break Spectrum and Partial-Loop Operation

It has been demonstrated using the FAC guidelines that peak cladding temperatures were significantly lower for partial pump operation than for 4 reactor coolant pump operation. The proposed technical specification limits for partial pump operation are based on minimum shutdown margin and ejected rod worth criteria.

It has been shown by additional analysis, using the FAC guidelines that the minimum shutdown margin and ejected rod worth criteria are still limiting. This analysis will be issued by July 23, 1975.

2. Potential Boron Precipitation

The requested information was provided by Met-Ed in our letter of April 19, 1975 in response to your letter of March 14, 1975.

3. Single Failure Analysis

As requested, a single failure analysis for manually-controlled, electrically-operated ECCS valves has been performed. The results of this analysis are contained in Chapter 6 of the TMI-1 FSAR and are supplemented in Attachment 1 to this letter.

Based on the information provided in the TMI-1 FSAR and Attachment 1, it is concluded that no credible single failure or operator error affecting any manually-controlled, electrically-operated ECCS valve could significantly adversely affect ECCS performance.

4. Submerged Valves

The following valves will be submerged when the entire contents of the BWST are discharged into the Reactor Containment Building:

ICV 1A and 1B	(Letdown Cooler shell side inlet isolation valves)
ICV 20	(RC Drain Tank cooler outlet isolation valve)
MUV 1A and 1B	(Letdown Cooler tube side inlet isolation valves)
MUV 2A and 2B	(Letdown Cooler containment isolation)
ICV 2	(Intermediate Cooling containment isolation)
WDL V302	(RC Drain Tank recirculation)
WDL V305	(RC Drain Tank recirculation)

Only three of the above valves (ICV 2 and MUV 2A and 2B) are Engineered Safety Feature valves. These three valves are containment isolation valves and will have performed their safety function prior to being submerged.

None of the above valves are required to change position for the short term or long term ECCS function and therefore their submergence will not affect any ECCS function.

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Even if power were maintained or inadvertently applied, during or after submergence, to one of the above valves, this single failure has been determined to have no adverse effects on the remainder of the electrical system.

5. Containment Pressure

The containment pressure used to evaluate the performance capability of the ECCS has been calculated in accordance with the methods contained in Section 4.3.6.1 of BAW-10104 and the results are presented in Section 4.4 of BAW-10103.

Also, as requested on Page 7 of the staff's Safety Evaluation Report which accompanied the Order for Modification of License, as-built passive containment heat sink data has been compiled and is given in Attachment 2.

The heat sink inputs to the generic model are conservative compared to this as-built data compilation. Using the generic heat sinks, the containment pressure calculation is in accordance with Branch Technical Position CSB 6-1.

Sincerely,

R C Arnold

R. C. Arnold
Vice President

RCA:CWS:tas

cc: Office of Inspection and Enforcement, Region 1

Attachments 1 & 2

File: 20.1.1 / 7.7.3.1.1

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In addition to that provided by Chapter 6 of FSAR

ATTACHMENT 1

SYSTEM	VALVE MARK NO.	DESCRIPTION	NORMAL POSITION	SINGLE FAILURE	EVALUATION
HPI	MU-V20	Seal Injection Line RB Isolator Valve	Open	Closed	Would only stop seal injection flow which is being provided by one HPI pump. No effect on ECCS performance.
	MU-V18	Isolation Valve in Normal Makeup Line	Closed	Open	Would cause slight increase in flow rate in one HPI string. If required, the flow rate can be reduced by throttling or closing HPI Valve MU-V16 A/B or by closing MU-V17.
	MU-V12	Make-up Tank Isolation Valve	Closed by Emergency Procedure	Open	Check valve MU-V112 prevents reverse flow of core cooling water into MU-T1.
LPI	DH-V1,2,3	Decay Heat Drop Line Isolation Valve	Closed	Open	Valves are all in series and are also in series with manual normally closed valves DH-V12 A/B. Unplanned operations of one of these valves would have no effect on ECCS injection capability. These valves are also used for control of boron concentration during long term cooling and must be opened within 30 days after the accident. A redundant flow path is available should any of these valves fail to open.
LPI	DH-V5A or DH-V5B	BWST Isolation Valve	Open	Fails to Close	If DH-V5 A or 5B fail to close when injection from the RB sump is to be established, check valve DH-V14A/B will prevent reverse flow back to BWST.
	DH-V6A or DH-V6B	RB Sump Outlet Valve	Closed during initial portion of accident	Fails Open	At most, one LPI pump and one RB spray pump would be effected. The redundant pumps would still be operable. Both strings of HPI would be available during initial injection from the BWST. If either DH-V6A or B should fail open during initial LPI from the BWST, then a RB pressure above ~35 psig would prevent flow out of the BWST to that LPI pump and RB spray pump. These pumps would therefore run dry for the time required to fill the RB sump. A 5 ft^2 LOCA will release ~2 times the sump volume in liquid form within the first 5 seconds.

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SYSTEM	VALVE MARK NO.	DESCRIPTION	NORMAL POSITION	SINGLE FAILURE	EVALUATION
					Since the LPI pump and building spray pump probably are capable of operating dry for several minutes, failure of DH-V6A/B during the initial portion of the accident, would probably have no effect on ECCS performance and at the worst, would only affect one of the redundant strings of LPI and building spray system.
	DH-V7A/B	Isolation Valve Between LPI and HPI	Closed	Open	Would increase flow rate of LPI pump by about 500 gpm since LPI pump would be pumping to both the reactor vessel and also to the suction of one HPI pump. No adverse effect will occur and flow will be throttled if necessary to maintain acceptable flow rate. Redundant LPI string is not effected.
	DH-V61 A/B	Isolation Valve in caustic addition line to suction of LPI pump	Closed	Open	Upstream manual isolation valve CA-V256 would be closed. This single failure therefore has no effect.
CF	CF-V1A/B	CF Tank Isolation Valve	Open	Not Credible	Tech. Spec. 3.3.1.2 requires breaker for valve operator to be open.
	CF-V2A/B	CF Tank Drain Valve	Closed	Opens	Redundant containment isolation valves CF-V20A/B would remain closed preventing any effect as a result of this single failure.
	CF-V3A/B	CF Tank Vent Valve	Closed	Not Credible	The breaker for the valve operator will be opened to ensure that this valve cannot open before or during CF tank discharge and result in a loss of CF driving pressure.

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A Comparison of Key Parameters Employed in the Generic Evaluation Model to Individual Plant Parameters

Parameter	Generic Model	Met-Ed
Reactor Building Free Volume ft^3	2.205×10^6	$\leq 2.205\times10^6$

The building is modeled with five heat sinks:

a. The reactor building walls including concrete wall, steel liner, and anchors:

Exposed area, ft^2	= 67,410.0	$\leq$ 67,410.0
Paint thickness, ft	= 0.00083	$\geq$ 0.00083
Steel thickness, ft	= .05504	$\leq$ .05504
Concrete thickness, ft (**)	= 4.0	$\leq$ 4.0

b. The reactor building dome including concrete, steel liner, and anchors:

Exposed area, ft^2	= 18,375.0	$\leq$ 18,375.0
Paint thickness, ft	= 0.00083	$\geq$ 0.00083
Steel thickness, ft	= .06546	$\leq$ .06546
Concrete thickness, ft	= 3.0	$\leq$ 3.0

c. Painted internal steel: (*)

Exposed area, ft^2	= 249,000.0	$\leq$ 249,000.0
Paint thickness, ft	= 0.00083	$\geq$ 0.00083
Steel thickness, ft	= 0.03125	$\leq$ 0.03125
Unpainted Internal Steel Area, ft. squared (###)	= 36,000	$\leq$ 36,000

d. Unpainted internal steel, stainless steel: (*)

Exposed area, ft^2	= 10,000.0	$\leq$ 10,000.0
Thickness, ft	= 0.03125	$\leq$ 0.03125

e. Internal concrete: 10CFR50.46a2 says these can be assumed

Exposed area, ft^2	= 160,000.0	$\leq$ 160,000.0
Paint thickness, ft	= 0.00083	$\geq$ 0.00083
Concrete thickness, ft	= 1.0	$\leq$ 1.0

f. Thermophysical Properties:

Thermal Conductivity, Btu/h-ft^2-F

POOR ORIGINAL

Material		
Concrete	= 0.92	$\leq$ 0.92
Steel	= 27.0	$\leq$ 27.0
Stainless Steel	= 9.1836	$\leq$ 9.1836
Paints	= .6215	$\leq$ .6215

(*) The total area of sinks C and D should be calculated and shown to be less than 295,000.0 ft^2.

(**) See B&W Topical Report 10091 Sup.1 Pages 3-14 & following (Question 25).

(###) This thickness may be assumed, per CSB 6-1 (NRC).

f. Thermophysical Properties: (Cont'd)

POOR ORIGINAL

Heat Capacity, Btu/ft^3-F

Material		
Concrete	= 22.6	≤22.6
Steel	= 58.8	≤58.8
Stainless Steel	= 54.263	≤54.263
Paint	= 40.42	≤40.42

g. Delay Times, Sec.

Reactor Building Coolers (No loss of off-site power)	= 0.0	≥0.0
Reactor Building Sprays (No loss of off-site power)	= 65.0	≥65.0

h. Building Initial Conditions:

Temperature, F	= 110	>110
Pressure, psia	= 13.7	≥ 13.7
Relative Humidity, %	= 100	≤100

Verification of the above values can be obtained from B&W topical report BAW-10103 Section 4.4.

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