Regulatory File Cy

METROPOLITAN EDISON COMPANY SUBSIDIARY OF GENERAL PUBLIC UTILITIES CORPORATION

POST OFFICE BOX 542 READING, PENNSYLVANIA 19603 TELEPHONE 215 – 929-3601

November 10, 1972

Directorate of Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

ATTENTION: Mr. R. C. DeYoung
Assistant Director for Pressurized Water Reactors

SUBJECT: THREE MILE ISLAND UNITS 1 AND 2
CIRCULATING WATER EXPANSION JOINT FAILURE
DOCKET NOS. 50-289 AND 50-320

Gentlemen:

In response to your letter of September 26, 1972, we have reviewed the design of Three Mile Island Units 1 and 2 to determine whether the failure of any non-Category I equipment, particularly in the circulating water system and fire protection system, could result in a condition that might potentially adversely affect the performance of safety related equipment required for safe shutdown of the units or to limit the consequences of an accident. The following paragraphs describe the findings of the review and the proposed solutions to this potential problem for each of the Three Mile Island Units.

The physical design of Three Mile Island Unit 1 is favorable to minimize the possibility of flooding safety related equipment via a circulating water expansion joint failure. These design conditions are:

1. The turbine room elevation is at grade so that relief may be attained if the water level resulting from the postulated failure should reach that elevation (305').

2. The source of cooling water is the cooling tower flume (Elev. 299'6") which is below the expansion joint elevation (308') so that water from the source will not flow by gravity to the postulated rupture.

3. Each of the six (6) circulating water pumps has its own 44" diameter discharge valve with one (1) minute closing time.

4. Any leakage from the postulated rupture would first fill the condenser pit which has approximately 600,000 gallon free volume.

With the Unit 1 arrangement described above, leakage from the postulated rupture should be (1) detected, (2) C.W. pump discharge valves closed which, in turn, trips pumps. The present detection system is from the condenser pit sump pump alarms. A large sump pump alarm without deluge alarm will indicate a large sump flow. The operator has approximately 55 seconds upon receipt of the alarm to close the C.W. pump discharge valves (which trip pumps) before flooding the condenser pit to elevation 305'. The actual volume of water that would enter the pit during the one minute valve closing time is approximately 370,000 gal.

In order to assure the operator better confidence that a rupture has occurred and not a fire, three float level switches will be installed in the condenser pit area with two out of three logic on a pit water level annunciated in the control room.

This alarm will also automatically open the 15' wide rolling door at grade serving the railroad to provide back-up relief, if necessary.

Also, a master switch with red handle will be added to the control console which will enable the operator to directly trip all circulating water pumps and thus effect an approximate additional minute savings in time over discharge valve closure.

With the above arrangement, the leakage from the postulated rupture will be contained in the condenser pit.

Other non-category I (seismic) equipment has been reviewed to determine if a rupture could result in a flooding condition of safety related equipment.

The secondary service river water line enters the heat exchanger vault briefly to cross connect with the nuclear service line. Duplex sump pumps operate on split level control with a high level alarm being annunciated. An operator has sufficient time to investigate and isolate should a leak occur. There is no machinery in the vault other than the aforementioned sump pumps and motor operated valves with handwheels and even if the line rupture should occur and the heat exchangers be slightly flooded, their function is maintained. It should also be noted that there are no expansion joints in the vault.

Each pump in the screen house has an expansion joint. Should a rupture occur in one of these smaller joints or non-seismic systems, the discharge would flow over the operating floor and out the doorways to the screen and bar rake openings and thus be dumped back to the river. A level alarm will be added to detect water level.

A 12" fire main exists in the Auxiliary Building and the possibility of its rupture has been studied. This main was installed to give a third path of travel through Unit No. 1 power plant and to supply water to the 1-1/2" fire hose stations, 4" deluge valve connections for the protection of the charcoal filters, and a 6" alarm valve for the sprinkler system at elevation 306' in the Control Building.

The water demand for the above systems does not require a 12" fire main. Therefore, to limit the water discharge into the Auxiliary Building in the event

of the 12" fire main rupture, and still provide the water supply for fire demand, the following changes will be made:

1. Relocate the Control Building sprinkler connection to outside the Auxiliary Building.

2. Install 1-1/8" circular orifices after the post indicator valve outside the south end of the Auxiliary Building and on the Auxiliary Building side of the sprinkler connection.

3. Install a low pressure pressure switch in the 12" fire main between the orifices.

With these modifications, should a rupture occur in the 12" fire main in the Auxiliary Building, the low pressure alarm would sound along with a fire pump running signal. Operators would then have ample time to shut off this section of the 12" fire main before any engineered safeguards could be affected.

The review of the Unit 2 design revealed that the water system located in buildings containing safety related equipment are designed to meet Seismic I requirements and will remain intact during such an occurrence.

The common wall between Turbine Building and Control Building Area is a Seismic I wall. However, there are four (4) openings in this wall which could allow the passage of water from the Turbine Building to affect the safety related equipment located in the Control Building Area.

The most severe event which could lead to water flooding the Control Building Area will result from the rupture of a circulating water system component (e.g., expansion joints) in the Turbine Building.

We have analyzed the failure of the expansion joints at the condenser in the Turbine Building and have concluded that failure of the joints could allow water to enter the Control Building Area where safety related equipment is located.

The openings in the Control Building Area wall connecting it to the Turbine Building are two personnel access openings and two equipment openings which would be fitted with roller doors. The personnel access openings connecting these areas will be eliminated and the equipment openings will be provided with watertight doors, in lieu of the roller doors, that can be quickly manually closed.

Elimination of the personnel access doors will be an inconvenience but will not be a safety problem from an accessibility standpoint. Alternative means of access is available from the 305' level in the Turbine Building through the Control Building.

During normal operation the equipment doors will be closed, except on the infrequent occasions that equipment will be removed from the Control Building Area.

Administrative procedures will be implemented to ensure that an equipment door remains open only for the minimum necessary period. An attendant will be on duty during the period a door is open to observe the expansion joints. In the highly unlikely event of a joint bursting at this time, the attendant will close the door and inform the Control Room to stop the circulating water pumps.

As an added precaution, we will increase the sill height of the equipment openings to approximately 15", which will increase the water retention capacity of the Turbine Building to around 500,000 gallons and will provide some measure of time for closing the door, should it be open at the time of an incident.

We trust that the above information satisfactorily answers your letter.

Very truly yours,

J. G. Miller
Vice President

mw

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TO:	ORIG	CC	OTHER	SENT AEC PDR	SENT LOCAL PDR
Mr. R. C. DeYoung	1			X	X

CLASS: (U) PROP INFO	INPUT	NO CYS REC'D	DOCKET NO:
		1	50-289/320

DESCRIPTION:
Ltr re our 9-26-72 ltr.....furnishing info concerning non-Category I equipment-related to circulating water expansion joint failure.....

ENCLOSURES:

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ACKNOWLEDGED

PLANT NAMES: Three Mile Island Units 1 & 2

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