

W 04/26/78

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)
DISTRIBUTION FOR INCOMING MATERIAL

50-289

REC: REID R W
NRC

ORG: HERBEIN J G
METROPOL EDISON

DOC DATE: 04/18/78
DATE RCVD: 04/24/78

DOCTYPE: LETTER NOTARIZED: NO
SUBJECT:

COPIES RECEIVED
LTR 1 ENCL 1

FORWARDING SUPPORTING INFO TO APPLICANT'S 02/14/78 TECH SPEC PROPOSED CHANGE
|
INFO.

PLANT NAME: THREE MILE ISLAND - UNIT 1

REVIEWER INITIAL: XJM
DISTRIBUTOR INITIAL: *me*

***** DISTRIBUTION OF THIS MATERIAL IS AS FOLLOWS *****

GENERAL DISTRIBUTION FOR AFTER ISSUANCE OF OPERATING LICENSE.
(DISTRIBUTION CODE A001)

FOR ACTION: BR CHIEF REID**W/7 ENCL

INTERNAL:

REG FILE**W/ENCL

I S E**W/2 ENCL

HANAUER**W/ENCL

EISENHUT**W/ENCL

BAER**W/ENCL

EEB**W/ENCL

J. MCGOUGH**W/ENCL

NRC PDR**W/ENCL

OELD**LTR ONLY

CHECK**W/ENCL

SHAO**W/ENCL

BUTLER**W/ENCL

J COLLINS**W/ENCL

EXTERNAL:

LPDR'S

HARRISBURG, PA**W/ENCL

TIC**W/ENCL

NSIC**W/ENCL

ACRS CAT B**W/16 ENCL

1563 298

DISTRIBUTION: LTR 40 ENCL 39
SIZE: 1P+2P+2P

CONTROL NBR: 781160157

***** THE END *****

7910810576 p



METROPOLITAN EDISON COMPANY

POST OFFICE BOX 542 READING, PENNSYLVANIA 19603

TELEPHONE 215 - 929-3601

April 18, 1978
GQL 0581

Director of Nuclear Reactor Regulation
Attn: R. W. Reid, Chief
Operating Reactors Branch No. 4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555



Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Technical Specification Change Request No. 71

Your letter of February 24, 1978 requested additional information in order for you to review the subject request. Upon review of Met-Ed's submittal, it was determined that certain technical justification had been omitted, because this issue appeared to be generic and had been addressed by several other licensees. Furthermore, Met-Ed incorrectly stated that the reason for requesting the change was to meet NRC concerns and requirements.

In view of the above, the attached pages are forwarded in support of Technical Specification Change Request No. 71.

Sincerely,

J. G. Herbein
Vice President-Generation

JGH:RJS:cjg

Attachment

1563 299

REGULATORY DOCKET FILE COPY

A001/s *
1/1

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Technical Specification Change Request No. 71
(Additional Information)

Reasons for Change Request

The present TMI-1 Technical Specification 4.16.1.c states, "verifying through manual actuation that the valve begins to open from the full closed position with a force equivalent to $\leq (0.15)$ psid, and is fully open with a force equivalent to $\leq (0.30)$ psid." B&W reviewed the assumptions used in the ECCS analysis and determined, "Demonstration that the vent valves will be fully open when a pressure differential is applied across them that is lower than that obtained during the LOCA analysis is sufficient to verify that the vent valves are operational." B&W further determined that the required pressure differential necessary to hold the vent valves full open must be shown to be no more than 1.0 psid, and that the Tech Spec should read, "verifying through manual actuation that the valve is full open with a force equivalent to $\leq (1.00)$ psid." Since these valves are normally exercised by applying a force vertically upward with an exercising tool, B&W calculated a vertical force of ≤ 400 lbs. to be equivalent to a differential pressure of $\leq (1.00)$ psid. This change deletes the start-to-open criterion, assumes changing the full-open criterion from $\leq (0.30)$ psid to $\leq (1.00)$ psid, and specifies a force of ≤ 400 lbs. (applied vertically upward) to verify that the valve is fully open.

Safety Evaluation Justifying Change

NRC letter of March 10, 1976, concluded that a vent valve flow penalty need not be taken if reactor internals vent valve surveillance requirements are incorporated into the Station Technical Specifications. The NRC issued Amendment No. 25 on March 7, 1977, to the TMI-1 Technical Specifications. However, based on experience at other plants, the criterion appeared to be overly conservative and restrictive. In an attempt to rectify the situation, B&W reviewed the assumptions used in the ECCS analysis regarding action of the internals vent valves and determined that:

1. In the event of a LOCA in the reactor inlet piping, internals vent valves have been designed in order to provide a direct steam relief path from the upper plenum to the break. During the reflooding phase of a LOCA transient, steam generated from ECCS fluid coming into contact with the hot cladding will pressurize the upper plenum, thereby opening the vent valves and allowing steam to flow through them. The rate of steam relief is calculated using a conservatively high flow resistance factor (k-factor) of 4.2 as is discussed in Topical Report BAW-10104. Demonstration that the vent valves will be full open when a pressure differential is applied across them that is lower than that obtained during the LOCA analysis is sufficient to verify that the vent valves are operational.
2. Large break LOCA analysis for B&W 177 FA plants demonstrating the compliance of the ECCS systems to 10 CFR 50.46 has been reported in Topical Report BAW-10103. During the reflooding phase of the accident, a pressure differential in excess of 1.0 psid was maintained across the vent valves throughout the transient. Therefore, the required pressure differential necessary to hold the vent valves full open must be shown to be no more than 1.0 psid.

Attached find the force equivalent calculation for a 1.0 psid driving force necessary to hold the vent valves full-open. As can be seen by this calculation, the value specified in the proposed Technical Specification ensures that the valves will be open during the reflooding phase. Also attached, for informational purposes only, find the calculation for derivation of the force equivalent needed for the vent valves to start to open. As BAW-10103 takes credit for the valves in the full-open position only and by virtue of the fact a lesser force equivalent is required to start-to-open, the requirement for testing of the valves "start-to-open" force is deemed to be unnecessary.

1563 301

Purpose:

Calculate equivalent vent valve exercise force to "Hold-Open" pressure of 1.0 psi.

Analysis:

The valve face makes an angle of 26° with the vertical in the open position. A one (1) psi pressure drop acting over the 15 inch exposed disc face has a $9 \frac{3}{8}$ inch moment arm with the hinge.

$$\begin{aligned} \text{Moment} &= \text{Pressure Drop} \times \text{Area} \times \text{Moment Arm} \\ &= 1.0 \text{ psi} \times \frac{\pi}{4} (15 \text{ in.})^2 \times 9.375 \text{ in.} \\ &= 1660 \text{ in-lbs.} \end{aligned}$$

Since the exercising force is a vertical force applied to the exercising pin, its moment arm is the projected horizontal distance of its radial location with respect to the valve hinge.

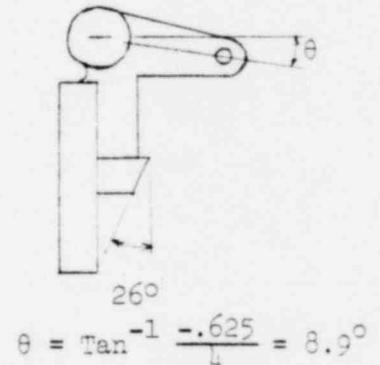
$$\text{Pin Radial Location is } ((4)^2 + (5/8)^2)^{1/2} = 4.048 \text{ in.}$$

The angle the pin makes with the horizontal when the valve is open is the angle the valve makes with the vertical (26°) minus the angle of the pin from horizontal when the valve is vertical (θ):

$$\begin{aligned} \text{Angle} &= 26^\circ - \tan^{-1} \frac{5/8}{4} \\ &= 17.1^\circ \end{aligned}$$

Moment of the exercising force:

$$\begin{aligned} M_{\text{force}} &= \text{Force} \times \text{Pin Radial Location} \times \text{Cosine Angle} \\ &= F \times 4.048 \times \cos 17.1^\circ \\ &= 3.87F \end{aligned}$$



Setting the force moment equal to the pressure moment, the equivalent vent valve exercising force is solved:

$$3.87F = 1660$$

$$F = 430 \text{ lbs.}$$

1563 302

Purpose:

Calculate equivalent vent valve exercising force to "Start-To-Open" pressure.

Analysis:

To simplify parameterizations, the calculations will be based on 1.0 psi driving pressure. For any other "start-to-open" pressure, the equivalent exercise force will be in direct proportion; i.e., for a 1/2 psi differential pressure, the exercise force is 1/2 the calculated value given below.

In the "closed" position, the valve hangs 5° from the vertical. The moment arm of the exercising pin when the valve is closed is:

$$L = ((4)^2 + (\frac{5}{8})^2)^{\frac{1}{2}} \cos (\tan^{-1} \frac{5/8}{4} - 5^\circ)$$

$$= 4.039 \text{ in.}$$

The pressure moment of the pressure acting over the 14 inch face of a closed valve is:

$$M = 1.0 \times \frac{5}{8} (14)^2 \times 9.375$$

$$= 1440 \text{ in-lbs.}$$

Setting the force and pressure moments equal:

$$4.039F = 1440$$

$$F = 360 \text{ lbs.}$$

1563 303