

April 13, 1979

NOTE TO: V. Stello, Jr., Director, TMI Operations
FROM: F. J. Miraglia, Jr., Coordinator, Team B

The attached report on penetration availability was prepared by IECB staff and is provided for your information.

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PENETRATION AVAILABILITY

ABSTRACT: This report presents, in abbreviated form, a summary of the Staff's efforts in evaluating the ability to monitor the Three Mile Island Unit 2 reactor pressure and level using instruments outside of the containment.

INTRODUCTION: The following penetrations were identified by Bill Millstead as being suitable for making pressure measurements during natural circulation.

- (1) PR 538
- (2) R 541
- (3) R 546
- (4) R 591
- (5) R 592

DISCUSSION: It was recognized that some of these penetrations are separated from the primary system by check valves which swing in the "wrong" direction, but Chuck Graves of the RSB has stated that pressure measurements can be made (once the valve is lifted off of its seat) as long as no flow occurs in the out of containment direction.

FINDINGS: 1. The following penetrations/valve strings are available for measuring pressure:

PENETRATION	VALVES (inboard out)
(a) R 538	RC-V117 Pressurizer CA-V1 steam space
	RC-V122 Pressurizer CA-V3 water space
	RC-V123 RC-P-1A CA-V6 Suction

- | | |
|-------------------|---|
| (b) R 541 | MU-V1A or MU-V1B RC-P-1A
and MU-V2A or MU-V2B Suction
(both A or both B) |
| (c) R 591 or R592 | RC Pump discharge Isolated
by inboard check valve little
or no flow will be tolerated |
| (d) R 546 | CF-V3A or B Core Flood
WDG-V2 tank Vents |
2. The following combinations of penetrations and valve strings are presented in highest to lowest point of connection to the primary system.
- | | |
|--------------------------------------|---|
| (a) R 546 | CP V3A & WDG-V2
CF V3B & WDG-V2 |
| (b) R 538 | RC-V117 & CA-V1 |
| (c) R 538
R 541
R 591
R 592 | RC-V123 & CA-V6
MU-V1A & MU-V2A
MU-V1B & MU-V2B
MU-V402C
MU-V402D |
| (d) R 538 | RC-V122 & CA-V3 |
3. The following valves are not powered by onsite sources, RC-V117, RC-V122, RC-V123, CF-V3A, CF-V3B, CF-V2A, and CF-V2B.
4. Of the valves which are powered by onsite sources, the following penetrations are associated:
- | | |
|-----------------|---|
| (a) R 538 | Division 2(CA-V1, V3, V6) |
| (b) R 541 | Both Divisions (MU-V1B & 2B)*
Division 1 (MU-V1A & 2A)*
*including interlocks |
| (c) R 546 | Division 2 (WDG-V2) |
| (d) R 591 & 592 | No electrical valves inboard |

5. The location of the sample points are in TMI Unit 1 Nuclear Sampling Room in the TMI Unit 1 Control Tower and the Unit 2 Sample Hood.
6. The elevations of the pipe runs and penetrations are not known.
7. The following valves have been verified as meeting the qualifications stated in FSAR Section 3.11.2 (60 psig, 286°F 100% RH, and 2.8×10^7 Rad). These are Limitorque valve actuators

CA-V1	RC-V117
	RC-V122
CA-V6	RC-V123

8. The following documents were used to obtain the information above:

PENETRATION	REFERENCE
(a) R 538	DWG 2034, 2031 FSAR Tables 6.2-15 9.3-2 FSAR Figures of 8.3 and 9.3-2
(b) R 541	DWG 2024, 2029 FSAR Table 6.2-15 FSAR Section 8.3
(c) R 546	DWG 2028, 2024, 2034
(d) R 591 & 592	DWG 2024

Conclusions: Based on the information which is presently available:

1. Most of the motor operated valves of interest are Limitorque valves and are qualified beyond 2.8×10^7 Rad. Therefore, radiation induced damage need not be considered.
2. It is not prudent to use any of the available penetration points to attempt to infer any sort of level information by differential pressure.

RECOMMENDATIONS: Based on the available data and the conclusions which are drawn therefrom the staff recommends:

1. That the available penetrations not be used for differential pressure measurements until more is known about the actual routing (and therefore elevations) of the affected piping.
2. That, should recommendations 1 be disregarded, the following penetration/valve pairs be used as

(a) First Choice:

Reference leg R 546 (CFV3A or CFV3B and WDG-V2)

Measured leg R538 (RCV122&CA-VB)

(b) Second Choice R 546 (CFV3A or CFV3B and WDG-V2)

Measured leg R 538 (RCV122&CA-V6)

(c) Third Choice

Reference leg R 538 (RC-V117 & CA-V1)

Measured leg R 541 (MU-V1A & MU-V2A)
or (MU-B1B & MU-V2B)

(In the event that valves CF/WDA are used it will be necessary to charge the lines by filling the core flooding tanks through the N2 supply or the tank cross connect lines)

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(It will also be necessary to determine the relative heights of the penetration used to determine the level which is actually being measured. (It could end up being negative)

(The pressurizer must be flooded with flow established via RCV177 & CA-V1 if alternative 3 is used) This will result in an atmospheric release.

3. The best penetration of system pressure measurement is R 538 via RCV122 & CA-V3.
4. All valves which are listed in Result 3 above should be opened at this time.
5. Isometric drawings (with dimensions) should be provided for the following piping runs:
 - (a) Pressurizer steam space sample line from the steam space to valve CA-V208.
 - (b) Pressurizer water space from the pressurizer water space to penetration R 538.
 - (c) Reactor coolant pump RC-P-1A suction letdown tap to valve CA-V6.
 - (d) Reactor Coolant Pump RC-P-1A suction to valve MU-V376.
 - (e) Discharge of RC-P-2A to valve MU-V16C.
 - (f) Discharge of RC-P-1A to valve MU-V16D.
 - (g) Core Flood Tanks 1A and 1B to PENETRATION R 546.
6. No external pressure measurement (except at the pressurizer) should be attempted while a reactor coolant pump is operating.