AP 1001

Figure 1001-8

Three Mile Island Nuclear Station

Special Operating Procedure

SIDE 1

SOP No. 2-63 REV 0
(From SOP Log Index)

Unit No. 2

Date 4-28-79

NOTE: Instructions and guidelines in AP 1001 must be followed when completing this form.

1. Title CONTROL OF RCS PRESSURE WITH SOLID PRZR.

2. Purpose (include purpose of SOP) Provide operator guidance to take the RCS solid and maintain it in that condition.

3. Attach procedure to this form written according to the following format.
   - A. Limitations and Precautions
     1. Nuclear Safety
     2. Environmental Safety
     3. Personnel Safety
     4. Equipment Protection
   - B. Prerequisites
   - C. Procedure

   Attached

4. Generated by BRYANT, SWISHER Date 4-18-79 PORC 4/2?/79

Duration of SOP - Shall be no longer than 90 days from the effective date of the SOP or (a) or (b) below — whichever occurs first.

(a) SOP will be cancelled by incorporation into existing or new permanent procedure submitted by N/A ☐

(b) SOP is not valid after ☐
(fill in circumstances which will result in SOP being cancelled)

6. (a) Is the procedure Nuclear Safety Related?
   If "yes", complete Nuclear Safety Evaluation. (Side 2 of this Form) .... Yes ☐ No ☐
   (b) Does the procedure aff t Environmental Protection?
   If "yes", complete Environmental Evaluation. (Side 2 of this Form) .... Yes ☐ No ☐
   (c) Does the procedure affect radiation exposure to personnel? .... Yes ☐ No ☐

   N/A

   NOTE: If all answers are "no", the change may be approved by the Shift Supervisor. If any questions are answered "yes", the change must be approved by the Unit Superintendent.

7. **Review and Approval**

NRC ______ Approved – Shift Supervisor ______ Date

B&W ______ Reviewed – List members of PORC contacted M Beyth 4/28/79 Date

ALARA ______ [signature] 4/28/79 Date

William [signature] [signature] 4/28/79 Date

Approved - Unit Superintendent [signature] 4/28/79 Date

8. **SOP is Cancelled**

______ Shift Supervisor/Shift Foreman ______ Date

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Z-63 Control of RCS Sys. Pressure with Solid PZR

1. Title: Control of Reactor Coolant System Pressure with the Pressurizer Solid

2. Purpose: To provide a procedure for control of RC System Pressure with the pressurizer solid (refer to Attachment 2).

3.A Limitation and Precautions

3.A.1 When using letdown flow to decrease RC Sys. Pressure, do not allow letdown press. to exceed 120 psig (this provides some margin for RC pressure increase without popping letdown line relief valve).

3.A.2 When solid a change of ± 1°F overall system temperature results in a ± 135 psig change in RC system pressure. A net addition or removal of 20 gals to the RC system changes the RC system pressure 50 psig.

3.A.3 Do not allow RC system pressure to move to the left of or above the pressure/temperature curve, Attachment 1.

3.A.4 Do not operate RCP's, if RCS pressure is less than 325 psig.

3.B Prerequisites

3.B.1 Pressuizer is in solid condition per Attachment 2.

3.C Procedure

3.C.1 Pressure control using makeup and letdown

3.C.1.1 Ensure MU-V-17 (Makeup Cont. Valve) is in the Manual position

3.C.1.2 Attempt to maximize letdown flow to improve controlability of pressure. Coordinate increases in letdown flow with corresponding increases in makeup flow to control RC sys. pressure.

3.C.1.3 Attempt to reduce seal injection flow by approx. 5 gpm to create about a 5 gpm need for the makeup valve. Open MU-V-18 and crack open makeup control valve MU-V17 to maintain RC system pressure. (see precaution 3.A.3).

3.C.1.4 Vary letdown and/or makeup flows as required to maintain RC system pressure in the established operating range (325-1500 psig) by throttling MU-V-5 or MU-V-17.

3.C.1.5 If letdown capability is lost and/or is insufficient and pressurizer pressure is increasing, proceed as follows: (for loss of makeup capability refer to step 3.C.1.6).

3.C.1.5.1 Reduce and/or secure makeup flow by throttling and/or shutting MU-V-17 & 18 to control RC system pressure.

3.C.1.5.2 If pressure continues to increase, reduce or secure seal injection flow by throttling MU-V-32 or by closing individual seal injection valves in Aux. Bldg.

3.C.1.5.3 If necessary "jog" open pressurizer vent valve RC-V-137.

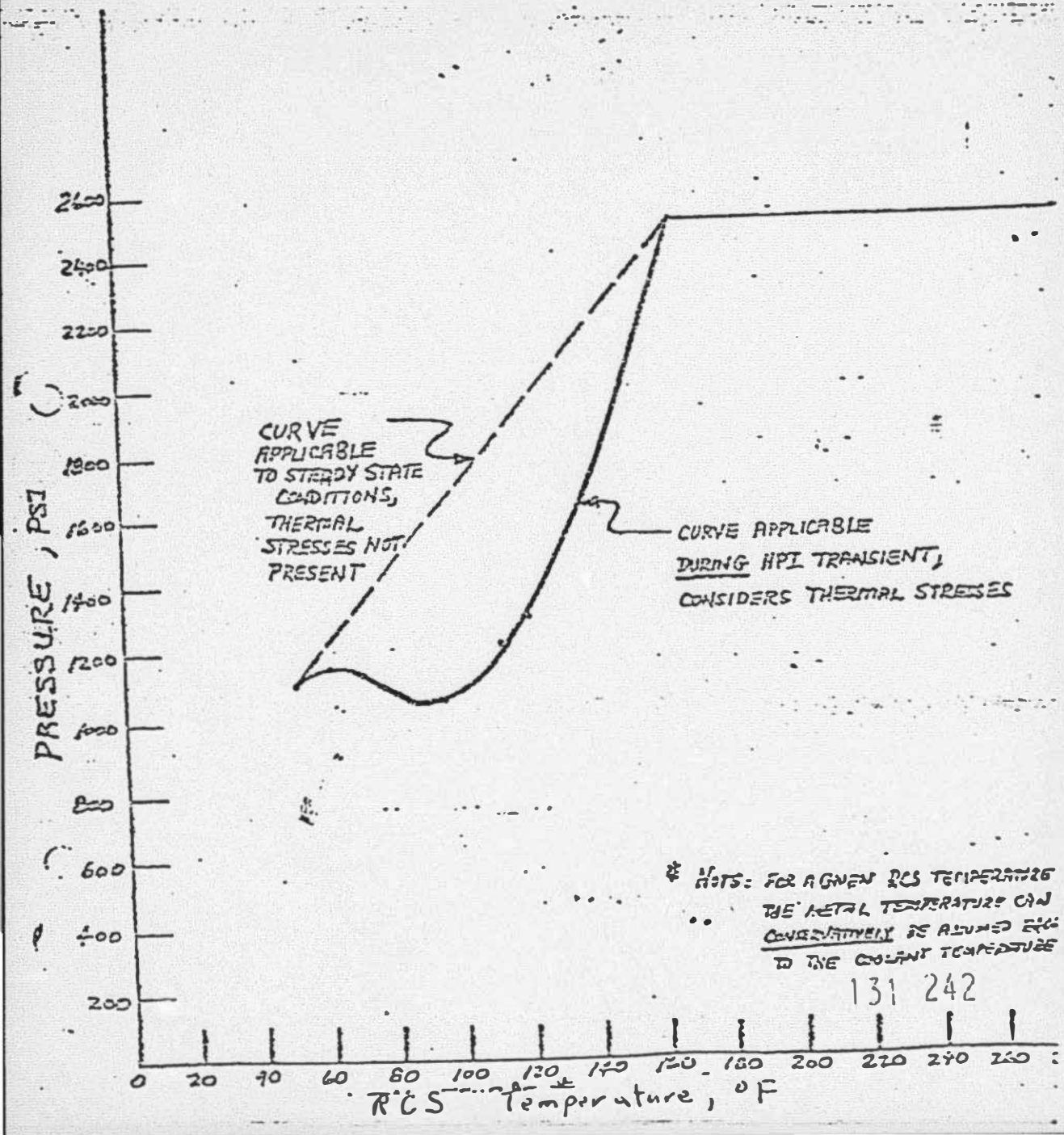
3.C.1.5.4 When pressure returns to perating range, close RC-V-137 and revert to makeup control.

NOTE: If it should become necessary to continuously vent the pressurizer thru RC-V-137 to control RC system pressure keep vented flow rate to a minimum. This is achieved by using the minimum makeup flow rate possible.

If RC-V-137 vent valve is frequently opened, the MU tank will require periodic replenishment.

3.C.1.5.5 If RC-V-137 is inoperable see EP-17 in case of RC-V-137 failed open or EP-20 in case of RC-V137 failed closed.

3.C.1.6 If makeup capability is lost and/or is insufficient and pressurizer pressure is decreasing proceed with EP-9.


PRESSURE, PSI
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
20
40
60
80
100
120
140
160
180
200
220
240
260
RCS Temperature, °F
CURVE APPLICABLE TO STEADY STATE CONDITIONS, THERMAL STRESSES NOT PRESENT
CURVE APPLICABLE DURING HPI TRANSIENT, CONSIDERS THERMAL STRESSES
* NOTE: FOR A GIVEN RCS TEMPERATURE THE METAL TEMPERATURE CAN CONSERVATIVELY BE ASSUMED EQUAL TO THE COOLANT TEMPERATURE
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Establishing the Pressurizer in a solid condition

a) Establish max. letdown

b) Throttle MU-V17 to maintain previous pressure plus 100 psig.

c) Secure heaters.

d) Shut/check shut RC-V1, RC-V2 and RC-V137.

e) Maintain the RCS pressure at this value to completely collapse the bubble and take the pressurizer to a solid water condition. Pressure should always be kept above 500 psi.

NOTE: The indication that the pressurizer is solid is a sudden increase in RCS pressure when making up at a constant rate.

CAUTION: When operating in a solid condition, RCS temperature changes and/or net addition or removal of RCS water cause large changes in RCS pressure. A net addition or removal of 20 gallons results in a pressure change of approximately 50 psig. A RCS temperature change of $1^{o}F$ results in a pressure change of approximately 135 psig.