INTERIM RESPONSE TO
OVERPRESSURIZATION AT SHUTDOWN CONDITIONS

There have been a number of reactor vessel overpressurization occurrences in operating PWR plants in which the Technical Specification Limit for maximum RC System pressure has been exceeded. The majority of these occurrences have occurred when the RC System was in a "solid water" condition during cold shutdown.

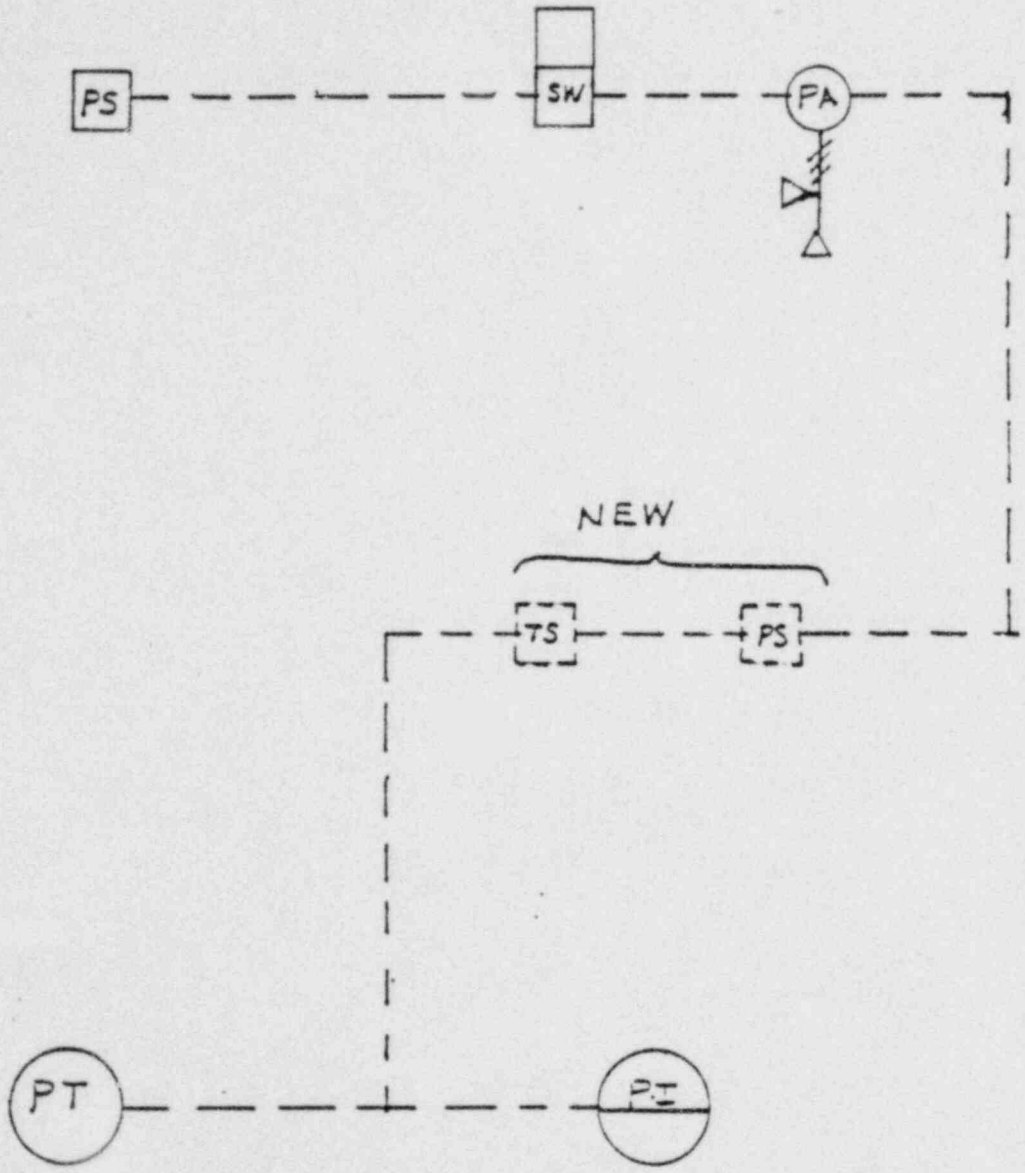
For those occurrences which have the potential for causing the RC System pressure to increase, the increase will be significantly faster in a "solid water" system than in a B&W Plant with a steam or gas space in the pressurizer. The Crystal River 3 Unit will always operate with a steam or nitrogen gas bubble in the pressurizer; no operations will involve a "solid water" condition.

To provide additional assurance that no overpressurization event will occur on Crystal River #3, the following additional design controls are available:

1. Nitrogen Overpressure Protection - CR#3 utilizes nitrogen gas to maintain the gas bubble in the pressurizer whenever a steam bubble is not maintained. In accordance with plant operating procedures, nitrogen gas is added to the pressurizer when the RC System pressure is at 50 psig or less during plant cooldown. Nitrogen addition is controlled by a 50 psig regulator valve (NGV-85). Relief valve NGV-115 provides protection against RC System overpressurization in the event of regulator failure. In addition, plant operating procedures require that NGV-82 be normally locked closed to prevent erroneous addition of nitrogen to the pressurizer. These valves are shown on FSAR Figure 6-2B.

2. Dual Setpoint Pilot Actuated Relief Valve - A dual setpoint capability will be added for the pilot actuated relief valve located on the pressurizer. The lower setpoint (550 psig) will be initiated by automatic actuation of a temperature switch closing at approximately 300°F RCS temperature during plant cooldown prior to startup of the Decay Heat Removal System at 280°F RCS temperature. Use of the pilot-actuated relief valve with the lower setpoint will provide overpressure protection for CR#3 for any credible occurrence in the shutdown condition. This dual setpoint modification will require approximately 2 months for materials and installation. In the interim, we have available through present CR#3 design and administrative controls the capability for the operator to manually actuate from the Control Room the pilot-actuated relief valve. Upon indication of a RC System pressure of 550 psig, the operator would actuate the relief valve by turning the key switch located in the Non-nuclear Instrumentation Cabinets (NNI) from the automatic to the open position. Opening of the relief valve will be verified by position indicator lights and is alarmed in the Control Room. Shutdown procedures will contain the provision for this action until the design change is effected.

DUAL SETPOINT FOR PRESSURIZER PILOT ACTUATED RELIEF VALVE



ELECTRICAL SIGNALS

3. Alarms and/or Indications - The following alarms and/or indications are available to the operator to aid in detection of potential for and/or termination of an overpressure transient.

A. Pressurizer high level alarm(s)
B. Higher than normal makeup line flow rate indication
C. Lower than normal makeup pump discharge pressure
D. Full open indicating light for makeup valve
E. High temperature alarm for relief valve discharge line
F. Higher than normal RCS pressure indication
G. Higher than normal pressurizer level indication
H. Higher than normal letdown flow rate indication to makeup tank
I. The "on" indicating lights for all pressurizer heater banks
J. HPI actuation alarm
K. HPI pump status indication
L. CFT discharge valve(s) position indication and alarms
M. CFT level indication
N. Pressurizer pilot actuated relief valve position indication and alarm
O. Makeup tank level indication and high and low level alarms
P. DH pump(s) status indication
Q. DH pump(s) discharge valve position indication
R. DH pump(s) low flow alarm(s)
S. DH pump(s) flow rate indication
T. RC pump(s) status indication
U. RC drain tank level indication

In addition to the design features outlined above, the following administrative controls are included in the present plant operating procedures or will be added to reduce the potential for RC System overpressurization.

1. The cooldown, shutdown, startup and testing of CR#3 are performed in accordance with approved plant operating procedures and technical specifications. The operator must initial each step of an operating procedure until completed. Following completion of a procedural section, the shift supervisor checks to see that all steps were performed and then signs off on the procedure indicating his acceptance. Procedural steps requiring the removal of equipment from operation or the locking out of pump and valve breakers, etc. must be performed in accordance with Procedure CP-115, In-plant Equipment Clearance and Switching Orders. This procedure requires that the operator must obtain from the shift supervisor an In-plant Equipment Clearance Order prior to removing equipment from service or locking out breakers of pumps and valves. Once the Equipment Clearance Order has been executed by the operator the equipment will be tagged in accordance with CP-115. For electrical purposes, red tags are placed on all open switches or control handles when these switches are not to be closed. For mechanical

purposes, a red tagged device shall not be operated or moved from its tagged position. In the case of locking out breakers of pumps and valves, red tags are placed on both the control room breaker switches and at the breaker location. Once this equipment has been placed under these administrative restrictions, the status of this equipment cannot be changed until the Shift Supervisor issues the appropriate Equipment Clearance Order allowing the change of status.

2. The circuit breakers for the four normally closed HP injection motor-operated valves are "locked out" during plant cooldown when the RC System pressure is less than or equal to 150 psig. This is accomplished by opening and tagging the selector switch in the Control Room and locking out and tagging the breakers located at the Motor Control Center. The operator has indiciation that power has been removed as the status lights in the Control Room will be off.

3. No testing of the HPI pumps during shutdown, as required by CR#3 Technical Specifications, will be performed except when the Reactor Vessel head is physically removed from the vessel.

4. At 700 psig or less, the CFT motor-operated block valves, CFV-5 & 6, will be closed and the breakers placed in the "locked out" position and tagged in accordance with CP-115. The locking out of the breakers is accomplished at the breaker location outside the Control Room. The status of the position of the CFT block valves is indicated in the Control Room by position indicator lights and is alarmed should the position change.

5. As part of our cooldown procedure, the pressurizer heater banks will be placed in the off position during cooldown to prevent erroneous energizing of the heaters. This function is performed by the operator from the Control Room. Position indicator lights in the Control Room provide the operator with continuous status of the heaters.

6. Maintenance on the pilot-actuated relief valve located on the pressurizer will be performed only when the RC System is in Modes 5 or 6 and is at steady state conditions.

The CR#3 Decay Heat System is designed to include redundant, diverse, interlock and automatic closure of both DH high-pressure isolation valves to prevent possible overpressurization of the DH system from the Reactor Coolant System. These features include the following:

a. Independent and diverse interlocks on each valve to prevent gross overpressurization of the DH system by preventing the opening of these valves when RC System pressure exceeds 284 psig.

b. Instrumentation and controls to ensure automatic closure of the valves if these same conditions exist.

In addition, the DH System has the following installed relief capacity:

Valve	Pressure Relief Setpoint	Approx. Water Relief Capacity at 10%&25% Overpressure @ 70°F(gpm)	
		10%	25%
DHV-37(F)	300 psig	17	28.3
DHV-38(F)	300 psig	17	28.3
DHV-44(F)	300 psig	17	28.3
DHV-17(F)	450 psig	20.5	34.2
DHV-28(F)	450 psig	20.5	34.2

Since the DH System is automatically isolated from the RC System when the RC pressure exceeds 284 psig, no additional relief protection from the DH System is availabile to the RC System in the event of an overpressure transient.

Conclusion

The design controls presently installed and the administrative controls which have been discussed herein, provide sufficient assurance that a Reactor Coolant System overpressurization event will not occur at Crystal River Unit #3.