UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 29 1979

NOTE TO: D. Eisenhut, Acting Director, Division of Operating Reactors
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FROM: G. Lainas, Chief, Plant Systems Branch, Division of Operating Reactors

SUBJECT: DRAFT I&E BULLETIN ON CONTAINMENT PURGE DURING PLANT OPERATION

As you requested, we have prepared a draft I&E Bulletin proposing an interim position on containment purging during normal operation. Three Options - A, B, and C have been provided. My position is that we use Option A as there is no basis for the 90 hours/year without proof of valve operability.

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DRAFT I&E BULLETIN

CONTAINMENT PURGE DURING PLANT OPERATION

DESCRIPTION

In November 19[illegible], the Commission (NRC) requested all licensees of operating reactors to respond to generic concerns about containment purging or venting during normal plant operation. The generic concerns were twofold:

(1) Events had occurred where licensees overrode or bypassed the safety actuation isolation signals to the containment isolation valves. These events were determined to be abnormal occurrences and reported to Congress in January 1979.

(2) Recent licensing reviews have required tests or analyses to show that containment purge or vent valves would shut without degrading containment integrity during the dynamic loads of a design basis accident (DBA-LOCA).

The NRC position of the November 1978 letter requested that licensees take the following positive actions pending completion of the NRC review: (1) prohibit the override or bypass of any safety actuation signal which would affect another safety function. The NRC Office of Inspection and Enforcement would verify that administrative controls prevent improper manual defeat of safety actuation signals. (2) To cease purging (or venting) of containment or to limit purging (or venting) to an absolute minimum, not to exceed 90 hours per year. Licensees were requested to demonstrate (by test or by test and analysis) that containment isolation valves would shut under postulated DBA-LOCA

conditions. The NRC positions were amplified by citation (and an attached copy) of our Standard Review Plan 6.2.4 Revision 1 and the associated Branch Technical Position CSB 6-4.

The NRC staff has made site visits to several facilities, have met with several licensees at Bethesda, Maryland, and has held telecon conferences with many other licensees and some valve manufacturers. During these discussions the NRC staff has stressed that positive actions must be taken as noted above to assure that containment integrity would be maintained in the event of a DBA-LOCA.

At this time the licensees of slightly over 50 percent of the operating reactors (14 PWR's and 20 BWR's) have not yet limited purging and venting of containment. The remainder of the licensees have either ceased purging or have limited purging to various degrees. Licensees which may have electrical override circuitry problems have been contacted or are being contacted as our review progresses. Pending completion of the NRC staff's review the following interim measures are to be taken by licensees of operating reactors that do not now limit purging or venting of containment.

ACTIONS TO BE TAKEN

[Maintain the containment purge and vent isolation valves closed whenever the reactor is not in the cold shutdown mode until such time as you can show that:] OPTION A

[Limit the use, i.e., opening, of all containment purge and vent isolation valves, whenever the reactor is not in the cold shutdown or refueling modes to no more than 90 hours per year; and make such modifications as OPTION B

necessary to segregate the isolation signals to ensure that at least a safety injection signal is uninhibited and available to initiate valve closure when otherisolation signals, such as high radiation may be blocked until such time as you can show that:]

OPTION B (cont.)

[Limit the use, i.e., opening, of all containment purge and vent isolation valves whenever the reactor is at power (>2% Rated Thermal Power) to no more than 90 hours per year; and make such modification as necessary to segregate the isolation signals to ensure that at least a safety injection signal is uninhibit d and available to initiate val· losure even when other isolation signals, such as high radiation, may be blocked until such time as you can show that:]

OPTION C

1. All isolation valves used for containment purge and venting operations are operable under the most severe design basis accident flow condition loading and can close within the time limit stated in your technical specifications. This operability shall be demonstrated by meeting the guidelines provided in Enclosure 1.

2. The requirements of IEEE Std. 279 are met for purge and vent isolation valves of all sizes. Explicitly, the closure initiation, reset bypass, and status indication circuitry of all valves should conform to the appropriate portions of Section 4 of the Standard.

3. The isolation valves including any controls, i.e., solenoid valves, shall be demonstrated to be environmentally qualified for the environment that they are located in.

Once the above conditions are met, restrictions on use of the containment purge and vent system isolation valves will be revised based on our review of your responses to the November 1978, letter justifying your proposed operational mode. The revised restrictions can be established separately for each system.

ENCLOSURE 1

GUIDELINES FOR DEMONSTRATION OF OPERABILITY OF PURGE AND VENT VALVES

OPERABILITY

A. In order to establish operability it must be shown that the valve actuator's torque capability has sufficient margin to overcome or resist the torques and/or forces (i.e., fluid dynamic, bearing, seating, friction) that resist closure when stroking from the initial open position to full seated (bubble tight) in the time limit specified. This should be predicated on the pressure(s) established in the containment following a design basis LOCA. Consideration which should be addressed include:

1. Valve closure rate versus time - i.e., constant rate or other.
2. Flow direction through valve; ΔP across valve.
3. Single valve closure (inside containment or outside containment valve) or simultaneous closure. Establish worst case.
4. Containment back pressure effect on closing torque margins of air operated valve which vent pilot air inside containment.
5. Adequacy of accumulator (when used) sizing and initial charge for valve closure requirements.
6. For valve operators using torque limiting devices - are the settings of the devices compatible with the torques required to operate the valve during the design basis condition.
7. The effect of the piping system (turns, branches) upstream and downstream of all valve installations.
8. The effect of butterfly valve disc and shaft orientation to the fluid mixture egressing from the containment.

B. Purge and vent valve structural elements (valve/actuator assembly) must be evaluated to have sufficient stress margins to withstand loads imposed while valve closes during a design basis accident. Torsional shear, shear, bending, tension and compression loads/stresses should be considered. Seismic loading should be addressed.

C. Once valve closure and structural integrity are assured a determination of the sealing integrity after closure and long term exposure to the containment environment should be evaluated. Emphasis should be directed at the effect of radiation and of the containment spray chemical solutions on seal material. Other aspects such as the effect on sealing from outside ambient temperatures and debris should be considered.

DEMONSTRATION

Demonstration of the various aspects of operability of purge and vent valves may be by analysis, bench testing, insitu testing or a combination of these means.

Bench Testing

A. Bench testing can be used to demonstrate suitability of the in-service valve by reason of its tracibility in design to a test valve. The following factors should be considered when qualifying valves through bench testing.

1. Whether a valve was qualified by testing of an identical valve assembly or by extrapolation of data from a similarly designed valve.
2. Whether measures were taken to assure that piping upstream and downstream and valve orientation are simulated.
3. Whether the following load and environmental factors were considered
   a. Simulation of LOCA
   b. Seismic loading
   c. Temperature soak
   d. Radiation exposure
   e. Chemical exposure

B. Bench testing of inservice valves-demonstrate the suitability of the specific valve to perform its required function during the postulated design basis accident is acceptable.

1. The factors listed in items A.2 and A.3 should be considered when taking this approach.

In-Situ Testing

In-situ testing of purge and vent valves may be performed to corfirm the suitability of the valve under actual conditions. When performing such tests, the conditions (loading, environment) to which the valve(s) will be subjected during the test will simulate the design basis accident.

For A, B, or C post test valve examination should be performed to establish structural integrity of the key valve/actuator components.