



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

Docket  
50-3

247

GL-79-46

September 27, 1979

ALL LIGHT WATER REACTORS

UNCLASSIFIED DOCUMENT FREE COPY

Gentlemen:

RE: Containment Purging and Venting During Normal Operation - Guidelines  
For Valve Operability

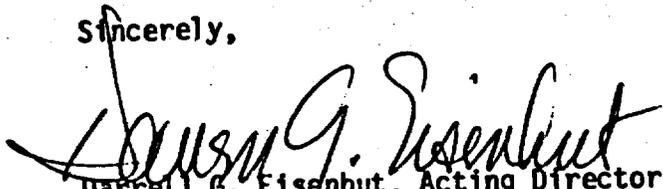
By letter dated November 28, 1978, the Commission (NRC) requested all licensees of operating reactors to respond to generic concerns about containment purging and venting during normal plant operation. We are continuing our review of responses to those letters.

As a result of our reviews, we have learned from several licensees that at least three valve vendors have reported that their valves may not close against the ascending differential pressure and the resulting dynamic loading of the design basis LOCA. All identified licensees who are affected have proposed to maintain the valves in the closed position or to restrict the angular opening of the valves whenever primary containment integrity is required pending a re-evaluation which shows satisfactory valve performance under the Design Basis Accident - Loss of Coolant Accident (DBA-LOCA) condition can be provided.

We have developed the enclosed guidelines with the aid of our consultants, Brookhaven National Laboratory. Valve manufacturers have also been contacted and are cognizant of these guidelines. You are requested to initiate action on an expedited basis to ensure that containment vent and purge valves at your facility meet these guidelines.

Please inform us within 30 days that you commit to implement a valve qualification program on an expedited basis.

Sincerely,

  
Darrell G. Eisenhut, Acting Director  
Division of Operating Reactors

cep

Enclosure:  
Guidelines for Demonstration  
of Operability of Purge and  
Vent Valves

cc: w/enclosure  
See next page

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## ENCLOSURE

### GUIDELINES FOR DEMONSTRATION OF OPERABILITY OF PURGE AND VENT VALVES

#### OPERABILITY

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 predicted on the pressure(s) established in the containment following a design basis LOCA. Considerations which should be addressed in assuring valve design adequacy include:

1. Valve closure rate versus time - i.e., constant rate or other.
2. Flow direction through valve;  $\Delta P$  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.

#### 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.

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.

Once valve closure and structural integrity are assured by analysis, testing or a suitable combination, 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.

The following considerations apply when testing is chosen as a means for demonstrating valve operability:

### 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
    - d. Debris
- B. Bench testing of installed valves to 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 confirm 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 should simulate the design basis accident.

NOTE: Post test valve examination should be performed to establish structural integrity of the key valve/actuator components.

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