



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

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3/27/86

MEMORANDUM FOR: Karl Kniel, Chief
Safety Program Evaluation Branch
Division of Safety Review and Oversight

FROM: Brian Sheron, Deputy Director
Division of Safety Review and Oversight

SUBJECT: REQUEST FOR PRIORITIZATION OF A GENERIC ISSUE ON
THE RELIABILITY OF PWR MAIN STEAM SAFETY VALVES

In accordance with Enclosure 2 of NRR Office Letter No. 40, we are attaching the required information entitled "Generic Issue Information" for a potential Generic Issue, "Reliability of PWR Main Steam Safety Valves."

Brian W. Sheron

Brian Sheron, Deputy Director
Division of Safety Review and Oversight

cc: w/attachment
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ENCLOSURE

GENERIC ISSUE INFORMATION

1. Suggested title of proposed Generic Issue or new requirement.
Reliability of PWR Main Steam Safety Valves (MSSV)
2. What is the known, suspected, or potential deficiency in the technical basis of existing staff guides or requirements?

The individual PWR plant FSARs assume credit for MSSV functional capability to provide overpressure protection for the secondary system. This includes the ability to achieve full ASME Code rated discharge flow at the design setpoint, relieve in a stable manner, and reclose at the design reseal pressure. The ultimate consequences of inadequate capacity could be overpressurization and rupture of some part of the secondary system and loss of secondary heat removal from the primary system.

Operating experience has demonstrated that failure could occur, not just in the "safety related" portion of a main steam line, but, in fact, almost anywhere in the secondary system. Recent failures in steam systems at both nuclear and non-nuclear plants illustrate this, i.e., valve gasketed joint failure (San Onofre 1) and steam reheat piping failures at Mohave and Monroe fossil plants. Also as evidenced by the San Onofre 1 and Davis Besse events, the consequential failures resulting from the event initiators are usually too subtle to predict, often result in complex system interactions, and have raised questions about the reliability of plant operators to properly respond under such conditions.

Similarly valve instability, i.e., valve chatter could result in a stuck open, (or more probably a partially stuck open) valve which would reduce secondary inventory and thus primary system heat removal capability. Excessive blowdown could result in primary system over cooling and loss of secondary inventory. Because of inadequacies in current ASME Code capacity certification requirements and related testing procedures, PWR MSSV adjusting rings may be adjusted such that valve capacity, stability and blowdown may be adversely affected. Test data provided to the staff recently indicates that insufficient emphasis has been given to proper ring adjustments (References (1) and (10)). The capability of the valve to be leak tight on reseating after discharge of liquid due to steam generator overfill following steam generator rupture (SGTR) may also be inadequate.

3. What present specific safety requirements (e.g., SRP, Regulatory Guide, Rule) appear to be inadequate or in doubt?

Inadequate capacity of the MSSVs may mean that SRP 5.2.2 and ASME Code pressure limit requirements for the Main Steam System are not met. Also, during anticipated occurrences the MSSVs provide heat removal from the primary system; therefore, inadequate capacity means GDC 15 may not be met regarding primary system design conditions. Similarly, excessive blowdown may ultimately result in primary system overcooling.

Should the MSSVs chatter, especially following a steam generator tube rupture (SGTR) with liquid discharge through the valves and not reseal properly, 10CFR Part 100 release requirements may also be exceeded.

4. If a new requirement is proposed, what is the proposed requirement? Provide, to the extent possible, a value-impact assessment.

With regard to verifying ring adjustments to assure valve rated capacity and/or design values, it may be necessary to conduct full size tests on the various MSSV models in U. S. PWRs. The most economical method to accomplish testing would probably be through an Owners Group type of effort whereby prototypical tests would be conducted for the entire industry. There are several test facilities capable of performing such tests. The costs involved appear to be for the tests only since valves may be supplied by various utilities. No impact on plant outage length is expected.

With regard to increasing the capability of the MSSVs to function and properly reseal for liquid discharge, it may be necessary to make modifications to the valves. There are pneumatic devices which can be added to safety valves which can eliminate unstable operation. These devices could effectively stop valve chatter, thus, minimizing seat damage so that the valves reseal properly. An alternative approach, may be to increase the reliability of the atmospheric vent valves such that the MSSVs are effectively never challenged with liquid during SGTR events.

5. What new information must be developed either to confirm the adequacy of the current technical bases or to define new requirements that would restore adequate protection?

New information may be necessary to fully resolve this issue may include thermal hydraulic system studies coupled with probabilistic risk studies of the secondary and primary systems to assess the public risk of inadequate MSSV capacity or extended blowdown.

6. What actions are being taken (if any) or should be taken on operating plants to correct the suggested deficiency? By whom (organization and individual) are these actions being taken?

The Office of Inspection and Enforcement has issued Information Notice No. 86-05 "Main Steam Safety Valve Test Failures and Ring Setting Adjustments" (Ref. 6). This should at least serve to advise the PWR Licensees and Applicants of the ring adjustment concern as related to rated relieving capacity.

Prior to the NRR reorganization the Division of Systems Integration had recommended to the Division of Licensing that a 50.54(f) letter be sent to PWR plant owners (Ref. 10) to justify that their plants continue to have sufficient overpressure protection and are within their safety analyses. As of this writing the DSI memorandum is under review by the Operating Reactors Assessment staff.

In addition, at the March, 1986 meeting of the ASME Section III Subgroup on Pressure Relief (SGPR), the SGPR agreed to revise the ASME Code to add a requirement that each MSSV must be full pressure, full flow tested by the manufacturer prior to shipment to assure that the adjusting ring stresses will provide for full stamped relieving capacity and blowdown as specified in the valve design specification. SGPR action does not necessarily mean the Code will ultimately be so revised, but it certainly is a significant and perhaps the most important step in the Code revision process.

The individuals that have been involved with these concerns are:

F. Cherny - former MEB, now EIB, DSRO
G. Hammer - former MEB, now Engineering Branch, PWR-A
S. Diab - former RSB, now RSIB, DSRO
R. Wessman - former ORAB, now ORAS
M. Caruso - former ORAB, now ORAS
M. Wegner - IE
H. Gregg - R I

7. If the issue is related to another generic issue, (e.g., TMI Action Plan Item) identify the generic issue and the area of issue overlap.

These issues are similar to those raised in TMI NUREG 0737, Item II.D.1 for primary safety valves.

8. Is anyone currently working on this issue? If so, name and organization.

NRR

Frank Cherny, EIB

Mark Caruso and Dick Wessman, ORAS

IE

Bob Baer and Mary Wegner, DEPER/EGCB

9. Name of person supplying information: Date provided.

Frank Cherny and Gary Hammer

Date: February, 1986

10. Provide references as appropriate (Memoranda, NUREGs, SRPs, etc.)

The following references are attached:

- (1) Letter from J. DeVincentis, PSNH to R. Starostecki, RI, dated 1/17/85 re: Interim 10CFR50.55(e) Report, "Main Steam Safety Valve Ring Setting Deficiency."
- (2) Memo from J. Durr, R I to R. Baer, IE dated 6/10/85 re: Potential Generic Issue Concerning Ring Settings of Crosby Safety Valves."
- (3) Memo from D. Crutchfield, DL to H. Thompson, Jr., DL dated 8/2/85 re: "Summary of Operating Reactors Events Meeting on July 23, 1985 - Meeting 85-12."
- (4) Letter from J. DeVincentis, PSNH to R. Starostecki, R I dated 8/27/85 re: "Final 10CFR50.55(e) Report, "Main Steam Safety Valve Ring Setting Deficiency."
- (5) Memo from H. Thompson, Jr., DL to E. Jordan, IE dated 9/9/85 re: "IE Notice Regarding Main Steam Safety Valve Test Failures at Wyle Laboratories."
- (6) IE Information Notice No. 86-05: Main Steam Safety Valve Test Failures and Ring Setting Adjustments
- (7) Memo from F. Cherny, DE to G. Holahan, DL dated 9/9/85 re: "MEB Comment on Draft NUREG-0844 NRC Integrated Program for the Resolution of USI A-3, A-4, and A-5 Regarding Steam Generator Tube Integrity."
- (8) Memo from R. Bosnak, DE to D. Crutchfield, DL dated 9/27/85 re: "July 23, 1985 Operating Reactor Events, Briefing Open Item - Inadequate Main Steam Safety Valve Capacity at Seabrook."

- (9) Letter from J. Williams, Jr., Toledo Edison to J. Stolz, DL dated 10/18/85
- (10) Table provided by Baltimore Gas and Electric on 11/26/85 on the Calvert Cliffs Unit 2 MSSV
- (11) Letter from R. Bernero to H. Thompson, Jr., dated 11/22/85 re: "Safety Implications of PWR Main Steam Safety Valves Flow Deficiency"

The following references are not attached:

- (12) Letter from J. DeVincentis, PSNH to H. Gregg, R I dated 2/27/85 (Wyle Lab test data)
- (13) ACRS Subcommittee on Reactor Operations Transcript of 9/10/85 meeting (not attached)