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Mr. E. G. Igne, Senior Staff Engineer US Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards Washington, DC 20555

> Subject: Meeting of May 23-21, 1985 Regarding Proposed General Design Criteria-4 Modifications and NRC Piping Review Committee Reports

Dear Mr. Igne:

The following are my comments on the subject meeting:

(1) NUREC 1061, Vol. 1, Pipe Crack

I remain uneasy about the continued operation of BWR's with cracked pipe and would have liked to see Vol. 1 place a bit more urgency on "Long-Term Fixes" to (hopefully) eliminate IGSCC.

With respect to continued operation with cracked pipe, SECY-83-267C permits crack sizes up to 2/3 of the size permitted by ASME Code, Section XI, IWB-3640. At present, IWB-3640 permits crack depths up to 63% of the wall thickness entirely around the circumference.

## (2) NUREG 1061, Vol. 2, Seismic Design of Piping Systems

I fully agree with all the recommendations given in Vol. 2 and decm that they will help to obtain a more reasonable balance between piping reliability in normal operation and piping reliability during earthquakes. The Addendum to Vol. 2, "Summary and Evaluation of Historical Strong-Motion Earthquake Seismic Response and Damage to Aboveground Industrial Piping", is particularly relevant to this balanced approach.

My only problem involves OBE to SSE relationships. I fully agree with the 16-13 recommendation to "permit decoupling of the OBE and SSE"; i.e., OBE should not be required to be some specific fraction of SSE. However, I am puzzled X - CRI - 2X-B.C ROPARA: G.H

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by the first part of a sentence in 5.2.1 of NUREG 1061, Vol. 5:

"Since designing piping systems to SSE is sufficient to ensure safety, the level of OBE should be defined as having a reasonable probability of occurrences but should be decoupled from the SSE."

If, in fact, designing piping systems to SSE is sufficient to ensure safety, then it would seem to follow that, from NRC's standpoint, the OBE could be eliminated rather than just "decoupled" from the SSE. I think that both OBE (with a relatively high factor of safety) and SSE (with a lower factor of safety) evaluations are significant to safety and, contrary to implications in some portions of Vol. 2, the design may, appropriately, turn out to be controlled by either the OBE or the SSE.

## (3) NUREG 1061, Vol. 3, Pipe Break

I divide the recommendations of Vol. 3 into 3 phases.

 (A) Elimination of Postulated Pipe Breaks in the Main Coolant Loop (~30" diam. piping) in PNR's.

This appears to have been presented to and accepted by ACRS some months ago. At this level of application, pipe breaks are still postulated at branch connections; e.g., at the connection between the ~12" surge line and the ~30" main coolant pipe.

(B) Arbitrary Intermediate Breaks

SRP 3.6.2 requires postulated pipe breaks in high energy piping systems at:

- (a) terminal ends; e.g., at the connection of the 12" pressurizer line to the main coolant loop; for the pressurizer piping system.
- (b) at intermediate locations where the calculated stresses exceed specified criteria.
- (c) at two intermediate locations, even though the stresses do not exceed the specified criteria.

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Item (c) represents the "arbitrary intermediate breaks" which Vol. 3 proposes to delete; but states that "Environmental qualification of the equipment in the vicinity of these lines should be reviewed on a caseby-case basis until definitive criteria are developed". I deem this recommendation to be appropriate and assume that NRC Staff will indeed look at equipment qualifications on a case-by-case basis.

(C) General Elimination of Postulated Pipe Breaks

This, of course, is the subject of the proposed "Broad Scope" modification of GDC-4. The no-postulated-break is now to become potentially applicable to <u>all</u> high energy, safety related piping; e.g., main steam, steam generator blow down, feedwater, etc.

The bases for eliminating postulated pipe breaks cited in Vol. 3 are almost entirely tests on cracked straight pipe and (lately) tests on straight pipes joined by girth butt welds with circumferential cracks in or near the welds; plus theories that, from a geometry standpoint, are restricted to uniform-wall, cylindrical shells. The knowledge of the behavior of such geometries is relatively well advanced and NRC is presently sponsoring a massive research program (Degraded Pipe Frogram) at Battelle-Columbus to enhance that knowledge. However, there are many geometrical details in piping which may not respond like straight pipe; e.g., elbows, tees, reducers, branch connections, pipe with welded-on lugs or trunions, flanged joints, pipe-to-valve junctures, etc. Accordingly, it is not apparent that we now have, or will have in two or three years, what I would call a complete test and/or theory basis for discontinuing postulated pipe breaks under the hypothesis that leak-before-break will occur. On the other hand, are we really getting a favorable cost/benefit ratio by postulating pipe breaks at several locations in high energy piping systems? While SRP 3.6.2 has attempted to identify most-likely break locations, I think there is almost an equal probability that a break (in the unlikely event that one occurred) would be at some location other than those selected for design purposes. In that case, the pipe whip/ jet impingement provisions might be of no value.

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In my judgment, Vol. 3 is recommending an appropriate path by inviting applicants to submit applications to eliminate pipe breaks. I think NRC Staff is fully aware of the caveats I mentioned, plus others, and will carefully review and dispose of those applications on a case-by-case basis.

I thought that ACRS members at the meeting brought up a number of pertinent comments/questions on the "Broad Scope" GDC-4 change; e.g., for piping outside containment, what kind of leak detection will exist? My impression of the ACRS conclusion was, in effect, let's think about this some more. In view of the complexity and scope of the proposal change, this struck me as an appropriate conclusion.

## (4) NUREG 1061, Vol. 4, Other Dynamic Loads and Load Combinations

I fully agree with the six recommendations as listed under Par. 7.3 of Vol. 5. With regard to the first recommendation, it might be noted that Vol. 3 recommends elimination of postulated breaks in the ~30" coolant loop piping. However, this still leaves branch lines breaks and other breaks; e.g., main steam line break, which rocks the steam generator and thus effects the main coolant piping. Thus, the separation of these remaining breaks from simultaneous occurrence with the SSE remains a significant aspect aspect.

Yours very truly, E.C. Rodabaugh

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