

1
 CT-2096
 PDR 3/25/94

cc: Paul Boehnert

10/6/93

To: Ivan Catton, Chairman ACRS/DHRS subcommittee
 From: Dave Ward

**Subcommittee meeting of October 5
 GI-23, "RCP Seal Failure":**

At issue is whether a rulemaking package, proposed by the RES staff as resolution of GI-23, should go out for public comment at this time. Although GI-23 was characterized in 1983 as High Priority it does not now appear to be. The staff has struggled for 10 years with it, not just because it is complex [many GIs are], but also because as it was investigated the perceived urgency for resolution decreased. That should not be surprising or distressing. The methodology for prioritizing generic issues purposively overstates risk so that potentially important issues are not overlooked. This is proper use of "conservatism" by the staff, I believe. Once the issue is studied in depth there is going to be a finite possibility that it is not as worrisome as had appeared. That's the case for GI-23.

The Staff acknowledges [p.17 of the draft FRN] that "no undue public risk exists with or without . . . the rule." Therefore, justification for rulemaking comes down to the results of a regulatory analysis. This shows the proposed resolution to be worthwhile because it would cost less than \$1000 per person-rem averted [or less than \$1600 if guideline dollars are inflated from 1983 to 1993]. The calculated cost, for 76 PWRs, comes to \$680 per man-rem averted. To me that is very gray area. Given the accuracy of "regulatory analysis" one can take reasonably sure guidance if the estimates comes out, say less than \$100 or more than several thousand dollars. But, in between is gray. The Staff claims to have made assumptions favoring high costs, but I don't find that to be so. For example, they ascribe 3 million public person-rem to a core-damage event. At TMI public dose was near zero.

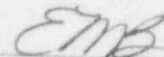
The Staff claimed less than \$100 million would be spent by the 76 PWRs to satisfy requirements. Industry reps indicated it could easily be several times that. The track record indicates higher costs are likely. Maybe \$100 million spread over 76 units is not much. But, could society use it in more useful ways - perhaps, prostate cancer research or a pitcher for the San Francisco Giants?

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The issue is as follows:

- Reactor Coolant Pump Seals [RCPS] are a part of the RCS high pressure boundary, but they have not traditionally been given the sort of QA attention devoted to pipes, vessels, etc.
- The seals usually don't leak very much, a few gpm per pump, easily handled by normal leak collection and makeup systems.
- However, if cooling flow is lost to the seals¹ it is believed they can "pop open" and leak at a much higher rate, perhaps up to a few hundred gpm per pump.
- Even this flow can easily be handled by the ECCS. However, the very condition that causes loss of seal cooling might also render the ECCS unavailable, e.g.,
 - station blackout,
 - loss of component cooling water,
 - loss of service water.

It gets complicated, but nothing PRA can't handle.

- In the favorable direction is the fact that it is anything but certain that a seal will pop open, and cause what amounts to a medium LOCA, even if seal cooling is lost. In fact, it is probably rare that a large leak would occur. Analysts of Westinghouse seals have developed a fault tree which shows that there are a lot of possibilities for different kinds and sizes of leaks, given overheating. Most of those are fairly small but some may be up to 480 gpm [which is probably more precisely stated than is warranted]. Unfortunately, the probabilities assigned to tree branches are conjectural and the Staff believes they cannot be relied upon. Therefore, this important probability does not fit easily into a PRA assessment.

The Staff wants to make what they call an "engineering assessment" of the problem, rather than a "probabilistic assessment". They reason that seals are designed to be cooled and so if they are not it is reasonable to assume they will leak 480 gpm. This, of course, is

¹Seals, depending on the design, are cooled either by direct injection of cooled process water to the sealing surfaces, or indirectly, by a small heat exchanger arranged to remove heat from the normal flow over the sealing surfaces.

a probabilistic assessment in dwarves' clothing; it merely assumes the probability of a medium LOCA given loss of seal cooling is 1.0. We know it is less than that. How much less may be difficult to ascertain. But, as Brother Hal has told us so many times, the real world of probability can be ignored only if we are willing to accept bad decisions.

The industry, one CE owner branch, argues that, at least for their BJ seals, the probability is zero. They claim to back this up with empirical evidence [seventy-some loss of cooling event with no big leaks], rather than the analytical approach taken by Westinghouse. They have not presented this in a very convincing way.

The industry, NUMARC branch, argues that if there are going to be requirements coming out of GI-23 resolution they prefer that they be in the form of a rule². That's understandable, but not very helpful. At issue now is whether generic requirements are warranted or not.

• The unresolvable part of the issues comes down to this: Is it possible, impossible, likely, or rare that an uncooled seal will pop open and create a medium LOCA? The Staff does not buy the Westinghouse analytical argument because the probabilities assigned to branches are not, the Staff believes, well supported. The Staff has not bought into the CE empirical argument because neither a utility nor CEOG has presented it adequately. Also, in the course of NUREG-1150 work, an expert panel opined that even a BJ seal would [could ?] pop open if uncooled.

The Staff says it will accept the argument that an uncooled seal can be relied upon to not pop open only if this is demonstrated in a rather elaborate, integrated, full-scale test. Presumably, this would be one test for each type of seal. Tests to date, including the often-mentioned French test of several years ago, have not, in the mind of the Staff, been adequate to prove anything.

• I believe the issue is not adequately posed yet. Therefore, the proposed resolution should not go out for public comment. It would

²This reflects the rather sorry state regulation has gotten to. A man coming from Mars might expect that "requirements" and "rules" were pretty close to being the same thing. How did we get to the state where many [most ?] NRC requirements are important enough for utilities to spend millions on but not important enough to be rules?

waste the time and resources of the public, the industry, and the NRC.

• It seems to me that the PWRs should be sorted into two bins:

1) Those which can claim that, even if their seals do pop open and leak 500 gpm or thereabouts, their ECCS can take care of it - even with interactions with station blackout, and loss of CCW and SW sequences. That's something that can be adequately sorted out with PRA. The IPEs for these plants should show this. That's what IPEs are for. If the Staff and ACRS have no confidence that IPEs can deal with this than there is a problem larger than G-23, i.e., the credibility of the IPE process.

2) For those who cannot make this claim about the effectiveness of ECCS in these kinds of events, then something has to be done about their systems. Options for them are;

- a) improve ECCS as in 1),
- b) provide some credible backup seal cooling,
- c) harden the Westinghouse analytical argument that seal popping would be very rare,
- d) harden the CE empirical argument that seal popping would be very rare, or
- e) test seals to show they won't pop, as the Staff wants.