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July 16, 2002

Anthony Mendiola, Section Chief
Division of Licensing Project Management
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Dear Mr. Mendiola,

Thank you for responding to my letter of June 3, 2002 wherein I suggested a design change to mitigate the problem of PWSCC of the alloy 600 nozzles.

I am aware that the head with its existing nozzle configuration must comply with Article 3000 of section III of the ASME BPV Code. If it had not, then it is unlikely that the reactor pressure vessel would have been certified in the first place. Nevertheless despite its conformity to Code the PV head suffered sufficient damage that, had it not been discovered, could have led to a LOCA. I have no doubt that the safety systems would have protected the public from significant exposure to radiation but the political and economic fallout would have been quite devastating.

You refer particularly to subparagraph NB-3337.3 which deals with partial penetration welded nozzles. The current configuration appears to conform most closely to Fig. NB-4244(d)2c. While this configuration is acceptable for materials not subject to PWSCC, it is wrong for the case where the nozzle material is so susceptible. The reason that it is wrong is that the susceptible material should not, as I pointed out in my letter, have been subjected to the high stress intensity at the edge of the penetration. My suggestion to use a nozzle configuration similar to that shown in Figure NB-4244(b)1a would solve the problem yet be in complete accordance with Article NB-3000 of the ASME BPV Code. Consequently, the solution to the cracking of the nozzles does not involve any changes to the Code. It merely requires a change in design that is in accord with the Code. The defect is in the current design that subjects the alloy 600 nozzles, or whatever PWSCC susceptible materials are used, to stress magnitudes they need not experience.

While I understand your desire to rely upon "frequent and more effective inspections", it is obvious that this merely copes with a problem rather than eliminating it. Where safety is concerned it is wise to maximize reliability against failures. That is why we insist that exposure to radiation be ALARA. For the possibility of containment failure we should similarly insist that it be AHARA, As High As Reasonably Achievable. Substituting alloy 690 is a worthwhile step in this direction. But is there sufficiently reliable data on this material to assure the public that it will make a significant improvement in performance? What is the level of uncertainty in using alloy 690 at the stress magnitudes now experienced by alloy 600?

I propose this design change as a result of my own experience in dealing with the USNRC. Before I retired in 1987 I was employed by the Lawrence Livermore National Laboratory where I headed up a group reviewing Safety Analysis Reports for the USNRC submitted by high level waste storage and trasportation cask vendors. Their conformity to the requirements of the ASME BPV Code was of fundamental importance. Nevertheless, there were design issues not covered by the Code that the applicant had to resolve before we would recommend certification. The principle that guided us was to minimize uncertainties inherent in the design and analysis that might compromise the reliability of the containment. Our philosophy was that conformity to the Code was necessary but not sufficient.

I believe that your office has a responsibility to inform the nuclear industry that it will not accept a design that can avoid the present problem. Enhanced inspection may well turn out to be both unreliable and expensive.

Sincerely,

Dr. Martin W. Schwartz