

D871208

Mr. Victor Stello, Jr.  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Stello:

SUBJECT: ACRS COMMENTS ON MEMORANDUM FROM VICTOR STELLO, JR., EDO,  
DATED OCTOBER 7, 1987 REGARDING THE EMBRITTLEMENT OF STRUC-  
TURAL STEEL

We are concerned and perplexed by your memorandum of October 7 (referenced). There you conclude that, "the neutron shield tanks and support structures do not appear to pose any safety problems. The embrittlement can be conservatively predicted as an increase in transition temperature of the steel of as much as 400~F." You support your conclusion with the statement, "These structures are in compression, so even with a 0.2 g earthquake, the tensile stresses generated appear to be too low for fracture initiation."

Studies indicate that the highest risk of sudden pipe rupture in the primary system arises from the failure of supports of a major component. We can see no reason to be sanguine about the safety of operating nuclear power plants with the largest, heaviest component in the primary system supported on a structure, parts of which are fully brittle. This is unsafe by any type of analysis. The average stress may be compressive, but it isn't the average stress which would determine the failure of the structure. These supports are welded structures so there are regions with tensile stresses as high as the yield stress. They operate in a temperature gradient so there will be thermal stresses which are tensile in the cold (less ductile) regions. They are uninspected so we have no real idea of what kinds of flaws are present, and flaw size is critical in any meaningful failure analysis.

It would be imprudent to operate nuclear power plants with brittle structures supporting the pressure vessels. We recommend that an early effort be made to gain answers to the following questions:

- 1) Is the temperature of the support structure of the reactor pressure vessel in any operating plant now below its nil ductility transition temperature (NDTT)?
- 2) Will the temperature of the support structure of the reactor pressure vessel in any operating plant drop below its NDTT before the plant's license expires?

We hope and suspect that the answer to the first question is "no." However, it is not clear that we know this with any certainty. The research program mentioned in your memorandum is necessary and desirable, but it is not clear that it will answer the safety-related questions noted above in a timely manner.

Sincerely,

William Kerr  
Chairman

Reference:

Memorandum from Victor Stello, Jr., EDO, to William Kerr, ACRS, dated  
October, 7, 1987, Subject: ACRS Comments on the Embrittlement of  
Structural Steel

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