



ATTACHMENT 7

Hopenfeld

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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MEMORANDUM TO: John T. Larkins, Executive Director
Advisory Committee on Reactor Safeguards

FROM: *Joram Hopenfeld*
Joram Hopenfeld, Task Manager
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SUBJECT: NEW INFORMATION RELATIVE TO STEAM GENERATOR
BEHAVIOR DURING SEVERE ACCIDENTS

REFERENCES: (1) Memo, J. Hopenfeld to N. Talyor, "DPO Regarding Voltage-
Repair Criiterion," July 13, 1994.

(2) Memo L.J. Callan to Commission, "Steam Generator
Rulemaking," May 23, 1997.

The purpose of this memorandum is to provide you with new information as a supplement to my March 5, 1997 presentation to the ACRS regarding mixing in the lower plenum during severe accidents. This new information is important because it further supports the DPO (1) that plants which use alternate repair criteria, ARC, under GL-95 may not meet Commission safety goals. This raises the issue of what should be done with plants which violate Commission policies and yet meet current regulation. This also applies to applications which are in process for ARC.

Based on the results of NUREG-1570 the staff informed the Commission (2) that the LERF from SGTR's induced by core damage sequences is in the low-to-mid 10 E-6/reactor-year. My presentation at the March 1997 meeting showed that the NUREG-1570 analysis is irrelevant and non-conservative, because it was based on the Westinghouse 1/7 scale tests. These tests were not prototypic of steam generators because fission product deposits in the plenum and on the tubes and flow leakage through defective tubes were not included in these bench studies. While the DPO is still in contention, the new data alone casts doubt on NUREG-1570 analysis and results.

The NUREG -1570 analysis incorrectly predicts that the surge line will fail before the tubes fail, thereby depressurizing the system and mitigating the accident. In contrast, the attached analysis by JAERI shows that the heat release from fission products causes a sharp rise in steam generator tube temperature but not in the surge line temperature. These results indicate that even if uncertainties in mixing due to model scaling, deposits buildup and leakage were discounted, steam generator tubes may still fail before the surge line. As indicated at the March 1977 meeting, when the tubes fail first the LERF exceed the Commission guideline (10 E-5 reactors/year).

John T. Larkins

- 2 -

Since the ACRS Subcommittee on Severe Accidents spent several days reviewing how the staff models the thermal-hydraulic in the lower plenum, they are well positioned on recommending how to dispose of the issue which is raised in this memorandum.

cc: J. Craig
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