

June 30, 2003

MEMORANDUM TO: Jack R. Strosnider, Jr., Deputy Director
Office of Nuclear Regulatory Research

FROM: Scott F. Newberry, Director /RA/
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

SUBJECT: CLOSURE OF STEAM GENERATOR ACTION PLAN ITEMS 3.5(b) and
3.5(c), "SEVERE ACCIDENT INDUCED-STEAM GENERATOR TUBE
RUPTURE (SAI-SGTR) METHODOLOGY" REPORT

The purpose of this memorandum is to record completion of two task milestones in the Steam Generator Action Plan associated with the Steam Generator (SG) Differing Professional Opinion (DPO). The first task (item 3.5(b)) is to "[i]ssue report describing improved methods for identifying severe accident scenarios that lead to challenges of the reactor pressure boundary," and the second (item 3.5(c)) is to "[i]ssue report describing improved PRA models of the scenarios identified above, including the impact of operator actions and appropriate treatment of uncertainty."

These two task milestones were completed on June 28, 2003, by issuance of the attached report, "Methodology for Assessing Severe Accident Induced-Steam Generator Tube Rupture (SAI-SGTR)." The report, by our SNL and SAIC contractors, describes a draft method to calculate the frequency of containment bypass events due to SAI-SGTR. My staff has reviewed the report and agrees that it is acceptable for its intended purpose, which is to proceed to the next milestone in which the draft method will be applied to an example plant. DET and DSARE staff have provided technical input to the report, and will continue to do so as work proceeds to achieve the next milestone. That next milestone, scheduled for completion on February 27, 2004, will make improvements to the method as indicated by the example application, and will also document results of the application. The attached report also supports RES Operating Plan issue 1A1ADB, "Assess risk from accident sequences involving failures of steam generator tube integrity."

The methodology begins by considering sequences of functional failures that have been found in previous documented studies to lead to induced steam generator tube ruptures in conjunction with a severe accident. It also develops a functional event tree and uses it to consider alternative causes of such sequences. Human errors of commission and omission that could contribute to the accident scenarios leading to SAI-SGTR are addressed. The methodology includes inherent consideration of uncertainties, both physical uncertainties associated with the processes occurring during the accident progression as well as uncertainties associated with human actions and inactions. It uses as its basis the method successfully developed and applied for the pressurized thermal shock (PTS) PRA/HRA analyses.

The method incorporates thermal hydraulic analysis models developed in separate efforts by RES/DSARE, and material failure evaluation methods for SG tubes and for other materials (i.e., hot leg and surge lines) developed by RES/DET. These models are incorporated into an integrated model that allows the frequency of core bypass due to SAI-SGTR to be calculated,

along with its uncertainty. The method relies heavily on ASME Standard RA-S-2002 (the "PRA Standard"). A significant portion of the attached report is dedicated to describing how the proposed methodology conforms to guidance provided in the standard's many sections.

The draft version of the methodology described in the attached report will be modified, as appropriate, by lessons learned from future milestones of the project. Comments on the report are encouraged, and should be directed to the project manager for item 3.5, Roy Woods (415-6622, hww@nrc.gov).

Attachment: As stated

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Distribution: DRAA Chron., Woods r/f, PRAB r/f

DOCUMENT NAME: G:\SGTR\CompleteTsk.wpd
June 26, 2003 (4:40PM)

OAR in ADAMS? (Y or N) Y ADAMS ACCESSION NO.: _____ TEMPLATE NO. RES-_____
Publicly Available? (Y or N) Y DATE OF RELEASE TO PUBLIC normal SENSITIVE? N
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(RES File Code) RES -2C-1A