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To: Dr. Graham Wallis, Chairman, Subcommittee on Thermal Hydraulics Phenomena
Via: Paul Boehnert
From: Virgil E. Schrock, Consultant *Virgil E. Schrock*
Subject: Consultant Report on the March 15, 2000 Subcommittee Meeting on Activities Associated with Thermal Hydraulic Codes and Revision of Pressurized Thermal Shock Rule
Date: April 7, 2000

THERMAL HYDRAULIC CODES

Status of EPRI RETRAN 3D CODE

Ralph Landry, NRR, gave a good summary of the history and the status of the NRR review of the code. EPRI submitted the code for review by NRC for approval as a "Best Estimate" code in September 1998. The initial reviews by NRR and by the T/H subcommittee of ACRS, revealed many problems including unjustified equations (inadequate derivations and errors), inadequate assessment and a multitude of user options and others and there was an exchange of RAIs and responses. EPRI revealed in May/June, 1999 that they had found their "5-equation flow model" to be inadequate and that they were working on new models (this and some other "new models"). Dr. Wallis showed that the "momentum equation" was incorrect and EPRI, without discussing the flaws, insisted that the equations are not in error and the code is supported by a vast amount of plant data. From any reasonable perspective I believe, effective technical discussion was totally absent. NRR had put the review of RETRAN 3D on hold pending receipt of additional material (to be sent Mar. 6, 2000). The material was received on Mar. 14, 2000. too late for NRR to review prior to the subcommittee meeting. NRR has had major frustrations dealing with this review. The code version submitted for review is not the one being distributed to users. The 3-D kinetics and flow field equations are not the same. NRR holds that the safety evaluation will apply only to the version reviewed.

I would think that under the circumstances NRR would have no basis to approve RETRAN 3D for anything. Yet it was indicated that NRR expects to be able to give

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approval for controlled events (PWR and BWR RIA) only, but not for events which require hydraulic feedback. Even reactivity initiated accidents depend to some degree on thermal hydraulic dependent feedback. Mr. Landry's conclusions appear to suggest that NRR is considering some kind of approval but it would shift the burden of justifying the code use from EPRI to the individual user. While I sympathize with NRR and the frustrations they have experienced with this review I fear that they are being pressured to give approval of some form without adequately resolving the fundamental issues that have been identified. Mr. Caruso's comment that he wasn't sure about the need to have transparent documentation was the kind of excuse we've heard many times before in various forms. It used to be "how good is good enough". The argument here should not be about whether some approximations are necessary in reactor safety computations, but about whether it is necessary to clearly document how, why and when engineering approximations are introduced. The issue has to be confronted. Can NRR justify any approval of a code that has been shown to be in error in its basic equations? I think not.

Mr. Gregg Swindlehurst, Duke Power Company, and Chairman of the RETRAN Maintenance Group gave the industry view of RETRAN 3D review by NRC. His perspectives on the review status is very different from the facts as I know them and also from the NRR perspective as presented by Mr. Landry. Mr. Swindlehurst's list is brief to the point of being terse and fails to address many of the issues raised. Yet he says "We have attempted to be responsive to all issues raised". In his presentation, he seemed to overstate the process of RAIs and responses. It is true that responses have been given but they have not adequately resolved the issues. It is not necessary for the applicant to seek resolution of concerns expressed by the ACRS except as they are expressed in RAIs and they have done that, he contends. He did offer the Subcommittee some advice on the standards for review. The standards should be consistent with the risk-significance of the intended application of the code, which is non-LOCA events. He feels that ACRS is trying to raise the bar. He also opined that use of plant transient analysis simulation codes should be encouraged as an enhancement to safety. This, of course, is not an issue. The issue is whether RETRAN 3D is an acceptable plant transient simulation code. It has not been shown to be. NRR should not yield to pressure to give approval under these conditions.

Siemens Power Corporation code SRELAP-5

Siemens is seeking approval of this code for use in SB LOCA and plant transients. NRR has reviewed the documentation and agreed to accept it for review. Siemens also

plans to submit a best estimate LB LOCA version for review and approval later this year. James Mallay and Larry O'Dell made introductory presentations of the code and Siemens plans. Dr. Wallis had already had a chance to give the documentation a cursory review and made a few preliminary comments. I was favorably impressed with the Siemens presentation. I had not yet received the documentation. I have it now and am awaiting instructions on how to proceed with my review.

General Electric code TRAC-G

GE Nuclear Energy is requesting review of the TRAC-G code for application to anticipated operational occurrences (AOOs). NRR has the documentation and will initiate its review when they receive a copy of the code for their own use. GE is finalizing the procedures for transferring the code. I have, since the meeting, received the documentation and am awaiting instructions on how to structure my review.

REVISION OF THE PRESSURIZED THERMAL SHOCK RULE

Mr. David Bessette, RES made a presentation on Thermal Hydraulics Input to PTS Screening Reevaluation Program. The presentation was lengthy and many questions were raised probably because we had not had the benefit of material to review prior to the meeting. RES has the task of reviewing the basis of the 1985 rule and considering updating, if necessary. Industry input is being obtained to ensure pertinent plant information is current. RES is supporting a program at the OSU APEX facility to obtain PTS specific data. Dr. Eltawila explained that this is the only facility they are able to maintain. Under budget restrictions the Univ. MD facility, which may have been better suited to the task, was not an option. Dr. Reyes made a good presentation on his plans. I expressed some concern about the scaling. The relatively thin wall of the vessel in APEX may not scale well from the standpoint of thermal stress. What I had in mind is that the ratio of penetration depth to wall thickness is very different for APEX and the plant. I look forward to reviewing the scaling report when it is available. Overall it looks like this will be a good job with very limited resources.