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The RETRAN Newsletter

November, 1997

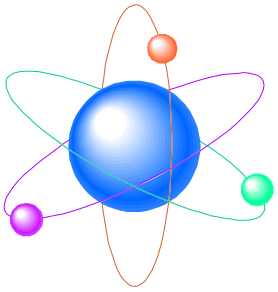
Summary of Activities

This issue of the RETRAN Newsletter contains information on the upcoming Steering Committee nominations, the training simulator project, Ninth International RETRAN Meeting, a summary on the RETRAN/CORETRAN/ VIPRE User Group Meeting, and interesting articles from code users . Your contributions are greatly appreciated. We, EPRI and CSA, encourage everyone to participate in this newsletter.

Previous issues of the RETRAN Newsletter are available from the RETRAN Web Pages at http://www.csai.com/retran.

In This Issue...

RETRAN/CORETRAN/ VIPRE User Group Meeting



G. Gose, CSA

All roads lead to Charlotte in October. That is, if you use the EPRI safety analysis codes RETRAN, CORETRAN, or VIPRE. The annual maintenance group meetings for this important group of EPRI software products was held in Charlotte, NC, hosted by Duke Energy. The three-day event (October 21-23) was a first of its kind, so to speak, because it was the first time that the CORETRAN reactor physics and thermal-hydraulic program was included as a maintenance group subject.

The concept of a maintenance group began nearly two decades ago with the early development of the RETRAN code and it continues to provide a forum for code users, developers, and project managers to discuss the status and direction of the code. The annual maintenance meetings also include technical sessions to provide a method to exchange information, modeling techniques, problems and solutions, and new ideas.

The Charlotte meeting had significant international participation with representatives from Spain, Japan, Switzerland, and Korea. Several new U.S. utilities were represented as well.

The first two days of the annual meeting were devoted to Code Maintenance and Modeling Issues, with several detailed technical papers presented. Topics included the use of the VIPRE code to investigate the trends and problems associated with the axial offset anomaly problem. This issue deals with a complex interaction of water chemistry and core physics phenomena that ultimately results in a power distribution problem and operational issues. *(continued on page 6)*

CORETRAN-01 Version 1.40

John Westacott, CSA and Antonio Dias, SLI

A prerelease transmittal of CORETRAN (Version 1.40) was prepared in October culminating this years development effort at S. Levy, Inc. and transmittal preparation at Computer Simulation & Analysis, Inc. This development includes the following.

Depletion Model. A depletion model based on a macroscopic approach. The basic function of this model is to modify the nodal cross sections to account for various fuel cycle dependencies. This allows exposure and other historical variables such as moderator density history, void history, and burnable position history, to name a few, to be accounted for as the nodal power is integrated over a time interval. Thus, CORETRAN now has the basis to generate cross-section data that includes exposure and fuel cycle dependencies.

A fuel shuffling algorithm is also included to aid in the treatment of multicycle analysis cases.

Pinpower Reconstruction. A pin power reconstruction model has been implemented that allows a determination of the distribution of fuel rod or "pin-wise" power distributions. These distributions are determined from the nodal fluxes and surface currents from the nodal calculations and flux form factors from a finer mesh single assembly calculation that preceded the core calculation.

Detector Modeling. A detector response calculation that will simulate the plant detector strings at user specified locations has been implemented.

New Input Format. A new format has been implemented on keywords to identify data groupings. The input structure has been simplified and specific types of input data can be identified by data sets or file names.

Access to CPM-3 Data. CPM-3 data written to the standard punch data file can now be accessed by CORETRAN.

The CORETRAN Version 1.40 CD-ROM transmittal installation will be reviewed at EPSC and by the organizations involved in the code testing effort. The efforts of Yankee Atomic and Northern States Power will provide a vital role in the early testing of CORETRAN.

A final release will be prepared in November. This version will incorporate corrections of errors identified in the Version 1.40 release and installation revisions based on review of the transmittal. The transmittal released this year will support Unix installations on the HP 9000/700, IBM RS/6000, and Sun SPARCstation workstations. A Window-95/NT installation will be added to the supported platforms early next year.

RETRAN Activities at Yankee Atomic Electric Co.

Yuki Fujita, YAEC

Several projects have been undertaken at YAEC in the RETRAN analysis support area.

The RETRAN-02 MOD005.1 code was used to support Seabrook Station (a four-loop 1194 W type PWR). Several analyses were recently performed including a main steamline break (MSLB) for the Cycle 6 reload. A RETRAN point kinetics model was used and the vessel was modeled by combining three intact loops into one and the faulted side as the remaining loop. Mixing is allowed in the lower and upper plenums and at the upper head. The reactivity weighting was determined from the YAEC three-dimensional kinetics code, STAR.

An analysis of the Seabrook spent fuel pool was performed in order to determine limitations on the total heat load to preclude bulk boiling in freshly discharged fuel. The RETRAN model used the vector momentum option to represent nodes near the bottom of the pool. The case was analyzed by initializing a zero flow, zero energy condition, and then a transient was run by gradually adding decay heat to the system.

Analyses to support Vermont Yankee for an increase in core flow was performed. During the coast down at the end of cycle, the core power can be sustained if the recirculation pump flow is increased which also increases the total core flow rate. This allows higher burnup in the upper region of fuel rods. The analysis was basically a typical BWR TTWOBP FSAR analysis. Modeling differences are cross-section data and initial conditions modeled by RETRAN. Resultant CPRs are slightly increased (more limiting).

ABB-CE found that for more than one plant, the piping from main steamline to the safety valves was on the order of 11 feet containing a series of elbows. However, the safety analysis ignored the pressure drop associated with the 11-foot pipe. This in combination with the contraction loss led to an excessive pressure loss not considered in the CE safety analysis for those plants. For Vermont Yankee, Seabrook, and Maine Yankee plants, the lengths of the pipes are on the order of one foot. Although the safety valve areas in the RETRAN models were adjusted to obtain the valves' rated flow rates, the losses for the pipe were not modeled in the RETRAN analyses. To determine the impact on the ASME code requirement, YAEC performed RETRAN analyses for pressurization transients with explicit modeling of these losses. The effects of the pressure losses were found to be very small, and the FSAR analyses met the ASME code requirement.

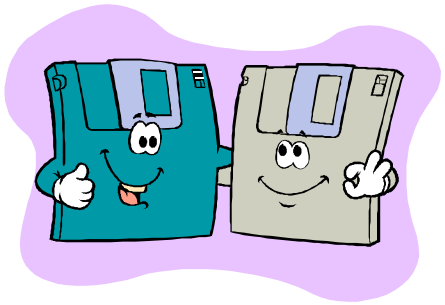
Steering Committee Nominations

Jim McFadden, CSA

The RETRAN Steering Committee serves to coordinate activities for the subscribing utilities and acts as an advisory group to the EPRI Project Manager on matters associated with maintenance of the RETRAN codes. Typical items the Steering Committee becomes involved with include providing recommendations on the support of new computers or operating systems, suggestions for adding new models or options, scheduling the release of new code versions, and, when necessary, interfacing with the NRC on matters involving the RETRAN Safety Evaluation Report.

The steering committee, comprised of five individuals, is selected from the subscribing utility representatives. The current members are Gregg Swindlehurst (Duke Energy), James Boatwright (TU Electric), Yuki Fujita (YAEC), Adi Irani (GPU Nuclear) and Chet Lehmann (PP&L).

EPRI began the process of electing a new Steering Committee at the User Group Meeting at Duke Energy. Each member of the Maintenance Group has an individual designated to represent that organization. These individuals will elect five people to serve on the Steering Committee.



RETRAN-3D in a Training Simulator

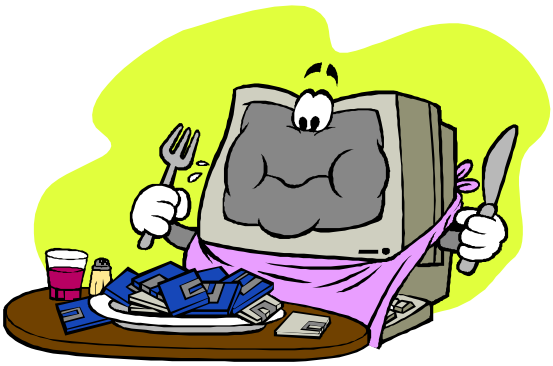
Jim McFadden, CSA

EPRI is establishing a tailored collaboration project to implement the RETRAN-3D program in a training simulator. This project offers significant benefits because:

- the validation base demonstrates the wide ranging and reliable analysis capability of RETRAN-3D,
- the existing Quality Assurance and Maintenance Programs provide for ongoing support,
- the features of RETRAN-3D meet the requirements of the modern training simulators, and
- the technical tasks that need to be performed are well defined and can be accomplished in a timely manner.

The tailored collaboration approach will provide the participating utilities with a cost-effective means of obtaining a state-of-the-art training simulator for their individual power plants. For further information contact Lance Agee (EPRI) or Jim McFadden (CSA).

Summary of RETRAN-02 Trouble Reports



The following is a summary of RETRAN-02 Trouble Report/Code Maintenance Activity.

Unresolved Trouble Reports

- 1 From MOD001
- 5 From MOD002
- 4 From MOD003
- 3 From MOD004
- 8 From MOD005

A list of trouble reports and the status can be obtained directly from the EPSC.

Additional information is available from the RETRAN-02 Trouble Report Page at http://www.csai.com/retran/r02trpt/index.html.

TROUBLE REPORT NO.	TYPE OF PROBLEM	CORRECTION NO.	IDENT	COMMENTS
1	Error 209 in TEMZ	***	*******	MOD001 Error
61	Delta T for Conductor with TDV	***	*******	Need Input Deck
121	OTSG Low Power Initialization	***	*******	
139	Failed Using Large Time Step	***	*******	Need Input Deck
140	Spurious Trips on High Level	***	*******	Need Input Deck
177	Overflow in WAT9	***	*******	Need Input Deck
209	Pump Coast Down Rates	***	*******	Need Correct Deck
272	Junction Properties at Break	***	*******	Need Input Deck
317	Junction Property Error	***	*******	
334	Time-Dep. Volume Input	***	*******	
342	Control Block Output near Zero	***	*******	Cannot Reproduce Error
354	Large Step Change in PHIR	***	*******	
366	Mixture/Liquid Level Difference	***	*******	Need Input Deck
376	Control Reactivity, No Motion	***	*******	
394	Anomalous Heat Trans. Behavior	***	*******	
408	OTSG Heat Transfer Problems	***	*******	
413	Incorrect Vsn No. in IBM Output	***	*******	Cannot Reproduce Error
431	Failure in JN Properties	406	MOD005P3	
436	Prandtl Number is Discontinuous	405	MOD005P3	
437	Heat Transfer Logic/CHF	-----	----------	Not a Code Error
438	Restart Failure/Pipe Transport	407	MOD005P3	
439	Decay Heat Input	***	*******	
440	Kinetic Energy/Time Dep Area	***	*******	
441	Anomalous Power Increase	-----	----------	Not a Code Error
442	Poor Diagnostics	***	*******	
443	Liquid Region Work Term	***	*******	

Summary of RETRAN-3D Code Trouble Reports

A total of 140 trouble reports had been filed as of September 30, 1997. Of these, 122 reports have been resolved, while 18 remain unresolved. A summary of the unresolved trouble reports is shown below. Additional information for RETRAN-3D trouble reports is available at http://www.csai.com/retran/r3dtrpt/index.html.

TROUBLE REPORT NO.	TYPE OF PROBLEM	CORRECTION NO.	IDENT	COMMENTS
7	Steam separator model fails	***	*******	
30	2-loop Oconee w/5-eq. fails in steady state	***	*******	
39	Time-step error; pressure is 5997 psia	***	*******	
40	Results do not agree with data	***	*******	
41	Anomalous downcomer level	***	*******	
45	Restart incorrect transient values	***	*******	
48	Steady state fails after 6 iterations	***	*******	
		006	MOD001g	(partial fix)
51	Pressure search failure for two-phase MOC	***	*******	
52	MOC does not return to the initial temp.	***	*******	
54	MOC solution; no null transient for two-phase	***	*******	
60	Anomalous countercurrent flooding	***	*******	
116	Fails in steady-state initialization	***	*******	
121	Calculation failure on second time step	***	*******	
122	Problems with EOS convergence	***	*******	
127	Lack of convergence error	***	*******	(water packing)
128	Lower index out of range for pressure	***	*******	(mass transfer)
134	Can't initialize pressurizer with P,x	***	*******	
140	Post-CHF heat tran on shell side of SG @ SS	***	*******	

RETRAN/CORETRAN/VIPRE User Group Meeting (Cont'd)

The verification and validation of the CORETRAN fuel management option was discussed in detail and an aggressive plan for 1998 was developed.

The RETRAN-3D code continues to provide expanded analysis capability and several papers were presented to illustrate the new kinetics, air-water models, and the five-equation methods.

The final day of the meeting was devoted to a discussion of the technical and management issues involved in the use of the RETRAN-3D code in a training simulator environment. Representatives from utility simulator staff, Purdue University, EPRI, and code contractors participated in a useful and positive discussion of this issue. A tailored collaboration using RETRAN-3D as the principle model is under consideration and a separate article on page 4 of this newsletter discusses the project in more detail.

MEETING ANNOUNCEMENT AND CALL FOR PAPERS

NINTH INTERNATIONAL RETRAN MEETING

Monterey, California June 7-10, 1998

The Ninth International RETRAN Meeting will be held on June 7-10, 1998, in Monterey, California. The purpose of the meeting is to exchange information concerning RETRAN analysis results, the use of the code for new applications, and modeling techniques that can be used for various transients. The meeting is being sponsored by the Electric Power Research Institute and Computer Simulation & Analysis, Inc.

Program Items

The program will include technical sessions with oral presentations, two keynote presentations, and a poster session. A plenary session, with an overview presentation and a panel of individuals discussing topics of interest to the electric utility industry, will be held on the first day of the meeting. A separate technical session featuring mixed code applications is planned.

Technical Paper Topics

Papers are requested on the following topics.

- Reload Licensing Analyses
- BWR Stability Calculations
- RETRAN Applications for Simulator Training/Qualification
- Analyses in Support of Plant Operations
- New Applications with RETRAN
- Topical Report Activities
- Training Plant Personnel with RETRAN
- Mixed Codes Applications for RETRAN, VIPRE, CORETRAN, CPM-3, and FREY

Abstracts

Code users are invited to participate in this meeting and to contribute technical papers on one or more of the items listed in this announcement. Papers with analysis results and data comparisons are encouraged. Abstracts (approximately 500 words excluding tables and figures) should be submitted by January 15, 1998, to:

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Electronic submission of abstracts is encouraged.

Abstracts will be reviewed by the Program Committee and those selected for presentation will be placed in appropriate sessions within the meeting. Authors of accepted papers are required to prepare a complete manuscript of their paper for delivery to EPRI at the meeting. The Proceedings will be published and distributed after the meeting.

Meeting Information

Location: Marriott Hotel, Monterey, California
World Wide Web: the RETRAN Web site "http://www.csai.com/retran/index.htm"
To submit abstracts electronically; send email with message of "Ninth-Abstracts" to csai@csai.com
General meeting inquiries: Pam Richardson, CSA (208-529-1700, voice or 208-529-1723, fax; pam@csai.com)

About This Newsletter

RETRAN Maintenance Program

The RETRAN Maintenance Program is part of a program undertaken by EPRI to provide for the support of the software developed in the Nuclear Power Division. The main features of the Subscription Service include:

- the code maintenance activities for reporting and resolving possible code errors,
- providing information to users through the User Group Meetings and this newsletter, and
- preparing new versions of RETRAN.

The RETRAN Maintenance Program now has 31 organizations participating in the program, including 23 member utilities, 5 organizations from outside of the U.S., and 3 nonmember utilities from the U.S. A Steering Committee, composed of representatives from the participating organizations, advises EPRI on various activities including possible enhancements for the code and the scheduling of future code releases. Information regarding the Maintenance Program can be obtained from

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Newsletter Contributions

The RETRAN Newsletter is published for members of the Subscription Service program. We want to use the newsletter as a means of communication, not only from EPRI to the code users, but also between code users. If this concept is to be successful, contributions are needed from the code users. The next newsletter is scheduled for March 1998 and we would like to include a brief summary of your RETRAN activities. Please provide your contribution to CSA, P. O. Box 51596, Idaho Falls, ID 83405, or to the E-mail addresses below by March 6, 1998. ***Contributors will receive a RETRAN mouse pad.*** We are looking forward to hearing from all RETRAN licensees.

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The RETRAN Web Page is located at http://www.csai.com/retran/index.html.

Steering Committee Nominations
Due November 13, 1997

Ninth International RETRAN Meeting
June 7-10, 1998
Marriott Hotel
Monterey, CA

EPSC Contacts

EPSC Hours: 7 a.m. to 8 p.m. EST
EPSC Hotline: (800) 763-3772
EPSC Fax: (619) 453-4495
Email:

For Nuclear Quality Assurance related questions, call Clark Wallace at (619) 622-6611.