

May 30, 2000

MEMORANDUM TO: Farouk Eltawila, Chief  
Safety Margins and Systems Analysis  
Office of Nuclear Regulatory Research

FROM: Mark Reinhart, Acting Chief */RA/*  
Probabilistic Safety Assessment Branch  
Office of Nuclear Reactor Regulation

SUBJECT: REQUEST FOR MAINTENANCE AND ENHANCEMENT OF  
THE RADTRAD COMPUTER CODE

PURPOSE:

The purpose of this memo is to emphasize our continued and ongoing need for maintenance and enhancements to RADTRAD as specified by our User Need letter dated July 28, 1998. The RADTRAD code models the release and transport of fission products. This code model is used to verify that 10 CFR Part 100 and 10 CFR Part 50 requirements are met.

Per Management Directive (MD) 9.28, these enhancements may be performed by the Office of Nuclear Regulatory Research (RES). MD 9.28 states:

*The Accident Evaluation Branch [of the Office of Nuclear Regulatory Research (RES)] plans, recommends, evaluates, and manages analytical and experimental research programs on accident phenomena of nuclear plants to provide a basis for accident regulatory policy. Emphasis is on modeling release and transport of fission products, aerosols and hydrogen, and accident sequences which could cause reactor coolant pressure boundary or containment failure.*

The Office of Nuclear Reactor Regulation (NRR) made the above cited request to enhance the efficiency and effectiveness of this code. These changes will reduce the time that the reviewer of licensing amendments needs to develop, debug, run and evaluate the analytical models. This will allow the reviewer to more efficiently consider a wider range of technical issues and increase their productivity.

CONTACT: Mark Blumberg, SPSB/DSSA  
415-1083

BACKGROUND:

The RADTRAD code is a code which models release and transport of fission products and accident sequences. This code was developed to model the alternate accident source terms described in NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants." These source terms provide a more realistic model of accident phenomena.

A User Need letter dated July 28, 1998, from NRR to RES, identified the need for RADTRAD code enhancements. A subsequent NRR/RES effort established a prioritized list of problems areas and enhancements to the code. On November 26, 1999, a RES letter informed NRR that the development of RADTRAD as requested by the User Need was completed. This revision incorporated a portion of the previously identified list. It involved a major change to the user interface of the code and an update of the code documentation. Following this effort, the nuclear industry (ITS Corporation) made changes to the RES version of the code. In March of 2000, ITS Corporation issued Version 3.02 to correct problems with the user interface. NRR has assessed both these revisions to the code and we do not feel the code is completed. Further development and maintenance of the code is needed.

NEED:

NRR has identified several areas for improvement for the RADTRAD code. These areas for improvement are given below:

- While the code performance has improved, the instability of the user interface hampers productivity. The user interface still creates several nuisance errors. The cause of these errors is not easily identified since the error messages are cryptic. Typically, the user must re-enter all input to get the code to execute. Users spend a great deal of time trying to debug these problems. As an example, the most current version of the code contains an editor that appears to generate code errors when it is used to modify input. The code needs more thorough testing, identification and resolution of these problems.
- Several enhancements previously identified and prioritized by NRR and RES need to be addressed to make the code more efficient. Examples of these are given below:
  - Improved code output. NRR can provide a requirement document detailing the type of code output needed and the preferred format.
  - The code needs to be able to model steam generator tube rupture and main steamline break accidents. This would require the code to model multiple source compartments and source term release rates. Release rates need to be specified in Ci/unit time or fraction per unit time. The graphical user interface needs to be expanded to make this easy and efficient.
  - Since the code is to replace HABIT (an old DOS based dose code) it needs to be able to model and provide output for the TID-14844 source term as well as for the alternate source term.
  - The code should be able to automatically stop containment sprays when the spray decontamination factor reaches its cutoff value.

- Lastly, a code maintenance budget needs to be established to provide customer service for addressing future code problem areas as they arise. The current method of correcting problems with the code is not timely or efficient.

The requested improvements and code maintenance are critical to the future implementation of the alternate source term and effective and efficient regulation. The flexibility and effectiveness of RADTRAD are still being challenged as it's user base increases. As with the application of any major code revision RADTRAD has a need for improvements and maintenance. A review of the RADTRAD website indicates that the power industry is looking for the same type of improvements. The industry has indicated that 10-15 licensees are likely to implement the alternate source term in the near term. Likewise, the Division of Safety Systems and Analysis (DSSA) has prioritized our needs from RES. Enhancements and maintenance of RADTRAD were ranked as our number three priority.

Without a well-refined tool, NRR will be challenged to meet the needs of the industry in our reviews of these amendments. RES support of this code is critical to our operating mission. DSSA requests your help to enhance and maintain this code. If you have any questions regarding the technical requirements of this request please feel free to contact Mark Blumberg at 415-1083.

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