

MEMORANDUM TO: John A. Zwolinski, Director, DLPM:NRR
Gary M. Holahan, Director, DSSA:NRR
David B. Matthews, Director, DRIP:NRR
Bruce A. Boger, Director, DIPM:NRR
Jack R. Stosnider, Jr., Director, NRR:DE
Farouk Eltawila, Acting Director, DSARE:RES
Michael E. Mayfield, Director, DET:RES
Wayne D. Lanning, Director, DRS:RGN-I
Charles A. Casto, Director, DRS:RGN-II
John A. Grobe, Director, DRS:RGN-III
Arthur T. Howell III, Director, DRS:RGN-IV

FROM: Thomas L. King, Director
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

SUBJECT: COMPLETION OF RELIABILITY AND AVAILABILITY DATA
SYSTEM, VERSION 1.0

The Operating Experience Risk Analysis Branch of the Division of Risk Analysis and Applications in the Office of Nuclear Regulatory Research has completed the initial software development of the Reliability and Availability Data System (RADS) Version 1.0. RADS is a database and analysis code designed to estimate industry and plant-specific reliability and availability parameters for selected components for use in risk-informed applications. The software contains modules to import data from the Equipment Performance and Information Exchange (EPIX) System (maintained by the Institute of Nuclear Power Operations [INPO]) and other data sources. The enclosed report, in the form of questions and answers, contains an overview of RADS, its regulatory uses, and other explanatory information.

RADS is a tool designed to help the NRC staff with risk-informed applications. Examples of these applications include the following:

- Review of licensee-performed risk analyses (RES:DRAA:PRAB)
- Use in Regulatory Guide 1.174 applications (NRR:DSSA:SPSB, RES:DRAA:PRAB)
- Use in risk-informed inspections (NRR:DRIP:IIPB, SRAs in Regions)
- Use in the review, prioritization, and resolution of generic safety issues (RES:DSARE:REAHFB, RES:DET:ERAB)
- Use in the Accident Sequence Precursor Program (RES:DRAA:OERAB)
- Use in the development of risk-based performance indicators for potential use in the reactor oversight process (NRR:DRIP:IIPB, NRR:DIPM:IQMB, RES:DRAA:OERAB)

Table 1 in the attached report contains a more detailed description of these uses and the NRC branches that will use RADS.

RADS was developed with extensive input and review from members of the RADS Coordination Group, representatives from branches that will use RADS. RADS contains options for the user to search and select the failure and reliability data for a set of components, estimate industry and plant-specific reliability parameters, and prepare output reports. The user can also trend reliability parameters over time. Statistical methods utilized in RADS include classical statistical methods (maximum likelihood estimates and confidence intervals), simple Bayesian methods, empirical Bayes methods (for estimation of plant-to-plant variability), and tests for homogeneity of the data for deciding whether to pool the data (e.g., plants and testing). Methods for trending the reliability parameters over time are also included.

RADS contains reliability information (failures, demands, and operating hours) for more than 11,000 risk-important components in risk-important systems. RADS can be used to estimate the probability of failure on demand and the failure rate during operation for these components. Maintenance out-of-service unavailability (planned and unplanned) will be added in the future. Appendix A of the enclosed report provides an overview of these reliability parameters and the input data necessary to estimate them.

The EPIX data constitutes a substantial portion of the data used in RADS. EPIX is a new, industry-sponsored, voluntary initiative to provide reliability and availability data to the NRC in lieu of the Reliability Data Rule (SECY 97-101 and SRM dated June 13, 1997). INPO started collecting the EPIX data in January 1997. As with any new endeavor, EPIX has been evolving during its initial startup. INPO is working with the utilities to ensure their full participation in EPIX and to provide quality data. EPIX staff are working to resolve problems identified by the NRC staff, and to expand the data classification to better support risk-related analyses. Consequently, regulatory decisions based on RADS analyses require that the input data used in the analyses be appropriately verified.

Improvements to RADS software and database for FY 2001 include adding initiating event data, maintenance out-of-service unavailability data, statistical analysis routines to use lognormal prior distributions, expanded reports, and plots of uncertainty distributions, and NRC workarounds. These are detailed in Table 2 of the enclosed report.

RADS was designed for two levels of users—those interested in results of analyses and those who want to estimate reliability parameters. A set of standard analysis reports and graphs of general interest (such as industry generic values for reliability parameters of key components and their trends) will be available on the NRC internal web to users who will not be required to exercise the analysis code. Individual analysts who want to estimate reliability parameters will have access to the analysis software on their own workstations and the RADS data, which will reside on a NRC LAN server. An icon to install the software will be placed on their workstations by OCIO staff in October 2000. Examples of the reports will be available on the web in December 2000.

We would like members of your staff to be aware of RADS and have them use it in their risk-informed applications over the next 6 months. In particular, we would like to have feedback regarding the following questions:

- Does RADS contain the data necessary for your risk-informed applications?
- Do the analysis reports contain the information needed for your applications?
- Are the reports organized so that the information is easily found?
- Are the RADS on-line help and users manual organized so that information can be found quickly and clearly presented?
- Are the search and analysis screens clear and easy to use?
- Do you have any suggestions for making RADS more user-friendly?

If you would like more information about RADS or have any have any questions regarding its use or to gain access to it, please contact Dr. Dale Rasmuson of my staff (301-415-7571, dmr@nrc.gov).

Attachment: As stated

MEMORANDUM DATED: / /00

SUBJECT: COMPLETION OF RELIABILITY AND AVAILABILITY DATA SYSTEM,
VERSION 1.0

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COMPLETION OF RELIABILITY AND AVAILABILITY DATA SYSTEM, VERSION 1.0

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