

September 21, 2010

MEMORANDUM TO: Michael J. Case, Director
Division of Engineering
Office of Nuclear Regulatory Research

FROM: Christiana H. Lui, Director **/RA/**
Division of Risk Analysis
Office of Nuclear Regulatory Research

SUBJECT: TRANSMITTAL OF REPORT ON REVIEW OF QUANTITATIVE
SOFTWARE RELIABILITY METHODS

For your information, enclosed is a Brookhaven National Laboratory technical report entitled, "Review of Quantitative Software Reliability Methods," BNL-94047-2010, prepared under Task 2 of JCN N6725, "Digital System Software PRA," in support of the NRC Digital System Research Plan, FY 2010 – FY 2014. This report documents a review of currently available quantitative software reliability methods (QSRMs). The objective of the review was to catalog potential methods that can be used to quantify software failure rates and demand failure probabilities of digital systems at nuclear power plants such that the system models can be integrated into a probabilistic risk assessment (PRA). The QSRMs were identified by reviewing research on digital system modeling methods sponsored by the NRC or by the National Aeronautics and Space Administration, performed by international organizations, and published in journals and conferences. The QSRMs were categorized, described, and evaluated regarding their strengths and limitations for PRA applications. Note, specific recommendations regarding which QSRMs have the most potential for integration into a PRA, and are therefore candidates for further assessment, are beyond the scope of this study, but will be included in a subsequent NUREG/CR report that will address the next phase of this work (i.e., the selection of one or more candidate QSRMs to be applied in a proof-of-concept study and demonstration of how each aspect of the candidate QSRM(s) will be applied in the study).

Several members of your staff, specifically, Russ Sydnor, Jeanne Dion, and Mike Waterman, performed a detailed review of the draft of this report. I would like to express my appreciation for their time and valuable input. If you have any questions regarding this report, please address them to the contact listed below.

Enclosure:
As stated

CONTACT: Alan S. Kuritzky, RES/DRA
301-251-7587

MEMORANDUM TO: Michael J. Case, Director
Division of Engineering
Office of Nuclear Regulatory Research

FROM: Christiana H. Lui, Director /RA/
Division of Risk Analysis
Office of Nuclear Regulatory Research

SUBJECT: TRANSMITTAL OF REPORT ON REVIEW OF QUANTITATIVE
SOFTWARE RELIABILITY METHODS

For your information, enclosed is a Brookhaven National Laboratory technical report entitled, "Review of Quantitative Software Reliability Methods," BNL-94047-2010, prepared under Task 2 of JCN N6725, "Digital System Software PRA," in support of the NRC Digital System Research Plan, FY 2010 – FY 2014. This report documents a review of currently available quantitative software reliability methods (QSRMs). The objective of the review was to catalog potential methods that can be used to quantify software failure rates and demand failure probabilities of digital systems at nuclear power plants such that the system models can be integrated into a probabilistic risk assessment (PRA). The QSRMs were identified by reviewing research on digital system modeling methods sponsored by the NRC or by the National Aeronautics and Space Administration, performed by international organizations, and published in journals and conferences. The QSRMs were categorized, described, and evaluated regarding their strengths and limitations for PRA applications. Note, specific recommendations regarding which QSRMs have the most potential for integration into a PRA, and are therefore candidates for further assessment, are beyond the scope of this study, but will be included in a subsequent NUREG/CR report that will address the next phase of this work (i.e., the selection of one or more candidate QSRMs to be applied in a proof-of-concept study and demonstration of how each aspect of the candidate QSRM(s) will be applied in the study).

Several members of your staff, specifically, Russ Sydnor, Jeanne Dion, and Mike Waterman, performed a detailed review of the draft of this report. I would like to express my appreciation for their time and valuable input. If you have any questions regarding this report, please address them to the contact listed below.

Enclosure:
As stated

DISTRIBUTION:

M. Cunningham, NRR	C. Ader, NRO	D. Coe, RES	S. Birla, RES
J. Dion, RES	S. Arndt, NRR	D. Santos, NRO	R. Sydnor, RES
S. Richardson	C. Antonescu, ACRS		

ADAMS Accession No.: ML102240551

OFFICE	RES/DRA/PRAB	SUNSI	BC:RES/DRA/PRAB	D:RES/DRA
NAME	AKuritzky	AKuritzky	KCoyne	CLui
DATE	8/11/2010	8/11/2010	9/03/2010	9/20/2010

OFFICIAL RECORD COPY