

NUCLEAR REGULATORY COMMISSION
DEVELOPMENT OF A METHOD FOR
SYSTEMATIC PROBABILISTIC RISK ASSESSMENTS
OF NUCLEAR POWER PLANTS

POOR ORIGINAL

AGENCY: NUCLEAR REGULATORY COMMISSION

ACTION: Announcement of Grant Award and Meeting Schedule

SUMMARY: The NRC Office of Nuclear Regulatory Research has recently awarded grants of financial assistance to two technical societies to coordinate efforts to develop a Procedures Guide for the performance of probabilistic analysis of the safety of nuclear power plants. Each society will hold a technical conference to provide a public forum for broad technical peer review.

DATES: October 25-28, 1981, IEEE Conference, Washington, DC
April 4-7, 1982, ANS Conference

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SUPPLEMENTARY INFORMATION:

- OVERVIEW -

The NRC Office of Nuclear Regulatory Research has recently awarded grants of financial assistance to two technical societies to coordinate efforts to develop a Procedures Guide for the performance of probabilistic analysis of the safety of nuclear power plants. The grants are for \$238,000.00 to the Institute of Electrical and Electronics Engineers (IEEE) and \$228,000.00 to the American Nuclear Society (ANS). Each of the societies will hold a technical conference to provide a public forum for broad technical peer review and understanding of the procedures guide. The IEEE conference will be held October 25-28, 1981, in Washington, DC and the ANS conference will be held April 4-7, 1982.

A number of technical specialists comprise the Technical Working Group. These individuals, from within and from outside the nuclear industry, will participate as authors of the various parts of the procedures guide. A number of peer reviewers, also from within and outside the nuclear industry, will participate on a regular basis to provide broad input to the work. Financial support of these technical specialists is being provided by the NRC, the Department of Energy, the Electric Power Research Institute, and many organizations in the nuclear industry.

A Steering Committee has been formed as an independent group to provide direction and planning for the project. The Steering Committee will be the final approval body for the procedures guide.

The project will produce a procedures guide that can be followed for probabilistic analysis of accident sequences, system failure probabilities, radioactivity release, and accident consequences. The NRC may adopt part or all of this guide later. However, this project will be completed upon publication of the procedures guide following the ANS conference in 1982.

NRC has established a file on this activity in the Public Document Room at 1717 H Street, NW, Washington, DC.

The plan and rationale for this activity described below was prepared by interested parties from the NRC, the technical societies and the nuclear industry before the activity was undertaken. This plan was the basis of agreement for this project. It should be noted that this project is intended only to prepare a technically sound procedures guide for probabilistic analysis of nuclear power plants, it is not intended to develop regulatory policy.

- PLAN -

1. BACKGROUND

Since the completion of the Reactor Safety Study (WASH-1400) the NRC has been exploring ways to systematically apply probabilistic analysis to nuclear power plants. The NRC, in its Interim Reliability Evaluation Program (IREP) which is now underway, is developing and giving trial use to a procedures guide which could be the basis for systematic analysis

of all nuclear power plants, a National Reliability Evaluation Program (NREP). Before settling on any procedures guides for such a broad undertaking the NRC is interested in obtaining the advice and participation of many competent parties, including the nuclear industry and probabilistic analysis experts from within and without the nuclear industry. Thus the NRC seeks to initiate and support a project to develop a procedures guide, a method for systematic probabilistic risk assessments of nuclear power plants.

2. THE PROJECT

The project envisioned is to develop a Procedures Guide for the systematic application of probabilistic and reliability analysis to nuclear power plants. This Procedures Guide is expected to define the acceptable methodology for performance of such studies. The Procedures Guide is expected to address the following subject areas: (1) system reliability analysis, (2) accident sequence classification, (3) frequency assessment for classes of accident sequences, (4) estimation of radiologic release fractions for core melt accident sequences, and (5) consequence analysis. For each of these subject areas, the Procedures Guide should delineate (1) acceptable analytic techniques, (2) acceptable assumptions and modeling approximations including the treatment of statistical data, common cause failures and human errors, (3) treatment of uncertainty, (4) acceptable standards for documentation, and (5) quality control. The Procedures Guide is expected to define a practical scope of analysis for such systematic review conducted in the next few years. Thus, the Procedures Guide might recommend omission, simplification, or postponement of some elements of a complete analysis. If it does, the

Procedures Guide may or may not include specific guidance on when or how to address these elements later. The Guide may be adopted and modified under other auspices later, but this project will end with the first publication of the Procedures Guide.

The NRC sees this situation as a unique opportunity to use the resources of two technical societies, the Institute of Electrical and Electronics Engineers (IEEE) and the American Nuclear Society (ANS), to develop and review statements of useful PRA methodology and recommend applications. The technical society activities envisioned are two conferences linked by a series of workshops which will prepare material for the conferences. The IEEE is seen as the principal host of the first of these conferences, the Review Conference, because their membership and ability to contribute spans not only the nuclear industry but other industries which have used probabilistic and reliability analysis for some time. The ANS is seen as the principal host of the second of these conferences, the Topical Conference.

The NRC would work directly with each of the two technical societies supporting and cosponsoring activities specifically related to this project. The societies would be expected to use their resources to obtain the attention and participation of technically qualified parties. The NRC, with Steering Committee advice, may select a time or times in the course of this project to make materials available for general public comment through other channels such as publication in the Federal Register, etc.

3. POLICY ACTIVITIES

The activity planned to develop a Procedures Guide for probabilistic analysis is premised on the expectation that the use of such a Procedures Guide would be systematically undertaken in the nuclear power industry and that the results of such analyses would be used in regulatory decisionmaking. Neither NRC nor the owners of the nuclear plants can or would delegate their policy setting responsibilities to others. Therefore, the NRC is expected to continue to develop specific policies on the extent and manner in which probabilistic analysis will be used in the regulatory process. The nuclear plant owners are expected to pursue resolution of these policy issues as well, operating individually and through the Atomic Industrial Forum (AIF), through its Policy Committee on Nuclear Regulation and its subordinate committees and subcommittees. The effectiveness of the preparation and use of the Procedures Guide depends heavily on timely policy input to the technical effort. Therefore, it is important that both NRC and the industry pursue resolution of these policy issues through normal channels as well as by dedicating persons to participate in this technical society effort who are significantly involved in resolution of these policy issues.

4. ORGANIZATION

The organization of this project is intended to enable the NRC and the nuclear industry to work closely with the two technical societies in cosponsoring their activities in a coordinated scheme of action. The project will be directed by a Steering Committee under the joint chairmanship of two representatives of the technical societies, the IEEE and

and the ANS. The principal work of developing technical documents for the project will be performed by a project Technical Committee. Each of the conferences is expected to have its own conference committee.

The Steering Committee, excluding the two co-chairmen, is drawn from different sources as follows:

<u>Affiliation</u>	<u>Number of Members</u>
NRC	3
DOE	1
IEEE	3
ANS	2
AIF	1
Other Nuclear Industry	4

The Steering Committee will set its final membership. At its discretion, it may include in its number the chairman of the project Technical Committee and the chairmen of the conference committees when they have been chosen by their respective professional societies. The chairman and the members of the Technical Committee will be chosen by the Steering Committee. The Technical Committee is expected to include about seven or eight specialists who have strong technical knowledge of both nuclear power plant analysis and probabilistic and reliability analysis techniques. These experts will be drawn from the nuclear industry, the national laboratories, and the NRC. In addition, as directed by the Steering Committee, the Technical Committee will be augmented from time to time by additional members, drawn from non-nuclear industry and

government experts in risk assessment methodologies. They will be assisting the Technical Committee to develop realistic descriptions and evaluations of candidate probabilistic analysis methods as well as reviews of pertinent experience in the use of probabilistic and reliability analysis for consideration by the Steering Committee and the technical society meetings.

It is expected that, under the Steering Committee's direction, the augmented Technical Committee will review the procedures for PRA which have been or are being used in the nuclear and non-nuclear fields and draft the Procedures Guide described in 2. above. When the Procedures Guide has been sufficiently developed, it will undergo peer review in the IEEE sponsored Review Conference. The Review Conference is expected to draw participants from the nuclear industry, from the research community, from professional societies, and from government. The Review Conference is expected to use a suitable choice of format to discuss: (1) status reports of recent PRA activities such as the NRC's IREP, the Zion/Indian Point Study, the Oconee/NSAC review, etc., (2) PRA applications and experience in non-nuclear settings, (3) implications of use of PRA, in the regulatory context, and (4) results of the Technical Committee's work on PRA methodologies with special emphasis on new approaches.

From time to time either before or after the Review Conference the Steering Committee may direct that drafts of the Procedures Guide be circulated to other reviewers for technical comment. Similarly, the

NRC may choose to circulate drafts of the Procedures Guide to the general public for information and comment at suitable times.

After the Review Conference the Technical Committee will resume drafting of the Procedures Guide. The Procedures Guide, and the bases for its form and methods will be reviewed again at workshops and the Topical Conference sponsored by the ANS. It is expected that the Topical Conference will include reports on many PRA projects, technical issues in PRA, and policy issues in PRA, as well as a suitable format for discussion and review of the Procedures Guide. Presumably, the Steering Committee and the Technical Committee will meet again after the Topical Conference to incorporate the comments obtained there. When the Procedures Guide is finished the project will be completed.

The Procedures Guide is not expected to be an officially endorsed product of either of the technical societies; it will not have gone through the rigorous and usually longer consensus process as would be the case in the development of a national standard. The Procedures Guide will be instead a product of the Steering Committee, an ad hoc group acting in concert with but independent of the two technical societies. The members of the Steering Committee are chosen in part because of their normal professional affiliation but act in the Committee as individuals. The members' acts in Committee do not represent the official positions of their agencies. No agency or organization, by the commitment of resources to this project is considered to be adopting or endorsing the resulting Procedures Guide. At the end of the project the Procedures Guide will be published to ensure its availability for critique and endorsement on its own merits.

5. SUPPORT

The two professional societies will act as secretariat for or sponsor the activities of this project under separate support agreements with the NRC. In general, the IEEE will sponsor and administer the Review Conference, the IEEE participation in the Steering Committee, and the non-nuclear industry contributions to the work of the Technical Committee. The ANS will sponsor and administer the Topical Conference and provide administrative support for the Steering Committee and the Technical Committee, providing meeting rooms, working facilities and whatever other physical support services are required. The final division of responsibility will be made by the Steering Committee.

Persons designated to participate in the Steering Committee and the Technical Committee will be expected to make a substantial commitment of their time. It is expected that the Technical Committee will meet for one week every six to eight weeks during the first six months of this project. The nuclear industry and NRC participants will be expected to devote about 20% of their working time to the project. The chairman of the Technical Committee and technical support staff will likely spend about half time on the project. Consultants will work as required.

7. PARTICIPANTS

The following participants have been tentatively designated:

Steering Committee:

Richard J. Gowen, Co-Chairman, (IEEE)
South Dakota School of Mining and Technology

Saul Levine, Co-Chairman (ANS)
NUS Corporation

Robert M. Bernero
U. S. Nuclear Regulatory Commission

John Boettger
Public Service Electric & Gas

Kenneth Canady
Duke Power Company

Malcolm L. Ernst
U. S. Nuclear Regulatory Commission

Herbert Feinroth
U. S. Department of Energy

Jack W. Hickman, Exofficio member of the Steering Committee as
Chairman of the Technical Committee
Sandia National Laboratories

Irving Howell
South Central Bell Telephone Company

Robert E. Larson
Systems Control, Inc.

James F. Mallyay
Nuclear Safety Analysis Center

Edward P. O'Donnell
Ebasco Services, Inc.

Wayne L. Stiede
Commonwealth Edison

Alfred Torri
Pickard, Lowe and Garrick, Inc.

Ian B. Wall
Electric Power Research Institute

Edwin Zebroski
Nuclear Safety Analysis Center

Signed at Silver Spring, Maryland, This 18th day of May 1981.

Robert B. Minogue

Robert B. Minogue, Director
Office of Nuclear Regulatory Research