

CERTIFIED

CERTIFIED COPY
DATE ISSUED: Jan. 5, 1988

ACRS-2542
PDR 1/22/88

SUMMARY/MINUTES OF THE
DECEMBER 16, 1987 MEETING OF THE
ACRS SUBCOMMITTEE ON RELIABILITY ASSURANCE
(EQ-RISK SCOPING STUDY)
WASHINGTON, D.C.

A meeting was held by the ACRS Subcommittee on Reliability Assurance on December 16, 1987. The purpose of the meeting was to explore the current status of the Equipment Qualification (EQ) Risk Scoping Study being performed by the NRC Office of Nuclear Regulatory Research. Notice of this meeting was published in the Federal Register on Monday, November 30, 1987. The Subcommittee received no oral or written statements from the public. The meeting was entirely open to the public. The meeting began at 8:00 a.m. and ended at 11:15 a.m. Richard Major was the cognizant ACRS Staff Engineer for the meeting.

Attendees:

ACRS

C. Wylie, Chairman
J. Ebersole, Member
C. Michelson, Member
R. Major, Staff
R. Savio, Staff
G. Brown, Fellow

Sandia

L. Bustard
D. Dahlgren
M. Bohn

NRC

D. Sullivan, RES
D. Gupton, RES
M. Vagins, RES
G. Weidenhamer, RES
H. Walker, RES
M. Dey, RES
R. Wilson, RES

Science Applications Int'l Corp.

G. Medford
A. Kolacykouski

Others

G. Langford, Bechtel
P. Beliveau, NUMARC
G. Fotoponlos, Bechtel
C. Lowe, NMS
I. Caffenlorry, Heritage Report.

CERTIFIED

BB01270602 BB0105
PDR ACRS
2542 PDR

DESIGNATED ORIGINAL

Certified By EMB

This meeting was an initial briefing by the NRC Staff on an Equipment Qualification Risk Scoping Study. The Subcommittee was briefed prior to any results being produced by this effort; this session was for information only. A copy of the schedule is enclosed.

Chairman's Introduction - C. Wylie

Mr. Wylie commented that the NRC had had a research effort to study equipment qualification. This effort covered a ten year period (1975-1985). When this program ended prior to its completion, the ACRS recommended in June 1986 that the EQ research to assess survivability of electrical equipment when subjected to hostile conditions including severe accidents be funded. The ACRS stated, "...Research is vital to preventing accidents as well as mitigating the consequences of accidents, should they occur." In this light, the Subcommittee was anxious to see the plan for the EQ Risk Scoping Study.

Introduction by Staff - Moni Dey, RES

Dr. Dey explained that the objective of the EQ Scoping Study was to determine the risk importance and priority for NRC funded EQ research. Electrical equipment (and mechanical equipment that is electrically driven) that are essential to preventing accidents, as well as mitigating the consequences of accidents, will be studied to determine their risk significance and prioritize the need for further study, EQ'

issues pertaining to the performance of the above equipment will be studied.

Results of this research will be used to determine the need for further EQ research (develop/revise regulations or regulatory guides), prioritize the research, and study the need for identifying new generic issues.

Results from the EQ Scoping Study are expected by March 1988. The Staff wishes to meet with the Subcommittee in March 1988 to discuss results and would like ACRS comments on this effort at the April 1988 ACRS meeting.

EQ-Risk Scoping Task Structure - Larry Bustard, Sandia

The EQ-Risk Scoping Study will attempt to assess the impact of electrical equipment environmental qualification or lack thereof on reactor risk and its uncertainties. It is also trying to identify any analyses or testing that may be necessary to reduce the risk or its uncertainties stemming from lack of qualification of equipment important to safety.

Among the EQ Issues to be addressed are:

1. Does the current EQ process adequately demonstrate equipment qualification for the design basis?

2. Does the current EQ process demonstrate equipment operability in agreement with current PRA assumptions?

The project approach being taken in the EQ Scoping Study is to first identify "candidate" equipment operations that must be accomplished in harsh environments. Second, prioritize "candidate" equipment operations. Third, for selected equipment operations, identify in more detail their risk impact, important sequences, typical harsh environments, subcomponent locations, fragilities, etc. Fourth, for selected equipment operations, identify impact of EQ issues on equipment function. Identify data sources and data base shortcomings. Finally, the risk significance of various EQ issues will be assessed and conclusions reported.

Risk Significant Equipment/Operations for Identified BWR and PWR Plants

- Alan Kolaczowski, SAIC

The purpose of this task is to identify from a PRA perspective important equipment operations which could be impacted by a harsh environment. The process to accomplish this involves a literature review to identify risk significant equipment. Also employed is a formalized process of ranking of equipment based in equipment importance, equipment location, and potential environments for each accident type reviewed. The ultimate goal is to identify areas where PRA results might be affected by equipment qualification knowledge.

A summary of the literature review process identified PORV's, SRVs, MSIVs, pressure sensors, and containment heat removal systems as potential EQ significant equipment. The literature review also pointed out the need to develop a process that focuses on identifying risk significant equipment with EQ potential as past work has not been designed to accomplish this.

The formalized process for ranking equipment qualitatively considers equipment locations in terms of potential for seeing a harsh environment. The process also uses risk increase and risk reduction calculations to identify important equipment. 17 BRW and PWR issues resulted from this process (e.g. containment isolation valves, low pressure inj. pump motors, containment fans, pressurizer level instrumentation). All literature review issues were identified again in the formalized process.

It is believed that the list of 17 equipment operation issues, with significant potential for harsh environment exposure, represents a broad spectrum of both core damage and total plant risk operational concerns. The issues will serve as input to other program tasks.

Risk Significance of EQ Issues - Larry Bustard, Sandia

The risk significance of EQ issues was illustrated using the example of containment fan coolers. It was noted that PRAs characterize equipment performance during accident conditions by usually assuming normal

operation failure probabilities. However, sometimes accident performance assumes a step-function change in failure probabilities.

EQ insights were also found to be useful towards defining accident failure probabilities:

- Where might PRA analyses assume step-function changes in failure probabilities.
- What are upper or lower bounds on accident environment failure probabilities.
- When during accident exposures do failure probabilities significantly diverge from normal operation values.

The risk changes associated with modified failure probabilities are useful for characterizing the risk significance of EQ issues.

Subcommittee Comments:

The Subcommittee noted that there should be an interrelation between this EQ effort and the A-17 Systems Interaction program. Failures caused by harsh environments (floods, fires, loss of air cooling) should be factored into the systems interaction process.

It was felt special attention should be paid to harsh environments that occur in the balance of plant. The subsequent loss of support equipment could be significant.

A concern was raised over the treatment of fires. The treatment of fires has been segregated into a separate fire risk scoping study. Caution should be exercised to ensure this topic receives adequate attention.

A significant problem could be the abnormal operation of a piece of equipment. This would be some intermediate area between failure (complete loss of function) and normal operation. Thought should be given to problems created when equipment behaves in unexpected ways.

Certain EQ concerns can be raised when seismic events are considered.

Future Action:

A Subcommittee chairman's report will be given to introduce this effort to the ACRS during the January 1988 meeting. Results from the EQ-Risk Scoping Study will be ready for Subcommittee consideration in March 1988. Full Committee comments are requested on this study during the April 1988 ACRS meeting.

NOTE: Additional meeting details can be obtained from a transcript

of this meeting available in the NRC Public Document Room,
1717 H St., NW., Washington, D.C. or can be purchased from
Heritage Reporting Corporation, 1220 L Street, NW.,
Washington, D.C. 20005 (202) 628-4888.