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NUCLEAR REGULATORY COMMISSION
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January 21, 1997

MEMORANDUM TO: Charles E. Rossi, Director
Safety Programs Division
Office for Analysis and Evaluation
of Operational Data

FROM: Jack E. Rosenthal, Chief
Reactor Analysis Branch
Safety Programs Division
Office for Analysis and Evaluation
of Operational Data

J E Rosenthal

SUBJECT: TECHNICAL REVIEW REPORT - DESIGN ERRORS IN NUCLEAR POWER PLANTS

Attached for your information and use is a technical review report on design errors in nuclear power plants. This report provides observations about how design errors at operating nuclear facilities have been discovered, and the potential impacts of regulatory or industry actions. The results of the 1985 through 1995 review indicate the following conclusions:

(1) The number of reported design errors has been steadily dropping since the early 1990s even though the number of NRC inspector-hours in performing engineering related inspection modules has increased during the same time period.

(2) The number of reported design errors discovered as a result of design-basis review efforts steadily decreased by 1995, presumably due in part, to diminishing licensing resources allocated to this effort and the lessening number of undiscovered latent design errors.

(3) The number of design errors discovered at any given time was dependent on the extent of initiatives taken by the NRC and the industry. Major NRC initiatives included design-related team inspections which began during the mid-1980's and many design-related generic communications. During this same time period, industry had initiated indepth design-basis reviews which resulted in an increase in the discovery of design problems.

(4) There appeared to be a relation between the number of design-related generic communications issued by the NRC and the number of licensee reported design errors. However, licensee event reports infrequently attributed generic communications as the initiator for the discovery of design errors.

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(5) Approximately two percent of the reviewed licensee event reports containing design errors were found significant enough to be evaluated under the Accident Sequence Precursor (ASP) program. Of those design error events that were in the ASP database, the majority had conditional core damage probabilities between 10^{-4} and 10^{-6}.

Attachment: As stated

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P. Lewis, INPO
D. Queener, NOAC

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(1) The number of design errors discovered at any give time was proportional to the extent of the initiatives taken by the Nuclear Regulatory Commission and the industry.

(2) Design oriented team inspections were very effective in discovering design errors.

(3) A number of reported design error events were of relative high risk significance.

(4) There appeared to be a direct correlation between the number of design-related generic communications issued by the NRC to the number of licensee reported design errors. However, licensee event reports infrequently attributed generic communications as the reason for discovery of design errors.

(5) The number of design errors discovered as a result of design-basis reconstitution efforts was shrinking, apparently due to diminishing resources allocated to this effort by licensees.

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