

January 30, 1990

Mr. William H. Rasin, Director  
Technical Division  
Nuclear Management And Resources Council  
1776 Eye Street N.W.  
Suite 200  
Washington, D.C. 20006-2496

Dear Mr. Rasin:

We appreciate the opportunity to have met with representatives of your Design Basis Issues Working Group for the purpose of discussing the first guideline that the Working Group developed on the handling of open items resulting from design reconstitution efforts. As you know, we have conducted a series of surveys (six utilities and one nuclear steam supply system vendor) to develop information on industry design control programs and implementation of design reconstitution efforts. Our conclusions from those surveys will be documented in a forthcoming NUREG report. In the interim, we have assembled the enclosed outline which describes some of the information gained during the surveys with respect to design reconstitution efforts.

We trust that the enclosed information will be of some value to your working group during the development of design reconstitution guidelines. If you have any comments regarding the information conveyed in the enclosure, please contact either myself (492-0903) or Mr. Gene Imbro (492-0954).

Sincerely,

Original signed by

Brian K. Grimes, Director  
Division of Reactor Inspection  
and Safeguards  
Office of Nuclear Reactor Regulation

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As Stated

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ENCLOSURE

## PERSPECTIVES ON DESIGN RECONSTITUTION PROGRAMS

The NRC has performed a survey program to gain an understanding of the design reconstitution efforts and design control programs that are ongoing in the industry. The survey team visited six utilities and one NSSS vendor. A standardized set of survey questions was utilized to gain specific utility feedback on their practices for design and design change control, drawing control, and the availability and accuracy of design documentation. An assessment was performed of their design document reconstitution program, if in place. The survey results are currently being compiled into a NUREG that will provide NRC recommendations and conclusions regarding design control practices and the ongoing design document reconstitution programs based on the survey observations.

Some of the survey observations are provided below.

### Need to Conduct a Design Document Reconstitution Program

The perceived utility need for a design document reconstitution program was found directly proportional with the age of the plant. Utilities with recent vintage plants have a design organization that participated directly in the initial design and construction of the plant and the design documentation is extensive and retrievable, therefore because of existing corporate memory they do not feel the need to collect the system and topical design bases in a central set of "upper tier" documents.

The following factors were identified as important for consideration by utilities in evaluating their organizations to determine the need for implementing some form of design document reconstitution program: 1) loss of utility, A/E, and NSSS vendor engineering and design corporate memory through personnel attrition; 2) the normal evolution of the utility organization from a design to an operating orientation with the typical shift in priorities away from expending resources to maintain and up-date design documents; 3) lack of a centralized design engineering organization with the responsibility for design control/configuration management shifted to the operating organization; 4) extensive reliance upon contracted engineering services with minimal licensee capability to provide technical oversight; 5) the availability of design bases and design analysis and calculations to support the "as-configured" plant; and 6) the ability to make timely operability determinations.

### Design Document Reconstitution Program Scope

Design document reconstitution programs have varying levels of information contained within the documentation with respect to content, format, and level of detail. It is the prerogative of each utility to develop their approach based upon their unique needs. The general intent of the reconstitution program can be to provide a central location for design basis information with emphasis on the design intent (the why of the design) and be a top level directory to the design documents that define the current plant configuration. The end result will provide information that will aid with the preparation of plant modifications and safety evaluations, and to aid in the development of

justifications for continued operation. The end users of the documentation can be identified and the content and format structured accordingly.

#### Design Bases vs. Design Document Reconstitution

One aspect of the reconstitution program is the identification of the functions performed by structures, systems, and components and the values or ranges of controlling parameters in accordance with the definition of design bases in 10 CFR 50.2. However reestablishment of the "design bases" without reconstitution of the supporting design documents, as necessary, may not provide a sufficient level of information for the basis for future modifications. The program could also integrate an effort to establish that the supporting design documentation (essential documentation) is available, accurate, and that the reconstituted design documents accurately reflect the plant configuration. The objective would be to establish a continuity among the various levels of design information and physical plant characteristics.

#### Availability of Design Documentation

Some utilities began licensed operation before the advent of design document controls such as 10 CFR 50 Appendix B and relevant ANSI standards. Because of this, and other reasons, the necessary documentation to demonstrate the acceptability of plant modifications is not available. The spectrum of design documentation can be reviewed to identify the set of essential documentation necessary to support Technical Specification limiting safety system setpoint, Technical Specification operating limits and bases, and to demonstrate that safety systems are designed and are being operated in accordance with their design bases. Regeneration of the missing documentation may be appropriate in a time-frame based on the safety significance.

#### Control of Incremental Changes

The surveys found that minor changes involving such things as electrical loads on Class 1E buses, fluid system resistance, valve weight changes, and pipe hanger relocations are not clearly documented within existing calculations when an engineering determination concludes the item is individually insignificant. While it may not be necessary to revise major calculations for incremental parameter changes, based upon engineering judgement, it is appropriate to track these changes to support the conclusion that the changes in aggregate do not affect the validity of the existing calculation and the ability of a system, structure or component to perform its design safety/design functions. It is apparent that some controls are needed for the logging of incremental changes such that they may be assessed in total when a subsequent modification is performed.

#### Operability/Reportability Determinations for Missing Documents

A design document reconstitution program can result in the identification of missing design documents with varying degrees of safety significance. Some may be minor inconsistencies in documentation while others can involve the possibility of operating the plant outside the design bases or in an unanalyzed condition that will necessitate immediate action. It is incumbent on the personnel involved with a reconstitution program to assess in a timely manner the concerns that have potential operability aspects. These concerns need to be escalated for a formal operability review on a time scale commensurate with

their safety significance. Applicable technical specification action statements are entered as appropriate when the operability determination has been made. A justification for continued operation and an action plan can then be developed as needed on a time schedule commensurate with the safety significance.

The determination of operability/reportability is a continuous process. If new information comes to light which changes the characteristics of a previously identified issue, the operability/reportability aspects need to be promptly reconsidered. The reportability decision follows directly from the operability determination. If the operability determination reveals that the plant was operating in an unanalyzed condition or outside its design basis, the item would be processed in accordance with normal reportability mechanisms.

Utility/NRC dialogue during the reconstitution process is appropriate so that operability issues can be discussed even if a requirement for formal notification is not evident.

#### Design Document Reconstitution (DDR) Programs

Self-initiated DDR programs were found to have several common weaknesses as discussed below.

1) The design reconstitution programs reviewed to date have not identified in advance the documents that are necessary to demonstrate that a structure, system or component will function properly. An alternative approach would be to initially develop a template identifying the set of design documents that will be known as "essential documents." This "template approach" could serve to define the set of design documents necessary to a) establish and define the functionality and operability requirements of systems, structures and components, and b) demonstrate the systems, structures and components conformance to the design bases, and c) identify the available margin. A review could be performed utilizing the "template approach" (i.e., compare the essential document list with available design documents). Missing documents would be identified and prioritized for reconstitution as appropriate.

Essential documentation could be further subdivided as follows:

Category I - Design documentation that supports or defines technical specification safety limits, limiting conditions for operation, limiting safety system setpoints, surveillance requirements or bases, or that demonstrates that systems, structures or components addressed in the plant's technical specifications will perform their safety function.

Category II - Design documentation that defines controlling parameters or demonstrates the functionality of safety-related SSC that are not explicitly addressed in the technical specifications but which provide a supporting function to the SSC addressed in the technical specifications.

Category III - Design documentation that defines controlling parameters or demonstrates functionality of safety-related SSC not included in Category I or II.

Category IV - Design documentation that defines controlling parameters or demonstrates the functionality of safety-related SSC with regard to passive considerations (i.e., seismic).

Category V - Design documentation that demonstrates the design of non-safety SSC is such that its failure would not impair the functionality of a safety-related SSC (i.e., seismic II/I).

2) The process for the regeneration of missing design documentation was not always proceduralized so that it could be handled in a systematic manner. The regeneration of the missing documents can be based upon the safety significance of the documentation. Particular emphasis for regeneration can be placed on documents necessary to show compliance with plant technical specifications, that define technical specification bases, or those necessary to demonstrate functionality of safety systems during postulated accidents or plant transients.

3) The validation of the content of specific DDR output documentation such as system or topical summary design documents was not always thoroughly carried out. Some level of validation of the plant configuration with respect to the reconstituted design documents is appropriate. The validation needs to address functional performance and interface requirements established within the design documents. Associated plant configuration management initiatives can be integrated into the validation program as appropriate.

4) One important intangible benefit from a design document reconstitution program performed with strong participation of the utility's staff is the in-depth understanding that is gained of the plant design bases. Some utilities that have implemented DDR programs have engaged the services of contracted engineering organizations to develop the DDR summary design documents. The end result is that the summary design documents are turned over to utility personnel who have not gained a working knowledge or appreciation of the design considerations embodied in the final design since the detailed review was performed by contractors. In this instance, the summary design document can become a less than useful document due to a lack of understanding and acceptance of the document by the working level utility staff.