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# NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document

Program Summary

Project Number 669

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**U.S. Nuclear Regulatory Commission**

Office of Nuclear Reactor Regulation



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Associate Directorate for Advanced Reactors and License Renewal  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
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## ABSTRACT

The Electric Power Research Institute (EPRI) is preparing a compendium of technical requirements, referred to as the "Advanced Light Water Reactor [ALWR] Utility Requirements Document," that is applicable to the design of an ALWR power plant. When completed, this document is intended to be a comprehensive statement of utility requirements for the design, construction, and performance of an ALWR power plant for the 1990s and beyond.

The Requirements Document consists of three volumes. Volume I, "ALWR Policy and Summary of Top-Tier Requirements," is a management-level synopsis of the Requirements Document, including the design objectives and philosophy, the overall physical configuration and features of a future nuclear plant design, and the steps necessary to take the proposed ALWR design criteria beyond the conceptual design state to a completed, functioning power plant. Volume II consists of 13 chapters and contains utility design requirements for an evolutionary nuclear power plant [approximately 1350 megawatts-electric (MWe)]. Volume III contains utility design requirements for nuclear plants for which passive features will be used in their designs (approximately 600 MWe).

The staff of the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, has prepared Volumes 1 and 2 (Parts 1 and 2) of its safety evaluation report (SER) to document the results of its review of Volume I and II of the Requirements Document. Volume 1, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document - Program Summary," provides a discussion of the overall purpose and scope of the Requirements Document, the background of the staff's review, the review approach used by the staff, and a summary of the policy and technical issues raised by the staff during its review. Volume 2, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document - Evolutionary Plant Designs," gives the results of the staff's review of the 13 chapters of the Requirements Document for evolutionary plant designs. Volume 3, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Requirements Document - Passive Plant Designs," scheduled to be issued in September 1993, will give the results of the staff's review of the 13 chapters of the Requirements Document for passive plant designs.

Preliminary drafts of Volumes 1 and 2 were forwarded to the Commission and the Advisory Committee on Reactor Safeguards (ACRS) on May 14, 1992. In its letter dated April 24, 1992, the staff issued a draft of Volume 3 on all of the chapters of the Requirements Document for passive plant designs. After the staff has completed its review of EPRI's responses to the draft SER (DSER) on passive plant designs in the form of revisions to the Requirements Document, it will issue a final SER to discuss its conclusions regarding its review of the final version of the document.

In staff requirements memoranda (SRM), the Commission instructed the staff to provide an analysis detailing where the staff proposes departure from current regulations or where the staff is substantially supplementing or revising

interpretive guidance applied to currently licensed LWRs. The staff considers these to be policy issues. Appendix B to Chapter 1 of Volume 2 of this report gives the staff's regulatory analysis of those issues identified for the evolutionary plant designs. Appendix B to the DSER on Chapter 1 of the Requirements Document for passive plant designs gives the regulatory analysis of those issues identified for the passive plant designs. These issues have been addressed in Commission papers SECY-90-016, "Evolutionary Light Water Reactor Certification Issues and Their Relationship to Current Regulatory Requirements"; SECY-91-078, "Chapter 11 of the Electric Power Research Institute's Requirements Document and Additional Evolutionary Light Water Reactor Certification Issues"; and in draft Commission papers, "Issues Pertaining to Evolutionary and Passive Light Water Reactors and Their Relationship to Current Regulatory Requirements," and "Design Certification and Licensing Policy Issues Pertaining to Passive and Evolutionary Advanced Light Water Reactor Designs," that were issued on February 27 and July 6, 1992, respectively.

In SRM dated June 26, 1990, and April 1, 1991, the Commission provided its decisions on SECY-90-016 and SECY-91-078 as they apply to evolutionary designs. The Commission will be reviewing the basis for the approach that the staff is proposing for those issues discussed in the draft Commission papers of February 27 and July 6, 1992, and, accordingly, may at some future point in the review determine that such issues involve policy questions that the Commission may wish to consider. These issues are considered fundamental to agency decisions on the acceptability of the ALWR designs. The staff will ensure satisfactory implementation of Commission guidance regarding these matters during its review of individual applications for final design approval and design certification.

There are no open issues pertaining to the Requirements Document for evolutionary plant designs other than policy issues on which the staff has taken a position, but for which the Commission has not had the opportunity to provide guidance. In addition, the staff concludes that there are issues that must be satisfactorily resolved before it can complete its review of the Requirements Document for passive plant designs. These issues are summarized in Section 4 of Volume 1 and discussed in detail in this report.

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## 1 INTRODUCTION

The Electric Power Research Institute (EPRI) is preparing a compendium of technical requirements, referred to as the "Advanced Light Water Reactor [ALWR] Utility Requirements Document," that is applicable to the design of an ALWR power plant. When completed, this document is intended to be a comprehensive statement of utility requirements for the design, construction, and performance of an ALWR power plant for the 1990s and beyond. Those participating in the program include utilities with nuclear plant experience, nuclear steam supply system vendors, architect-engineering firms, and consultants in related fields.

The Requirements Document consists of three volumes. Volume I, "ALWR Policy and Summary of Top-Tier Requirements," is a management-level synopsis of the Requirements Document, including the design objectives and philosophy, the overall physical configuration and features of a future nuclear plant design, and the steps necessary to take the proposed ALWR design criteria beyond the conceptual design state to a completed, functioning power plant. Volume II consists of 13 chapters and contains utility design requirements for an evolutionary nuclear power plant [approximately 1350 megawatts-electric (MWe)]. Volume III contains utility design requirements for nuclear plants (approximately 600 MWe) in which passive features will be used for the ultimate safety protection of the plant.

The staff of the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission (NRC), has prepared Volumes 1 and 2 (Parts 1 and 2) of its safety evaluation report (SER) to document the results of its review of Volume I and II of the Requirements Document. Volume 1, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document - Program Summary," provides a discussion of the overall purpose and scope of the Requirements Document, the background of the staff's review, the review approach used by the staff, and a summary of the policy and technical issues raised by the staff during its review. Volume 2, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document - Evolutionary Plant Designs," gives the results of the staff's review of the 13 chapters of the Requirements Document for evolutionary plant designs. Volume 3, "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document - Passive Plant Designs," scheduled to be issued in September 1993, will give the results of the staff's review of the 13 chapters of the Requirements Document for passive plant designs.

### 1.1 Background and Review Status

In 1983, EPRI began its program by working with the NRC staff to identify and resolve key safety and licensing issues. This joint effort resulted in a process whereby the unresolved and generic safety issues applicable to ALWRs

as of July 1, 1986\* were identified. This process was consistent with the procedures described in NUREG-0933, "A Prioritization of Generic Safety Issues." Additional information about this effort and its results is provided in NUREG-1197, "Advanced Light Water Reactor Program - Program Management and Staff Review Methodology," dated December 1986. In 1985, two new phases were added to the EPRI program: the development of EPRI's ALWR Utility Requirements Document for evolutionary plants and the assessment of small-plant options. This assessment resulted in the development of the Requirements Document for passive plant designs.

#### Chronology of Review of Requirements Document for Evolutionary Plant Designs

From June 30, 1986, through October 26, 1989, EPRI submitted Revision 0 of the Requirements Document for evolutionary plant designs. From September 24, 1987, through November 4, 1991, the staff developed and issued its draft SERs (DSERs) on these submittals. Table 1.1 gives the dates when these documents were issued.

On September 7, 1990, EPRI submitted Revision 1 of the Requirements Document for evolutionary plant designs, modifying the document in its entirety. On April 26 and November 25, 1991, and April 17, 1992, EPRI submitted Revisions 2, 3, and 4, respectively. Volume 2 of this report addresses the Evolutionary Document for evolutionary plant designs through Revision 3. Where possible, the staff's review included consideration of Revision 4 of the Requirements document.

A preliminary draft of Volume 2 was forwarded to the Commission and the Advisory Committee on Reactor Safeguards (ACRS) on May 12, 1992. The staff discussed the contents of the SER with the Committee and has included the views of the ACRS in Section 3 of this report.

#### Chronology of Review of Requirements Document for Passive Plant Designs

In its letter dated September 7, 1990, EPRI submitted Revision 0 of the Requirements Document for passive plant designs. On April 26, 1991, and January 2, 1992, EPRI submitted Revisions 1 and 2, respectively. In its letter dated April 24, 1992, the staff issued the DSER on all of the chapters of the Requirements Document for passive plant designs. After the staff has completed its review of EPRI's responses to this DSER in the form of revisions to the Requirements Document, it will issue a final SER as Volume 3 of this report to provide its conclusions regarding its review of the final version of the Requirements Document.

#### 1.2 Purpose and Regulatory Status of EPRI's ALWR Utility Requirements Document

EPRI's ALWR Utility Requirements Document is designed to serve as a vehicle to obtain consistent resolution of common operating problems, issues generically applicable to designs, severe-accident issues, and certain unresolved and generic safety issues. The document is to be used with companion documents, such as utility procurement specifications, that cover the remaining technical

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\*This date has since been changed to January 1990.



requirements applicable to new plant projects. It is also designed to serve as a vehicle to identify early in the design process major concerns about design concepts for LWRs in which passive safety systems will be used.

EPRI's ALWR Utility Requirements Document, because it is an agreement between the vendors and the nuclear power utilities, identifies what utilities desire in future designs. The Requirements Document has no legal or regulatory status. It is not intended to demonstrate complete compliance with the Commission's regulations, regulatory guidance, or policies, nor is it intended to be used as a basis for supporting final design approval and design certification (FDA/DC) for a specific design.

### Commission Guidance

In its staff requirements memorandum (SRM) dated December 15, 1989, the Commission assigned the review of the Requirements Document for evolutionary plant designs priority equal to those of General Electric Company's Advanced Boiling Water Reactor and Combustion Engineering, Inc.'s System 80+. In addition, the Commission directed the staff to compare future designs against the Requirements Document for evolutionary plant designs.

In the same SRM, the Commission directed the staff to complete its review of the Requirements Document for passive plant designs before it submitted the results of its review of the licensing review basis (LRB) for passive designs to the ACRS. Although a design certification applicant is no longer required to submit an LRB because the promulgation of Part 52 of Title 10 of the Code of Federal Regulations (10 CFR Part 52) negated the need for such a document, the staff interprets this guidance as directing it to complete its review of the Requirements Document for passive plant designs before significant interaction with the ACRS begins on these designs. It is the staff's position that, with the issuance of the DSER on Volume 3 in April 1992, this has been accomplished.

In its SRM of June 22, 1990, the Commission directed the staff to formally resolve major technical and policy issues in the context of the review of the Requirements Document for passive plant designs. The staff has identified such issues during its review of Volume III of the ALWR Utility Requirements Document and conceptual design information on the passive ALWRs. The staff developed the draft Commission papers dated February 27 and July 6, 1992, to address resolution of these issues. To ensure timely resolution of these policy issues, the staff will continue to evaluate resolutions proposed by EPRI and the ALWR vendors, and will address them in future Commission papers.

### 1.3 EPRI's Policy Statements

The ALWR Utility Steering Committee established policies to provide guidance for the overall development of the EPRI's ALWR Utility Requirements Document and to provide the plant designer with guidance in applying the design criteria. Although not design criteria themselves, these policies cover fundamental principles that have a broad influence on the design criteria of the Requirements Document. These policies include consideration of simplification, design margin, human factors, safety, regulatory stabilization,

standardization, use of proven technology, maintainability, constructibility, quality assurance, economics, protection against sabotage, and environmental effects.

#### 1.4 ALWR Design Bases

The term "ALWR design bases," as defined by EPRI, refers to the three sets of requirements that form the foundation for the ALWR design criteria. The first set of requirements forms the "licensing design basis," which includes the requirements necessary to satisfy regulatory criteria. These requirements and associated analytical methods are based on conservative, NRC-approved methods, and equipment is designed to safety-grade standards. The second set is the "risk-evaluation-basis," which extends the licensing design basis to meet public safety objectives. Probabilistic risk assessments are used for the risk evaluation basis methods. The third set is the "performance design basis," which is based on economic and investment protection considerations for a utility and for which realistic, designer-selected, best-estimate methodology is used. EPRI states that the licensing design basis is intended to provide an adequate level of safety, whereas the risk evaluation and performance design bases provide additional or enhanced protection.

#### 1.5 Regulatory Stabilization

Consistent with the overall ALWR program approach, as described in NUREG-1197, regulatory stabilization for an ALWR design can be achieved through the identification and resolution of plant optimization subjects and generic safety and licensing issues.

Plant optimization subjects are proposals, initiated by EPRI, to deviate from regulatory requirements. EPRI proposes to resolve these issues by providing technically supportable alternatives to current regulatory requirements. Table 1.2 contains a list of EPRI's proposed plant optimization subjects and their applicability to the evolutionary and passive plant designs. These issues are identified for both the evolutionary and passive plant design criteria in Section 2 of Appendix B to Chapter 1 of Volumes II and III of the Requirements Document. The staff's evaluation is provided in the corresponding sections of Volume 2 of this report and the April 1992 draft of Volume 3 of this report.

In addition, EPRI specifically addressed those generic safety issues that were classified as "high" or "medium" priority as of January 1990 in Section 3 of Appendix B to Chapter 1 of Volumes II and III of the Requirements Document. The staff's evaluation of the generic safety issues specifically addressed by EPRI and those unresolved safety issues and generic safety issues that are considered applicable to ALWRs is provided in the corresponding sections of Volume 2 of this report and the April 1992 draft of Volume 3 of this report.

#### 1.6 NRC Review Criteria

##### Criteria Governing the Review of EPRI's ALWR Utility Requirements Document

The staff's review of the Requirements Document is being conducted as described in NUREG-1197. As noted therein, the staff is using NUREG-0800, "Standard Review Plan [SRP] for the Review of Safety Analysis Reports for

Nuclear Power Plants," for review guidance. In addition to the criteria of NUREG-0800, the staff's review reflects the requirements of 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Reactors," and the Commission's "Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants" (50 FR 32138, August 8, 1985) and its policy statement on "Safety Goals for the Operations of Nuclear Power Plants" (51 FR 28044, August 4, 1986).

The Requirements Document places primary emphasis on preventing significant problems that have been experienced in existing plants; however, many details that will be provided in specific design applications are missing. Therefore, the staff is reviewing the proposed requirements at the level of detail presented by EPRI but is not determining their adequacy to meet all NRC requirements.

Although the SRP is being used as guidance, the level of detail does not permit a review for completeness. The SRP was written to support the review of safety analysis reports on specific plant designs for which a significant amount of design and construction information was available. Therefore, the staff's evaluation became one of "review by exception," and the staff is conducting its review with the understanding that EPRI intends that the Requirements Document contain design criteria that meet all current regulations, except where deviations are identified in the document. The staff's review of the Requirements Document is focused primarily on determining whether the EPRI criteria do or do not conflict with current regulatory requirements. If a requirement proposed by EPRI is found not to conflict with NRC requirements, the staff judges it to be acceptable.

However, in certain technical areas (e.g., advanced instrumentation and control design, human factors considerations), little or no requirements or guidance exists. Therefore, design criteria in the Requirements Document associated with these areas are unlikely to conflict with regulatory requirements. In those cases, although using the conflict standard would result in a finding of acceptability, the staff deems it appropriate to apply additional standards to judge the acceptability of a requirement. In such cases, the staff is using a combination of consideration of those regulations that do apply, good engineering judgment, past practice and experience at operating power plants, and applications in other industries to evaluate the requirements proposed by EPRI in the Requirements Document.

During its review, the staff also identified potential incompatibilities between EPRI-proposed design requirements and current regulatory requirements, and where possible misinterpretations of regulatory requirements exist in the Requirements Document.

In the February 15, 1991, SRM pertaining to SECY-90-377, "Requirements for Design Certification Under 10 CFR Part 52," the Commission directed the staff to review the Requirements Document to ensure that it is sufficient to allow the staff to evaluate the severe-accident issues and the incorporation of experience from operating events in current designs. The staff has used both deterministic and probabilistic methods of evaluation, considering how the Requirements Document addresses these issues through specific design criteria and through the guidelines it provides for performing a probabilistic risk assessment.

In addition to addressing such matters relative to safety, the staff also has provided constructive comments on the document that, while not specifically regulatory in nature, would offer improvements in its requirements. The staff will review an actual ALWR plant in accordance with the most current version of the SRP and will follow the SRP criteria, except for those instances where the staff has specifically accepted other positions in EPRI's ALWR Utility Requirements Document and those positions have been endorsed in the final SER for the ALWR program.

Finally, as discussed in Section 1.2, the staff's review of the Requirements Document is not intended to substitute for any portion of the staff's review of future applications for final design approval and design certification.

#### Additional Criteria Governing the Review of the Requirements Document for Passive Plant Designs

The licensing design-basis analysis of the Requirements Document for passive plant designs relies solely on the passive safety systems to demonstrate compliance with the acceptance criteria for various design-basis transients and accidents. Consequently, uncertainties remain concerning the performance of the unique passive features and overall performance of core and containment heat removal because of lack of a proven operational performance history. For example, uncertainties exist about the performance of check valves in the passive safety systems, which operate at low differential pressures provided by natural circulation or gravity injection. These low pressures may not provide sufficient force to fully open sticking check valves (i.e., pumped emergency core cooling systems are more likely to overcome stuck valves). As a result, these uncertainties enhance the importance of the active non-safety-related systems in providing the defense-in-depth protection to prevent and mitigate accidents and core damage. Therefore, the review of the passive designs requires a review of not only the passive safety systems, but also the functional capability and availability of the active non-safety-related systems to provide significant defense-in-depth protection and the capability to prevent accidents and core damage.

For those active systems that perform defense-in-depth functions, the Requirements Document for passive plant designs specifies systems and equipment design and performance requirements. These include radiation shielding to permit access following an accident, the availability and redundancy of non-safety-related electric power, and protection against internal hazards, as well as safety analysis and testing required to demonstrate system capability for defense-in-depth considerations. However, the Requirements Document does not provide specific requirements pertaining to the reliability of these systems. EPRI has indicated that it is evaluating the specific reliability targets and other measures to ensure that the passive plants will meet performance requirements and that it will address these safety concerns for both passive safety and active non-safety-related systems.

In addition, technical specification development is a subset of the overall regulatory treatment of the passive designs. The staff is evaluating the need to establish reliability-based technical specification (TS) for the passive plant designs to determine which systems and components (including certain non-safety-related systems) will require the imposition of TS, and the

parameters of the TS (limiting conditions for operation, surveillance, etc.). The reliability assurance program is expected to strongly influence TS.

Since the passive ALWR design philosophy departs from current licensing practices, the staff has raised this issue to the Commission as a policy issue. The staff has not completed its review of this issue and, therefore, has not provided a recommendation to the Commission. This issue is discussed further in the staff's regulatory departure analysis, which is given in Appendix B to the DSER on Chapter 1 of the Requirements Document for passive plant designs.

### 1.7 Format and Availability of Documentation

Volume 1 of this report is a program summary of the NRC review of EPRI's ALWR Utility Requirements Document. It is not intended to provide a discussion of Volume I of the Requirements Document (EPRI submitted Volume I for information only and did not request the staff to review it). Sections 1 through 5 provide a discussion of the overall purpose and scope of the Requirements Document and the results of the staff's review of that document. Section 6 gives the staff's conclusions regarding the review of the Requirements Document for the evolutionary plant designs and the status of the review of the Requirements Documents for the passive plant designs. Appendix A is a chronology of the correspondence related to the review of the document. Appendix B contains the references for Volumes 1-3 of this report. Appendix C is a list of abbreviations used in Volumes 1-3 of this report. Appendix D is a list of principal contributors. Appendix E is a list of Commission papers that are applicable to the staff's review of the ALWR applications for FDA/DC. Appendix F is a copy of the report of the Advisory Committee Reactor Safeguards on the ALWR Utility Requirements Document.

The format of Volume 2 and the April 1992 draft of Volume 3 follows that of Volumes II and III of the Requirements Document as closely as possible.

Copies of Volumes 1 and 2 of this report and the April 1992 draft of Volume 3 are available for inspection at the NRC Public Document Room, 2120 L Street, N.W., Washington, DC 20555.

The NRC project managers for the staff's review of EPRI's ALWR Utility Requirements Document are J. H. Wilson and T. J. Kenyon. They may be contacted by calling (301) 504-1118 or by writing to: Associate Directorate for Advanced Reactors and License Renewal, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

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\*NRC documents (e.g., NUREG reports and regulatory guides) are not included in Appendix B because they may be retrieved as indicated in the "Availability Notice" on the inside front cover of this report.

Table 1.1 Chronology of the Review of EPRI's Requirements Document for Evolutionary Plant Designs

Chapter	Title	Date of Submittal of Revision 0	Date DSER Was issued
1	Overall Requirements	June 30, 1986 July 8, 1986	September 24, 1987 February 18, 1988
1A	PRA Key Assumptions and Groundrules	June 30, 1989 February 22, 1990	November 4, 1991
1B	Licensing and Regulatory Requirements and Guidance	None issued	None issued
2	Power Generation Systems	October 15, 1986	February 18, 1988
3	Reactor Coolant System and Reactor Non-Safety Auxiliary Systems	June 18, 1987 December 11, 1987	May 13, 1988
4	Reactor Systems	June 15, 1987	June 10, 1988
5	Engineered Safety Systems	December 8, 1987	February 28, 1990
6	Building Design and Arrangement	November 18, 1988	January 15, 1991
7	Fueling and Refueling Systems	February 28, 1989	January 15, '91
8	Plant Cooling Water Systems	December 30, 1988	January 15, '91
9	Site Support Systems	January 11, 1989	January 15, 1991
10	Man-Machine Interface Systems	October 26, 1989	October 8, 1991
11	Electric Power Systems	April 10, 1989	April 3, 1991
12	Radioactive Waste Processing Systems	December 23, 1988	January 15, 1991
13	Main Turbine-Generator Systems	February 6, 1989	January 15, 1991

Table 1.2 EPR Proposed Plant Optimization Subjects

Plant Optimization Subject	Applicability	
	Evolutionary	Passive
Operating-Basis Earthquake and Dynamic Analysis Methods	X	X
Tornado Design	X	X
Boiling Water Reactor (BWR) Main Steamline Isolation Valves and Leakage Control	X	X
Simplification of Postaccident Sampling System	X	X
Type C Containment Leakage Rate Testing Interval	X	X
Source Term	X	X
Dedicated Containment Vent Penetration	X	X
Mitigation of Anticipated Transients Without Scram for the Advanced BWR	X	X
Simplification of Offsite Emergency Planning	N/A	X
Safe Shutdown of Passive ALWRs	N/A	X

N/A = not applicable

## 2 POLICY ISSUES

In the staff requirements memorandum (SRM) dated August 24, 1989, the Commission instructed the staff to provide an analysis detailing where the staff proposes departure from current regulations or where the staff is substantially supplementing or revising interpretive guidance applied to currently licensed light water reactors. The staff considers these to be policy issues. Appendix B to Chapter 1 of Volume 2 of this report gives the staff's regulatory analysis of those issues identified for the evolutionary plant designs. Appendix B to the DSER on Chapter 1 of Volume 3 of the Requirements Document gives the regulatory analysis of those issues identified for the passive plant designs. These issues have been addressed in Commission papers SECY-90-016, "Evolutionary Light Water Reactor Certification Issues and Their Relationship to Current Regulatory Requirements," and SECY-91-078, "Chapter 11 of the Electric Power Research Institute's Requirements Document and Additional Evolutionary Light Water Reactor Certification Issues," and in draft Commission papers, "Issues Pertaining to Evolutionary and Passive Light Water Reactors and Their Relationship to Current Regulatory Requirements," and "Design Certification and Licensing Policy Issues Pertaining to Passive and Evolutionary Advance Light Water Reactor Designs," that were issued on February 27 and July 6, 1992, respectively.

In its SRMs dated June 26, 1990, and August 15, 1991, the Commission provided its decisions on SECY-90-016 and SECY-91-078 as they apply to evolutionary designs.

The February 27 and July 6, 1992, draft Commission papers have been forwarded to the Advisory Committee on Reactor Safeguards. The staff will include its views in the final paper and document its final positions before seeking Commission approval. The approaches to resolving these issues have not been reviewed by the Commission, and, therefore, do not represent agency positions.

These policy issues are considered fundamental to agency decisions on the acceptability of the ALWR designs. To aid in identifying its positions, the staff underlined those for which it requested Commission approval in the Commission papers discussed above. Table 2.1 contains a list of these policy issues and their applicability to the evolutionary and passive plant designs. Table 4B.1 of Appendix B to Chapter 1 of Volume 2 of this report lists the issues that are applicable to the Requirements Document for evolutionary plant designs with the cross-reference to the chapters and sections in which they are discussed. Table 5B.1 of Appendix B to Chapter 1 of the April 1992 draft of Volume 3 of this report lists those issues that are applicable to the Requirements Document for passive plant designs at the time of issuance along with the appropriate cross-references.

In addition, Appendix E lists the papers that the staff has forwarded to the Commission regarding policy issues that the staff has identified to date for both evolutionary and passive ALWRs. The staff developed these papers as a result of its review of the EPRI's ALWR Utility Requirements Document, the final design approval and design certification applications for the evolutionary plants, and the conceptual design information on the passive plants.



Table 2.1 Policy Issues Pertaining to the Evolutionary and Passive Plant Designs

Policy Issue	Applicability	
	Evolutionary	Passive
Use of physically based source term	X	X
Anticipated transients without scram	X	X
Mid-loop operation	X	N/A
Station blackout	X	X
Fire protection	X	X
Intersystem loss-of-coolant accident	X	X
Hydrogen control	X	X
Core-concrete interaction - Capability to cool core debris	X	X
High-pressure core melt ejection	X	X
Containment performance	X	X
Dedicated containment vent penetration	X	X
Equipment survivability	X	X
Elimination of operating-basis earthquake	X	X
Inservice testing of pumps and valves	X	X
Industry codes and standards	X	X
Electrical distribution	X	X
Seismic hazard curves	X	X
Leak before break	X	X
Classification of main steamline of boiling-water reactor	X	X
Containment bypass	X	X

N/A = not applicable

Table 2.1 (Continued)

Policy Issue	Applicability	
	Evolutionary	Passive
Tornado design basis	X	X
Containment bypass	X	X
Containment leak rate testing	X	X
Postaccident sampling system	X	X
Level of detail	X	X
Prototyping	X	X
Inspections, tests, analyses, and acceptance criteria	X	X
Probabilistic risk assessment beyond design certification	X	X
Reliability assurance program	X	X
Severe-accident mitigation design alternatives	X	X
Generic rulemaking related to design certification	X	X
Regulatory treatment of non-safety-related systems	N/A	X
Definition of passive failure	N/A	X
Thermal-hydraulic stability of the simplified boiling water reactor	N/A	X
Safe shutdown requirements	N/A	X
Control room habitability	N/A	X
Radionuclide attenuation	N/A	X
Simplification of offsite emergency planning	N/A	X

N/A = not applicable

Table 2.1 (Continued)

Policy Issue	Applicability	
	Evolutionary	Passive
Defense against common-mode failures in digital instrumentation and control	X	X
Analysis of external events beyond the design basis	X	X
Multiple steam generator tubes ruptures	N/A	X
Reliance of the passive plant control room operator	N/A	X
Control room annunciator reliability	X	X

N/A = not applicable

### 3 REVIEW BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

In September 1984, the NRC staff, EPRI, and the Advisory Committee on Reactor Safeguards (ACRS) met to discuss early efforts leading to the development of EPRI's ALWR Requirements Document. Since that time, these parties have met periodically to discuss the programmatic aspects and progress of EPRI's ALWR program.

The ACRS met with the staff and EPRI numerous times during the period October 1987 through January 1992 to discuss the contents of each chapter of Volume II of the ALWR Requirements Document and corresponding DSER after issuance of the documents. Each chapter and DSER was discussed with the ACRS Subcommittee on Improved Light Water Reactors one or more times.

In addition, many of the policy issues identified in Appendix B to Chapter 1 of Volume 2 were discussed with the Committee. The reports of the ACRS and the staff's responses to their comments on these policy matters are in Annexes A-C of Appendix B to Chapter 1 of Volume 2 of this report.

The staff met with the ACRS Subcommittee on Improved Light Water Reactors to discuss the May 1992 draft of the SER on Volume II of the ALWR Requirements Document on June 17 and 18, and July 27, 1992. The staff met with the ACRS Full Committee to discuss the results of its review of Volume II during the 387th and 388th meetings of the ACRS on July 10 and August 7, 1992, respectively. A copy of the ACRS report on Volume II of EPRI's ALWR Utility Requirements Document, dated August 18, 1992, is attached as Appendix F.

The staff will continue to interact with the ACRS during its review of policy issues and any additional issues on evolutionary ALWRs that may be resolved in the context of Volume II of the ALWR Utility Requirements Document. In addition, the staff will continue to interact with the ACRS during its review of Volume III of the ALWR Utility Requirements Document and will report the results of the Committee's review of that document and the staff's SER when it is completed.

#### 4 OUTSTANDING ISSUES

During its review of EPRI's ALWR Utility Requirements Document, the staff identified several items for which additional information is required before the staff can reach a final conclusion. The staff considers these issues to be outstanding. These outstanding issues fall into one of three categories: (1) open policy issues on which the staff has taken a position, but for which the Commission has not provided guidance; (2) open issues that must be satisfactorily resolved before the staff can complete its review of the Requirements Document; or (3) confirmatory issues for which the staff will ensure that EPRI meets its commitments to revise the Requirements Document. The outstanding issues for the entire Requirements Document, provided by chapter or appendix with references to appropriate sections of the SER chapter or appendix given in parentheses, are listed below.

The designators in front of each issue provide a unique identifier for each issue. The letter "E" or "P" indicates that the issue applies to evolutionary or passive plant designs, respectively. The first number designates the chapter in which it is identified. The letter that follows designates the appendix, if applicable. The letter "O" or "C" designates whether it is an open or a confirmatory issue, respectively. The final number is the sequential number assigned to it in Section 1.4 of each chapter or appendix.

##### 4.1 Outstanding Issues Pertaining to the Requirements Document for Evolutionary Plant Designs

###### OPEN ISSUES

The following is a list of open policy issues pertaining to the Requirements Document for evolutionary plant designs (Volume II) on which the staff has taken a position, but for which the Commission has not had the opportunity to provide guidance. There are no other types of open issues resulting from the staff's review of the Requirements Document for evolutionary plant designs.

###### Chapter 1 - Overall Requirements

E.1.0-1 tornado wind speeds (4.5.2)

E.1.0-2 leak before break (4.5.5)

###### Appendix B to Chapter 1 - Licensing and Regulatory Requirements and Guidance

E.1B.0-1 impact of the elimination of the operating-basis earthquake from the design process (2.1.1, Item IV.A of Annex A, and Item I.M of Annex C, Item C of Annex D)

E.1B.0-2 applicability of industry codes and standards (2.1.1 and Item II.A of Annex C)

E.1B.0-3 tornado design basis (2.1.2 and Item II.F of Annex C)

- E.1B.0-4 main steamline classification (2.3.1.1 and Item II.E of Annex C)
- E.1B.0-5 simplification of postaccident sampling system (2.3.2 and Item II.I of Annex C)
- E.1B.0-6 containment leak rate testing (2.5.1 and Item II.H of Annex C)
- E.1B.0-7 source term (2.5.2.1, 2.5.2.2, Item I.B of Annex A, and Item I.A of Annex C)
- E.1B.0-8 seismic hazard curves (Item II.C of Annex C)
- E.1B.0-9 leak before break (Item II.D of Annex C)
- E.1B.0-10 containment bypass (Item II.G of Annex C)
- E.1B.0-11 prototyping (Item II.K of Annex C)
- E.1B.0-12 reliability assurance program (Item II.M of Annex C)
- E.1B.0-13 defense against common-mode failures in digital instrumentation and control systems (Item A of Annex D)
- E.1B.0-14 analysis of external events beyond the design basis (Item B of Annex D)
- E.1B.0-15 control room annunciator reliability (Item G of Annex D)

#### Chapter 5 - Engineered Safety Systems

- E.5.0-1 core debris coolability (6.6.2)

#### CONFIRMATORY ISSUES

There are no confirmatory issues pertaining to the Requirements Document for evolutionary plant designs.

#### 4.2 Outstanding Issues Pertaining to the Requirements Document for Passive Plant Designs

#### OPEN ISSUES

The following is a list of open issues that must be resolved before the staff can complete its review of the Requirements Document for passive plant designs (Volume III).

#### Chapter 1 - Overall Requirements

- P.1.0-1 scope of mitigation requirements (2.1 and 2.4)
- P.1.0-2 regulatory treatment of non-safety-related systems (2.3.1, 4.3.1, 7, 10, 12.2.1, 12.2.3, and Appendix B)

- P.1.0-3 automatic standby liquid control system for passive boiling-water-reactor (BWR) design (2.3.2 and Appendix B)
- P.1.0-4 check valve categorization (2.3.2)
- P.1.0-5 tornado wind speeds (4.5.2.5)
- P.1.0-6 leak before break (4.5.5)
- P.1.0-7 seismic evaluation and design of small-bore piping (4.7.3)
- P.1.0-8 use of Institute of Electrical and Electronics Engineers (IEEE) Standard 323 (4.8.2)
- P.1.0-9 method of environmental qualification of mechanical and electrical equipment (4.8.2)
- P.1.0-10 limits on nitrites, nitrates, and total halogens as chlorine (5.2.8)
- P.1.0-11 pressurized-water-reactor (PWR) water chemistry (5.5.2)
- P.1.0-12 reliability assurance program framework (6.2)
- P.1.0-13 quantitative reliability and availability goals (6.2)
- P.1.0-14 integration of reliability engineering techniques (6.2, 6.3, and 6.4)
- P.1.0-15 relationship of system requirements to overall plant safety reliability and availability goals (6.2)
- P.1.0-16 difference between reliability assurance program for safety- and non-safety-related systems (6.3)
- P.1.0-17 human factors considerations for operation and maintenance provisions (8.2)
- P.1.0-18 computer security reference (11.12)

Appendix A to Chapter 1 - PRA Key Assumptions and Groundrules

- P.1A.0-1 reporting of core-damage-frequency results as mean values (1.7)
- P.1A.0-2 point-estimate quantification (1.8)
- P.1A.0-3 quantitative treatment of uncertainties (1.9)
- P.1A.0-4 guidance on presenting results of probabilistic risk assessment (PRA) (1.10)
- P.1A.0-5 guidance on modeling detail required to represent passive system behavior (2.1)

- P.1A.0-6 guidance on modeling interactions between passive and active systems (2.1)
- P.1A.0-7 guidance for developing the success criteria for passive systems (2.3)
- P.1A.0-8 determination of an appropriate mission time (2.10)
- P.1A.0-9 requirements to address the important passive design-specific areas of uncertainty (6.1)
- P.1A.0-10 failure rate for the main step-up transformers (8.2)

Appendix B to Chapter 1 - Licensing and Regulatory Requirements and Guidance

- P.1B.0-1 impact of the elimination of the OBE from the design process (2.1.1, 3.3.1, and Item I.M of Annex A)
- P.1B.0-2 applicability of industry codes and standards (2.1.1 and Item II.A of Annex A)
- P.1B.0-3 tornado design basis (2.1.2 and Item II.F of Annex A)
- P.1B.0-4 simplification of emergency planning requirements (2.1.3 and Item III.G of Annex A)
- P.1B.0-5 need for leakage control system for main steam isolation valves (2.3.1 and Item II.E of Annex A)
- P.1B.0-6 main steam isolation valve leakage rate (2.3.1 and Item II.E of Annex A)
- P.1B.0-7 simplification of postaccident sampling system (2.3.2 and Item II.I of Annex A)
- P.1B.0-8 containment leak rate testing (2.5.1 and Item II.H of Annex A)
- P.1B.0-9 source term (2.5.2 and Item I.A of Annex A)
- P.1B.0-10 hydrogen generation and control (2.5.3, 3.2.26 and Item I.G of Annex A)
- P.1B.0-11 safe shutdown requirements (2.5.6 and Item III.D of Annex A)
- P.1B.0-12 revised deficiency reporting requirements (Generic Safety Issue II.J.4.1) (3.2.3)
- P.1B.0-13 criteria for safety-related operator actions (Generic Safety Issue B-17) (3.2.5)
- P.1B.0-14 diesel generator reliability (Generic Safety Issue B-56) (3.2.6)
- P.1B.0-15 allowable emergency core cooling system equipment outage periods (Generic Safety Issue B-61) (3.2.7)



- P.1B.0-16 reactor coolant pump seal failures (Generic Safety Issue 23) (3.2.10)
- P.1B.0-17 bolting degradation or failure (Generic Letter 91-17) (Generic Safety Issue 23) (3.2.12)
- P.1B.0-18 use of EPRI NP-5076 on good bolting practices for bolted joints (3.2.12)
- P.1B.0-19 bolting degradation or failure (Generic Safety Issue 29) (3.2.12)
- P.1B.0-20 effects of fire protection system actuation on safety-related equipment (Generic Safety Issue 57) (3.2.13)
- P.1B.0-21 power-operated relief valve and block valve reliability (Generic Safety Issue 70) (3.2.14)
- P.1B.0-22 anticipated transients without scram (Generic Safety Issue 75) (3.2.16 and Item I.B of Annex A)
- P.1B.0-23 unanalyzed reactor vessel thermal stress during natural convection cooldown (Generic Safety Issue 79) (3.2.17)
- P.1B.0-24 control room habitability (3.2.18)
- P.1B.0-25 low-temperature overpressure protection (Generic Safety Issue 94) (3.2.21)
- P.1B.0-26 piping and use of highly combustible gases in vital areas (Generic Safety Issue 106) (3.2.23)
- P.1B.0-27 dynamic qualification and testing of large-bore hydraulic cylinders (Generic Safety Issue 113) (3.2.24)
- P.1B.0-28 reliability, operability, and on-line testability of terminal actuation contacts in protection systems (3.2.25)
- P.1B.0-29 essential service water pump failures at multiplant sites (Generic Safety Issue 130) (3.2.29)
- P.1B.0-30 guidelines for upgrading other procedures (Generic Safety Issue HF 4.4) (3.2.33)
- P.1B.0-31 electronic display of procedures, use of mixed types of procedures from one control station to another, and use of active simulator to validate procedures (3.2.33)
- P.1B.0-32 clarification of definition of local control stations (3.2.34)
- P.1B.0-33 centralization of safety functions (3.2.34)
- P.1B.0-34 development of a human factors verification and validation test plan (3.2.35)

- P.1B.0-35 documentation of test activities for traceability and assurance that all human factors requirements are addressed during test and evaluation (3.2.35)
- P.1B.0-36 development of quantitative measures to assess human-system performance (3.2.35)
- P.1B.0-37 uniform damping values (3.3.1)
- P.1B.0-38 modal combination of high-frequency modes for vibratory loads (3.3.1)
- P.1B.0-39 safety implications of control systems (Generic Safety Issue A-47) (3.3.3)
- P.1B.0-40 heat exchanger testing (3.3.4)
- P.1B.0-41 control of biofouling (3.3.4)
- P.1B.0-42 zebra mussel fouling (3.3.4)
- P.1B.0-43 mid-loop operation (Item I.C of Annex A)
- P.1B.0-44 station blackout (Item I.D of Annex A)
- P.1B.0-45 fire protection (Item I.D of Annex A)
- P.1B.0-46 intersystem loss-of-coolant-accident (Item I.E of Annex A)
- P.1B.0-47 core-concrete interaction - capability to cool core debris (Item I.G of Annex A)
- P.1B.0-48 high-pressure core melt ejection (Item I.I of Annex A)
- P.1B.0-49 containment performance (Item I.J of Annex A)
- P.1B.0-50 dedicated containment vent penetration (Item I.K of Annex A)
- P.1B.0-51 equipment survivability (Item I.L of Annex A)
- P.1B.0-52 inservice testing of pumps and valves (Item I.N of Annex A)
- P.1B.0-53 electrical distribution (Item II.B of Annex A)
- P.1B.0-54 seismic hazard curves (Item II.C of Annex A)
- P.1B.0-55 leak before break (Item II.D of Annex A)
- P.1B.0-56 classification of main steamline of BWB (Item II.E of Annex A)
- P.1B.0-57 containment bypass (Item II.G of Annex A)
- P.1B.0-58 level of detail (Item II.J of Annex A)

- P.1B.0-59 prototyping (Item II.K of Annex A)
- P.1B.0-60 inspections, tests, analyses, and acceptance criteria (Item II.L of Annex A)
- P.1B.0-61 reliability assurance program (RAP) (Item II.M of Annex A)
- P.1B.0-62 site-specific PRAs (Item II.N of Annex A)
- P.1B.0-63 severe-accident mitigation design alternatives (Item II.O of Annex A)
- P.1B.0-64 generic rulemaking related to design certification (Item II.P of Annex A)
- P.1B.0-65 regulatory treatment of non-safety systems (Item III.A of Annex A)
- P.1B.0-66 definition of passive failure (Item III.B of Annex A)
- P.1B.0-67 thermal-hydraulic stability of the Simplified Boiling Water Reactor (Item III.C of Annex A)
- P.1B.0-68 control room habitability (Item III.E of Annex A)
- P.1B.0-69 radionuclide attenuation (Item III.F of Annex A)

#### Chapter 2 - Power Generation Systems

- P.2.0-1 safety valve design (3.4)

#### Chapter 3 - Reactor Coolant System and Reactor Non-Safety Auxiliary Systems

- P.3.0-1 leak-testing of feedwater system valve that performs containment isolation function (5.5)
- P.3.0-2 postaccident sampling system (7)

#### Chapter 4 - Reactor Systems

- P.4.0-1 rod insertion capability after an earthquake (2.2.6)
- P.4.0-2 inservice inspection of reactor pressure vessel (RPV) internals (2.3.2)
- P.4.0-3 RPV thermocouples (3.3)

#### Chapter 5 - Engineered Safety Systems

- P.5.0-1 justification for 72-hour design-basis period for control room habitability (2.1.1, 2.2, and 6.5)
- P.5.0-2 need for activated charcoal filters (2.1.2)
- P.5.0-3 timing of fission product release (2.1.3)

- P.5.0-4 evaluation of aerosol fission product removal (2.1.6)
- P.5.0-5 secondary building fission product holdup and plateout (2.1.7 and 6.4)
- P.5.0-6 chemical form of iodine in containment (2.1.9)
- P.5.0-7 guidance on vendor-supplied information (2.4.2)
- P.5.0-8 identification of vital equipment (2.5)
- P.5.0-9 use of carbon austenitic stainless steel for passive decay heat removal (PDHR) heat exchanger piping material (3.3)
- P.5.0-10 diverse reactor protection system (RPS) input to control rods (3.4)
- P.5.0-11 definition of the safe shutdown condition (4.3)
- P.5.0-12 PDHR water pool capacity (4.3)
- P.5.0-13 gravity drain tank for standby liquid control system (4.5)
- P.5.0-14 separate connecting line for the two trains of the automatic depressurization system final stage (5.4)
- P.5.0-15 elimination of Type C leakage rate testing (5.2)
- P.5.0-16 Type B air lock leak test interval requirements (6.3)
- P.5.0-17 dose consequence criteria for design-basis accidents (6.4)
- P.5.0-18 maximum interval for Type C leakage rate testing (6.3)
- P.5.0-19 need for safety-grade containment spray system and engineered safety features atmosphere cleanup (2.1.6 and 6.4)
- P.5.0-20 thyroid and beta skin radiation dose limits and credit for long-term use of breathing apparatus (6.5)
- P.5.0-21 hydrogen concentration for PWR dry containment (6.6)
- P.5.0-22 allowable compressive stress consistent with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (6.6)
- P.5.0-23 safety-grade hydrogen recombiners system (6.6)
- P.5.0-24 containment steam bypass capability consistent with Standard Review Plan (7.2)

Chapter 6 - Building Design and Arrangement

- P.6.0-1 classification of non-safety-grade auxiliary systems as vital equipment (2.3.3)

- P.6.0-2 turbine-generator building safe shutdown earthquake loading conditions (4.4)
- P.6.0-3 location of the control complex (4.5.4)
- P.6.0-4 requirements and acceptance criteria for human factors considerations (4.5.4)

Chapter 7 - Fueling and Refueling Systems

- P.7.0-1 nondestructive testing of the spent fuel pool liner (2.3.1)
- P.7.0-2 inservice testing requirements for the spent fuel pool liner (2.3.1)
- P.7.0-3 criticality of new fuel in new fuel storage facility (2.3.3)
- P.7.0-4 radiological consequences of a fuel handling accident (2.3.9)
- P.7.0-5 source term for a fuel handling accident (2.3.9)
- P.7.0-6 incorrect water clarity requirement reference (3.1.1)

Chapter 8 - Plant Cooling Water Systems

- P.8.0-1 regulatory treatment of non-safety-related active systems (2.2, 3.1, 4.1, 5, and 7)
- P.8.0-2 design requirements for the fuel pool cooling system (9)

Chapter 9 - Site Support Systems

- P.9.0-1 balance-of-plant fire protection program (3)
- P.9.0-2 independence of ventilation systems inside the containment to prevent migration of smoke and hot gases (3.3.1)
- P.9.0-3 requirements for smoke-removal capability (3.3.1)
- P.9.0-4 safety classification for heating, ventilating, and air conditioning (HVAC) systems (including pumphouse ventilation system) (8.2)
- P.9.0-5 seismic Category II/I criteria for HVAC systems and components (8.2.1 and 8.4.1)
- P.9.0-6 use of post filter instead of high-efficiency particulate air filters (8.2.1)
- P.9.0-7 thyroid and beta skin radiation dose requirements (8.2.2)
- P.9.0-8 control room habitability following design-basis accident (8.2.2)
- P.9.0-9 omission of fans for warehouse areas (8.2.5)

- P.9.0-10 omission of cooling coil supplied by chilled water for reactor cavity system (8.4.1)
- P.9.0-11 use of Uniform Building Code, Zone 2A (8.5)
- P.9.0-12 power source and performance requirements following a loss of offsite power (8.5)
- P.9.0-13 HVAC design for several areas not required to meet requirements specified in the General Design Criteria, Standard Review Plan, or regulations (8.5)

Chapter 10 - Man-Machine Interface Systems (M-MIS)

- P.10.0-1 independence of the software verification and validation review teams (3.1.2, 3.1.4, and 6.1.5)
- P.10.0-2 use of commercial compilers for software used in safety systems (3.1.2)
- P.10.0-3 dedication of commercial-grade software (3.1.2)
- P.10.0-4 clarification of requirements for analysis and validation testing of M-MIS (3.1.3)
- P.10.0-5 use of rapid prototyping in the development and validation of functional specifications (3.1.3)
- P.10.0-6 operator aids (3.4.5)
- P.10.0-7 establishment and use of reliability and availability estimates (3.5)
- P.10.0-8 definition of "practical" (3.5.3)
- P.10.0-9 environmental conditions for equipment design (including compatibility with tasks) (3.5.3)
- P.10.0-10 component reliability of M-MIS (3.5.4)
- P.10.0-11 overall reliability of M-MIS (3.5.4)
- P.10.0-12 sneak circuit analysis (3.5.4)
- P.10.0-13 software maintenance (3.5.4)
- P.10.0-14 minimum tests for continuous on-line testing (3.6.1)
- P.10.0-15 vulnerability of power supplies for alarm systems (4.3.1)
- P.10.0-16 guidance on criteria to establish priorities (4.3.4)
- P.10.0-17 guidance on the maximum number of alarms (4.3.4)

- P.10.0-18 alarm sequence recording (4.3.4)
- P.10.0-19 valve position indication (4.4)
- P.10.0-20 guidance on frequency allocation plan (4.6)
- P.10.0-21 guidance on interference between communication systems and M-MIS equipment (4.6)
- P.10.0-22 environmental conditions for minimally used local control stations (4.9.2)
- P.10.0-23 guidance on inadvertent actuation of controls at local control stations (4.9.2)
- P.10.0-24 special physical security measures for the data transmission cable (5.2.1)
- P.10.0-25 guidance on data system characteristics (5.2.2)
- P.10.0-26 propagation of common-mode failures through the data system (5.2.2)
- P.10.0-27 expansion capability of multiplexers (5.2.3)
- P.10.0-28 reliability of multiplexing system (5.4)
- P.10.0-29 software design aids and tools (6.1.1 and 6.1.5)
- P.10.0-30 quality assurance requirements for safety-related software (6.1.2)
- P.10.0-31 configuration management requirement for software (6.1.2)
- P.10.0-32 software integrity (6.1.2)
- P.10.0-33 guidance on software user documentation (6.1.2)
- P.10.0-34 acceptance testing of commercially available software (6.1.2)
- P.10.0-35 notification of software errors or modifications of commercially delivered software products (6.1.2)
- P.10.0-36 long-term configuration control of software (6.1.2)
- P.10.0-37 clarification of top-down structured design approach (6.1.3)
- P.10.0-38 guidance on convolution of software structure (6.1.3)
- P.10.0-39 behavior of commercial software when assumptions are violated (6.1.3)
- P.10.0-40 guidance on memory protection (6.1.3)
- P.10.0-41 use of information by redundant safety channels (6.1.3)

- P.10.0-42 guidance on tools to improve reliability and quality of software (6.1.5)
- P.10.0-43 definition of reasonable testing and degree of confidence to be considered (6.1.5)
- P.10.0-44 specification of the level of diversity in safety systems (6.1.6, 6.2.3, and 6.2.5)
- P.10.0-45 guidance on performance of reliability evaluation (6.1.6)
- P.10.0-46 reference to IEEE 1050-1989 (6.2.2 and 6.2.9)
- P.10.0-47 compatibility between M-MIS equipment and its external power supply systems (6.2.2)
- P.10.0-48 alarmed, self-diagnostic feature on clock update (6.2.3)
- P.10.0-49 guidance on position of sensor isolation valves (6.2.5)
- P.10.0-50 capacitance-type pressure sensors (6.2.5)
- P.10.0-51 minimal acceptance review criteria for isolation device (6.2.6)
- P.10.0-52 voltage design of battery and dc system (6.2.8)
- P.10.0-53 standards for surge suppression (6.2.8)
- P.10.0-54 electromagnetic interference/radiofrequency interference (EMI/RFI) considerations for wiring shields (6.2.9)
- P.10.0-55 specific grounding standards (6.2.9)
- P.10.0-56 use of qualified isolators for wiring shields (6.2.9)
- P.10.0-57 requirements for signal reconstruction (6.3.3)
- P.10.0-58 use of interrupts (6.3.3)
- P.10.0-59 redundancy of safety systems (6.3.4)
- P.10.0-60 selection of automatic or manual control (7.2)
- P.10.0-61 operation of plant by load dispatcher (7.3.2)
- P.10.0-62 alternate means of inventory monitoring (7.13)
- P.10.0-63 clarification of actuation logic self-testing (8.2.3)
- P.10.0-64 initiation of standby liquid control system (8.7)
- P.10.0-65 inclusion of four elements in human factors organizational structure (3.1.2 of Appendix B)



- P.10.0-66 scheduling of human factors studies before start of control room design process (3.1.3 of Appendix B)
- P.10.0-67 guidance to the M-MIS designer to overcome past problems (3.1.4 of Appendix B)
- P.10.0-68 guidance to improve interfaces between the operator and the plant (3.1.4 of Appendix B)
- P.10.0-69 identification of human factors criteria, guidance, etc., that were used as the supporting bases for M-MIS requirements (3.2.1 of Appendix B)
- P.10.0-70 traceability of human factors requirements to original source (3.2.2 of Appendix B)
- P.10.0-71 method for establishing effective human factors requirements (3.2.3 of Appendix B)
- P.10.0-72 guidance on systems analysis (3.2.4 of Appendix B)
- P.10.0-73 organization of plant information (3.2.4 of Appendix B)
- P.10.0-74 configuration of operator's workstation (3.2.5 of Appendix B)
- P.10.0-75 human factors guidelines for new technology (3.3 of Appendix B)
- P.10.0-76 illumination levels (3.3 of Appendix B)
- P.10.0-77 maintenance procedures (3.4 of Appendix B)
- P.10.0-78 selection and qualification of plant personnel (3.5 of Appendix B)
- P.10.0-79 training requirements for top-level personnel (3.6 of Appendix B)
- P.10.0-80 human factors verification and validation test plan (3.7.1 of Appendix B)
- P.10.0-81 documentation of human factors test activities (3.7.2 of Appendix B)
- P.10.0-82 team performance (3.7.4 of Appendix B)

Chapter 11 - Electric Power Systems

- P.11.0-1 regulatory treatment of active non-safety systems (2.2.1, 3.2.2, 5.2.1, 5.2.4, 5.2.5, and 8.2.1)
- P.11.0-2 clarification of terminology describing the role of non-safety systems (2.2.1)
- P.11.0-3 loss of non-safety ac power during shutdown conditions (2.2.6)

- P.11.0-4 second offsite power supply circuit for permanent non-safety load buses during power operations (3.2.1)
- P.11.0-5 consistency of Appendix A to Chapter 1 assumptions with Chapter 11 (3.2.3)
- P.11.0-6 data provided in Appendix A to Chapter 1 relative to loss-of-offsite-power events (3.2.5)
- P.11.0-7 non-safety ac electrical power systems during a small-break loss-of-coolant accident (5.2.1)
- P.11.0-8 clarification of revised requirements in Sections 1.5.2 and 5.3.1.1 (5.2.1)
- P.11.0-9 applicability of the 2000-hour rating and its impact on peaking operation (5.2.1)
- P.11.0-10 peaking operation of non-safety standby power sources (5.2.3)
- P.11.0-11 consistency of failure and unavailability rates in Appendix A to Chapter 1 (5.2.4)
- P.11.0-12 justification for the use of independent self-contained cooling systems (5.2.6)
- P.11.0-13 potential loss of dc buses (7.2.1)
- P.11.0-14 load shedding for 72-hour battery endurance (7.2.3)
- P.11.0-15 backup battery and battery charger (7.2.4)
- P.11.0-16 transfer scheme for the safety dc power supply system (7.2.5)
- P.11.0-17 battery and battery charger instrumentation and alarms (7.2.8)
- P.11.0-18 lack of requirements for electric protective assemblies in RPS power for BWRs (7.2.9)

#### Chapter 12 - Radioactive Waste Processing Systems

- P.12.0-1 source term basis for designing radioactive waste systems and evaluation of offsite effluent radioactive nuclide concentration (2.2.2)
- P.12.0-2 basis for 2-minute-delay requirement for BWR turbine gland seal system exhaust (3.3.1)
- P.12.0-3 production sources for essentially nonradioactive steam (3.3.1)
- P.12.0-4 discrepancy between Figure 12.3-1 and requirement in Chapter 13 (3.3.1)

- P.12.0-5 use of post-filter downstream of charcoal adsorber in ventilation exhaust systems (3.3.3)
- P.12.0-6 guidance regarding direct piping from radioactive plant systems to sumps or waste collection tanks (BWR) (4.2)
- P.12.0-7 requirements for liquid radioactive waste processing systems (LRWPS) filter housing and components (4.2)
- P.12.0-8 requirements for LRWPS filters (4.2)
- P.12.0-9 requirements for LRWPS ion exchangers (4.2)

#### Chapter 13 - Main Turbine-Generator Systems

- P.13.0-1 turbine loss of generation probability effect on safety-related systems or components (3.1.4)
- P.13.0-2 inservice inspection interval for turbine steam valves (3.3)

#### CONFIRMATORY ISSUES

The following is a list of confirmatory issues for which the staff will ensure that CPRI meets its commitments to revise the Requirements Document for passive plant designs.

#### Chapter 1 - Overall Requirements

- P.1.C-1 tornado wind speeds (4.5.2)
- P.1.C-2 internal flooding design criteria (4.5.5)
- P.1.C-3 compliance with Regulatory Guides 1.26 and 1.29 (9)

#### Appendix A to Chapter 1 - Key Assumptions and Groundrules

None

#### Appendix B to Chapter 1 - Licensing and Regulatory Requirements and Guidance

- P.1B.C-1 commitments to 10 CFR Part 21 and 50.55(e) (3.2.3)
- P.1B.C-2 Target Rock safety/relief valves (3.2.5)

#### Chapter 2 - Power Generation Systems

None

#### Chapter 3 - Reactor Coolant System and Reactor Non-Safety Auxiliary Systems

- P.3.C-1 anticipated-transients-without-scrams events (5.5)

#### Chapter 4 - Reactor Systems

None

Chapter 5 - Engineered Safety Systems

None

Chapter 6 - Building Design and Arrangement

None

Chapter 7 - Fueling and Refueling Systems

P.7.C-1 quality group classification of components for the new and spent fuel storage racks (2.3.1)

Chapter 8 - Plant Cooling Water Systems

None

Chapter 9 - Site Support Systems

P.9.C.1 guidance on the need for assessing the area interior to security detection equipment (5.2.7)

Chapter 10 - Man-Machine Interface Systems

P.10.C-1 intention of use (1)

P.10.C-2 impact of support software on installed software (6.1.2)

P.10.C-3 software common-mode failures (6.1.6, 6.2.5, and 8.2.1)

P.10.C-4 BWR depressurization system design change (8.6)

P.10.C-5 manner of M-MIS that controls security functions (10.2.3)

Chapter 11 - Electric Power Systems

P.11.C-1 isolation of safety systems from their non-safety sources (2.2.5)

P.11.C-2 minimum starting voltages for valve actuator motors (2.2.8)

P.11.C-3 requirements for main step-up transformers (3.2.6)

P.11.C-4 harmonic distortion effect of adjustable speed drives (4.2.3)

P.11.C-5 location of non-safety standby ac power sources (5.2.2)

P.11.C-6 sizing of thermal overload devices (6.2.1)

P.11.C-7 battery sizing criteria specified for 72-hour coping capability (7.2.2)

P.11.C-8 physical and electrical separation of the safety dc and low-voltage

vital ac power supply system (7.2.5)

P.11.C-9 non-safety dc power supplies for switchyard circuit protection and control equipment (7.2.6)

P.11.C-10 battery capacity margin (7.2.7)

P.11.C-11 normal and emergency lighting following design-basis events (8.2.1)

P.11.C-12 intensity of emergency lighting system (8.2.2)

Chapter 12 - Radioactive Waste Processing Systems

None

Chapter 13 - Main Turbine-Generator Systems

P.13.C-1 compliance with Regulatory Guide 1.29 seismic design classification (3.1.1)

P.13.C-2 compliance with Standard Review Plan quality group classifications (3.1.2)

## 5 VENDOR- OR UTILITY-SPECIFIC ITEMS

During its review of EPRI's ALWR Utility Requirements Document, the staff identified items that were inadequately addressed in the document or were issues that could not be addressed generically. These items will have to be satisfactorily resolved during the staff's review of a vendor- or utility-specific application (i.e., an application for final design approval and design certification or a combined construction permit and operating license).

As discussed in Section 1.2 of this report, the Requirements Document has no legal or regulatory status and is not intended to demonstrate complete compliance with the Commission's regulations, regulatory guidance, or policies. It is not intended to be used as a basis for supporting final design approval and design certification for a specific design, nor is it to be used to substitute for any portion of the staff's review of future applications for final design approval and design certification. Specifically, satisfactory resolution of the items identified in this section for a vendor- or utility-specific application will not, by itself, support a finding that the application complies with the Commission's regulatory requirements. The staff will perform a complete licensing review of these applications using the Standard Review Plan (NUREG-0800) and other appropriate Commission guidance. Satisfactory resolution of the vendor- or utility-specific items constitutes only one portion of the staff's review.

The vendor- or utility-specific items for the entire Requirements Document, provided by chapter or appendix with references to appropriate sections of the SER chapter or appendix given in parentheses, are listed below. The designators in front of each issue provide a unique identifier for each issue. The letter "E" or "P" indicates that the issue applies to evolutionary or passive plant designs, respectively. The first number designates the chapter in which it is identified. The letter that follows designates the appendix, if applicable. The letter V designates that it is a vendor- or utility-specific item. The final number provides the sequential number assigned to it in Section 1.5 of each chapter or appendix.

### 5.1 Vendor- or Utility-Specific Items Pertaining to the Requirements Document for Evolutionary Plant Designs

The following is a list of vendor- or utility-specific items that are identified in the SER (Volume 2 of this report) on the Requirements Document for evolutionary plant designs.

#### Chapter 1 - Overall Requirements

- E.1.V-1 scope of mitigation features (2.1 and 2.4)
- E.1.V-2 implementation of design characteristics intended to enhance accident resistance (2.2)
- E.1.V-3 bounding analysis by standard site design parameters (2.3.1)

- E.1.V-4 selection of initiating events and their frequency categorization (2.3.2)
- E.1.V-5 acceptance criteria for transient and accident analysis (2.3.2)
- E.1.V-6 anticipated transient without scram response analysis (2.3.2)
- E.1.V-7 acceptability of analytical codes and methodologies for safety analysis (2.5)
- E.1.V-8 60-year plant life (3.3, 4.8.2, 8.2, and 11.3)
- E.1.V-9 operation of PWR with a secured reactor coolant pump (3.5)
- E.1.V-10 defense-in-depth analysis (3.5)
- E.1.V-11 event response capability (3.5)
- E.1.V-12 fuel burnup requirements (3.6)
- E.1.V-13 extended operating life of control blades and control rod assemblies (3.6)
- E.1.V-14 safety classification (4.3.1)
- E.1.V-15 seismic qualification by experience (4.3.2 and 4.8.1)
- E.1.V-16 non-seismic building structures (4.3.2 and 4.7.2)
- E.1.V-17 structural design and construction codes (4.4 and 4.4.1)
- E.1.V-18 elimination of operating-basis earthquake from design (4.4.3, 4.7.3, and Appendix B)
- E.1.V-19 definition of support group (4.4.3)
- E.1.V-20 use of Appendix N of ASME Code, Section III (4.4.3 and 4.7.3)
- E.1.V-21 analysis of vibratory loads with significant high-frequency input (4.4.3)
- E.1.V-22 use of nonlinear analysis to account for gaps between pipes and piping supports (4.4.3)
- E.1.V-23 probabilistic approach for changing existing loads and/or loading combinations (4.5.1)
- E.1.V-24 recurrence interval for wind loadings (4.5.2)
- E.1.V-25 maximum ground water level (4.5.2)
- E.1.V-26 precipitation for roof design (4.5.2)
- E.1.V-27 snow loading (4.5.2)

- E.1.V-28 detailed quantification of soil parameters (4.5.2)
- E.1.V-29 minimum margin against liquefaction (4.5.2)
- E.1.V-30 external hazards evaluation (4.5.2)
- E.1.V-31 number of full-stress cycles (4.5.2 and 4.8.1)
- E.1.V-32 site-specific SSE (4.5.2)
- E.1.V-33 power spectrum density function of the time history (4.5.2)
- E.1.V-34 external impact hazards (4.5.2)
- E.1.V-35 design temperature (4.5.2)
- E.1.V-38 protection against surface vehicle bombs (4.5.3)
- E.1.V-39 BWR safety/relief valve loads (4.5.4)
- E.1.V-40 NUREG-1061 methodology and acceptance criteria for leak before break (4.5.5)
- E.1.V-41 hydrodynamic loads from safety/relief valves (4.5.5)
- E.1.V-42 suppression pool dynamic loads (4.5.5)
- E.1.V-43 design against internal-missile generation (4.5.5)
- E.1.V-44 design of concrete containment (4.6.1)
- E.1.V-45 load combinations for seismic Category I buildings and structures (4.6.1)
- E.1.V-46 design of seismic Category I steel structures (4.6.1)
- E.1.V-47 combination of pipe rupture loads with seismic loads for seismic Category I structures (4.6.1 and 4.6.1)
- E.1.V-48 combination of loss-of-coolant-accident and SSE loads (4.6.1)
- E.1.V-49 load combinations for safety-related portions of the plant (4.6.2)
- E.1.V-50 dynamic analysis techniques (4.7.2)
- E.1.V-51 methodology for generating design response spectra or time histories (4.7.2)
- E.1.V-52 structural damping values (4.7.2)
- E.1.V-53 masonry walls in Category I buildings (4.7.2)
- E.1.V-54 use of expansion anchor bolts - compliance with Office of Inspection and Enforcement Bulletin 79-02 (4.7.2 and 4.7.3)



- E.1.V-55 stability of shell-type structures under compression (4.7.2)
- E.1.V-56 seismic evaluation and design of small-bore piping (4.7.3)
- E.1.V-57 use of ASME Code Case N-411 (4.7.3)
- E.1.V-58 use of ASME Code Cases N-411 and N-420 in same analysis (4.7.3)
- E.1.V-59 construction of core support structures (4.7.3)
- E.1.V-60 fatigue design curves (4.7.3)
- E.1.V-61 use of IEEE 323 (4.8.2)
- E.1.V-62 environmental qualification of mechanical and electrical equipment (4.8.2)
- E.1.V-63 use of zinc to reduce radiation fields (5.2.7)
- E.1.V-64 limits on nitrites, nitrates, and total halogens as chlorine (5.2.8)
- E.1.V-65 grinding controls for PWRs (5.3.1)
- E.1.V-66 effect of fabrication processes on intergranular stress corrosion cracking (5.3.1 and 5.3.1)
- E.1.V-67 hardness limits for stainless steel (5.3.1)
- E.1.V-68 use of Alloy 600 and other alloys (5.3.1)
- E.1.V-69 allowance for carbon and low-alloy-steel corrosion (5.3.1)
- E.1.V-70 selection of seals, gaskets, and protective coatings (5.3.5)
- E.1.V-71 aging of cable insulation and other electrical materials (5.3.6)
- E.1.V-72 use of hydrogen water chemistry for the advanced BWR design (5.5.2)
- E.1.V-73 PWR water chemistry (5.5.2)
- E.1.V-74 submittal of operational reliability assurance program (O-RAP) (6)
- E.1.V-75 organizational description for reliability assurance program (6.1)
- E.1.V-76 analyses methods or models used in developing the reliability assurance program (6.2)
- E.1.V-77 reliability data bases (6.2)
- E.1.V-78 reliability, maintainability, and testability analyses (6.2)
- E.1.V-79 apportionment of contributions of structures, systems, and components to core damage frequency (6.3)

- E.1.V-80 priority of safety in accident recovery (6.3)
- E.1.V-81 relationship between safety and production availability (6.3)
- E.1.V-82 effect of limitations on refueling duration on plant safety (6.3)
- E.1.V-83 effect of planned outage duration on plant safety (6.3)
- E.1.V-84 effect of major outage duration on plant safety (6.3)
- E.1.V-85 inspection of construction activities (7 and 11.13)
- E.1.V-86 quality assurance for non-safety-related facilities and systems (7)
- E.1.V-87 installed operating-phase security system (7)
- E.1.V-88 reliability of modular construction (7)
- E.1.V-89 use of IEEE P1025 P1023-1988/D5 and EPRI-2360 for guidance regarding human factors engineering (8.2)
- E.1.V-90 inspection and verification of security locks robotically (8.3)
- E.1.V-91 quality assurance requirements for all equipment, structures, systems, facilities or software that have some safety importance or has one importance (9)
- E.1.V-92 compliance of FDA/DC applications with Commission's regulations and guidance (10)
- E.1.V-93 issue resolution for FDA/DC reviews (10)
- E.1.V-94 inspections, tests, analyses, and acceptance criteria (10)
- E.1.V-95 implementation of simplification objective (11.4)
- E.1.V-96 implementation of standardization objective (11.5)
- E.1.V-97 check valve testing methods (12.2.2)
- E.1.V-98 full-flow testing of check valves (12.2.2)
- E.1.V-99 qualification testing of active and nonactive motor-operated valves (MOVs) (12.2.2)
- E.1.V-100 technical concerns regarding MOVs (12.2.2)
- E.1.V-101 leak rate testing for individual containment isolation valves (12.2.2)
- E.1.V-102 instrumentation to determine net positive suction head during all modes of operation (12.2.3)
- E.1.V-103 testing of pump flow rate (12.2.3)

E.1.V-104 frequency and extent of disassembly and inspection of safety-related pumps (12.2.3)

Appendix A to Chapter 1 - PRA Key Assumptions and Groundrules

- E.1A.V-1 use of PRA in design
- E.1A.V-2 modeling of a PRA (1.6)
- E.1A.V-3 shutdown and low-power events (1.6)
- E.1A.V-4 external events (1.6, 3.3, and 6.1)
- E.1A.V-5 core damage frequency (1.7)
- E.1A.V-6 uncertainty treatment (1.9 and 6.1)
- E.1A.V-7 documentation of method of truncation of accident sequences (1.10 and 2.5)
- E.1A.V-8 low-frequency accident initiators leading to core damage (2.2)
- E.1A.V-9 mission time (2.10)
- E.1A.V-10 failure rate for components (2.11)
- E.1A.V-11 tornadoes and extreme winds (3.2)
- E.1A.V-12 external river flooding (3.2)
- E.1A.V-13 hurricanes and storm surges (3.2)
- E.1A.V-14 tsunami (3.2)
- E.1A.V-15 internal fires (3.2)
- E.1A.V-16 site-specific external events
- E.1A.V-17 internal flooding (3.2)
- E.1A.V-18 seismic hazards analysis (3.3)
- E.1A.V-19 core-damage-sequence binning (4.1)
- E.1A.V-20 plant damage state definition (4.2)
- E.1A.V-21 containment isolation assumptions and criteria (4.3)
- E.1A.V-22 in-plant sequence assessment (4.5)
- E.1A.V-23 containment event analysis (4.6)
- E.1A.V-24 details of uncertainty analysis (4.6)

- E.1A.V-25 source term definition (4.7)
- E.1A.V-26 event tree binning (4.8)
- E.1A.V-27 risk measures related to containment performance (4.8)
- E.1A.V-28 use of mean values for characterization of risk results (5.1)
- E.1A.V-29 assessment of risk measures (5.2)
- E.1A.V-30 calculation of offsite consequences (5.2)
- E.1A.V-31 importance analysis for input to reliability assurance program (6.1)
- E.1A.V-32 assessment of containment response (6.2)
- E.1A.V-33 source term (6.3)
- E.1A.V-34 scope and objective of human reliability analysis (HRA) (7.1)
- E.1A.V-35 process and criteria to confirm adequacy of human reliability analysis (HRA) (7.2)
- E.1A.V-36 impact of advanced technologies on HRA (7.3)
- E.1A.V-37 function, task, timeline, and link analyses (7.3)
- E.1A.V-38 generic data sources (7.3)
- E.1A.V-39 performance shaping factors and their evaluation tools (7.3)
- E.1A.V-40 quantification methods for HRA (7.3)
- E.1A.V-41 loss of offsite power frequency (Annex A)
- E.1A.V-42 site data (Annex B)

Appendix B to Chapter 1 - Licensing and Regulatory Requirements and Guidance

- E.1B.V-1 compliance of FDA/DC applications with Commission's regulations and guidance (1.3)
- E.1B.V-2 issue resolution for FDA/DC reviews (1.3)
- E.1B.V-3 elimination of missile provisions (2.1.2)
- E.1B.V-4 dynamic seismic analysis of main steam piping and condenser (2.3.1.1 and Item II.E of Annex C)
- E.1B.V-5 main steamline classification (2.3.1.1 and Item II.E of Annex C)
- E.1B.V-6 seismic analysis and plant walkdown of turbine building (2.3.1.1 and Item II.E of Annex C)

- E.1B.V-7 plateout considerations for main steam piping and valves (2.3.1.2 and Item III.F of Annex C)
- E.1B.V-8 reactor pressure vessel level instrumentation system (2.4.1)
- E.1B.V-9 source term (2.5.2.1, 2.5.2.2, Item I.B of Annex A, and Item I.A of Annex C)
- E.1B.V-10 compliance with Branch Technical Position MTEB 6.1 (2.5.2.2)
- E.1B.V-11 fission product cleanup analysis (2.5.2.2)
- E.1B.V-12 deletion of charcoal adsorbers (2.5.2.2)
- E.1B.V-13 dedicated containment vent penetration (2.5.3 and Item I.K of Annex C)
- E.1B.V-14 decoupling of operating-basis earthquake (OBE) from safe shutdown earthquake (SSE) in seismic design of structures (Generic Safety Issue A-40) (3.2.7)
- E.1B.V-15 deletion of OBE damping values in seismic design of structures (Generic Safety Issue A-40) (3.2.7)
- E.1B.V-16 use of algebraic sum method for modal combination of high-frequency modes for vibratory loads (Generic Safety Issue A-40) (3.2.7)
- E.1B.V-17 use of spectral peak shifting techniques in lieu of spectral broadening (Generic Safety Issue A-40) (3.2.7)
- E.1B.V-18 plant-specific design and arrangement of control systems (Generic Safety Issue A-47) (3.2.9)
- E.1B.V-19 conformance to 10 CFR 50.34(f) hydrogen control requirements (Generic Safety Issues A-48 and 121) (3.2.10 and 3.2.46)
- E.1B.V-20 reliability of emergency diesel generators (Generic Safety Issue B-56) (3.2.14)
- E.1B.V-21 resolution of Generic Safety Issues 2 and 110 (3.2.18 and 3.2.42)
- E.1B.V-22 resolution of Generic Safety Issue 15 (3.2.19)
- E.1B.V-23 independent reactor coolant pump seal cooling during station blackout (Generic Safety Issue 23) (3.2.20)
- E.1B.V-24 resolution of Generic Safety Issue 24 (3.2.21)
- E.1B.V-25 design details on threaded fasteners (Generic Safety Issue 29) (3.2.22)
- E.1B.V-26 reduction of biofouling in open-cycle service water and component cooling water systems (Generic Safety Issue 51) (3.2.23)

- E.1B.V-27 resolution of Generic Safety Issue 57 (3.2.24)
- E.1B.V-28 resolution of Generic Safety Issue 73 (3.2.26)
- E.1B.V-29 equipment classification and vendor interface for reactor trip system components (Generic Safety Issue 75) (3.2.27)
- E.1B.V-30 2-week requirement for corrective maintenance (Generic Safety Issue 75) (3.2.27)
- E.1B.V-31 preventive maintenance and surveillance program for reactor trip breakers (Generic Safety Issue 75) (3.2.27)
- E.1B.V-32 resolution of Generic Safety Issue 76 (3.2.28)
- E.1B.V-33 cooldown rate in natural convection cooldown analysis (Generic Safety Issue 79) (3.2.29)
- E.1B.V-34 low-density storage racks in spent fuel pool for most recently discharged fuel (Generic Safety Issue 82) (3.2.30)
- E.1B.V-35 plant-specific design and arrangement for control room heating, ventilating, and air conditioning (HVAC) system (Generic Safety Issue 83) (3.2.31)
- E.1B.V-36 design of emergency filter units (Generic Safety Issue 83) (3.2.31)
- E.1B.V-37 design details for control room capacity following a design-basis accident (Generic Safety Issue 83) (3.2.31)
- E.1B.V-38 design details for control room HVAC systems in the smoke removal mode (Generic Safety Issue 83) (3.2.31)
- E.1B.V-39 resolution of Generic Safety Issue 87 (3.2.33)
- E.1B.V-40 adequacy of low-temperature overpressure protection design (Generic Safety Issue 94) (3.2.34)
- E.1B.V-41 adequacy of BWR water level redundancy (Generic Safety Issue 101) (3.2.37)
- E.1B.V-42 interfacing system design details (Generic Safety Issue 105) (3.2.39)
- E.1B.V-43 inservice testing programs and technical specifications for appropriate pressure isolation valves (Generic Safety Issue 105) (3.2.39)
- E.1B.V-44 resolution of Generic Safety Issue 106 (3.2.40)
- E.1B.V-45 environmental qualification and inservice inspection and testing of large-bore hydraulic snubbers (Generic Safety Issue 113) (3.2.43)

- E.1B.V-46 use of prestressed concrete containments (Generic Safety Issue 118) (3.2.44)
- E.1B.V-47 reliability, operability, and on-line testability of protection system final actuation contacts (Generic Safety Issue 120) (3.2.45)
- E.1B.V-48 operator training program and emergency operating procedures related to initiating feed-and-bleed cooling (Generic Safety Issue 122.2) (3.2.50)
- E.1B.V-49 auxiliary feedwater analyses (Generic Safety Issue 124) (3.2.52)
- E.1B.V-50 operational aspects of electrical power reliability (Generic Safety Issue 128) (3.2.56)
- E.1B.V-51 resolution of Generic Safety Issue 130 (3.2.57)
- E.1B.V-52 resolution of Generic Safety Issue 132 (3.2.58)
- E.1B.V-53 resolution of Generic Safety Issue 135 (3.2.59)
- E.1B.V-54 resolution of Generic Safety Issue 142 (3.2.60)
- E.1B.V-55 resolution of Generic Safety Issue 143 (3.2.61)
- E.1B.V-56 resolution of Generic Safety Issue 151 (3.2.62)
- E.1B.V-57 assessment of safety service water system failure modes and contributions to core damage frequency and identification of dominant accident sequences (Generic Safety Issue 153) (3.2.63)
- E.1B.V-58 resolution of Generic Safety Issue HF 4.4 (3.2.64)
- E.1B.V-59 resolution of Generic Safety Issue HF 5.1 (3.2.65)
- E.1B.V-60 resolution of Generic Safety Issue HF 5.2 (3.2.66)

#### Chapter 2 - Power Generation Systems

- E.2.V-1 safety valve design (3.4)
- E.2.V-2 attachment loads for safety and relief valves (3.4)
- E.2.V-3 side stream condensate polisher (4.3)
- E.2.V-4 condensate makeup system raw water pretreatment (6.4)

#### Chapter 3 - Reactor Coolant System and Reactor Non-Safety Systems

- E.3.V-1 power supplies for power-operated relief valves (3.3)
- E.3.V-2 pressurizer heater power source control design (3.4)
- E.3.V-3 chemical and volume control system design (6.2)

#### Chapter 4 - Reactor Systems

- E.4.V-1 reactor pressure vessel fatigue design criteria (2.3.2)
- E.4.V-2 BWR thermal-hydraulic stability performance during an anticipated transient without scram (4.2)
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- E.5.V-2 metal-water reaction and hydrogen generation and control during a severe accident (2.3 and 6.5.1)
- E.5.V-3 fire protection (2.5)
- E.5.V-4 diesel generator start time (3.2)
- E.5.V-5 detailed LOCA analysis concerning core spray for BWRs (4.1)
- E.5.V-6 safety classification of containment spray system (4.4 and 7.2)
- E.5.V-7 suppression pool bypass leakage (4.5 and 7.2)
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- E.5.V-13 safety depressurization and vent system (5.4, 5.5, and 6.6.5)
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- E.5.V-16 containment integrated leak rate testing (6.3.1)
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- E.6.V-6 compliance with the requirements of Three Mile Island (TMI) Action Plan Item II.B.2 (2.3)
- E.6.V-7 details of shielding design and shielding computer codes (2.3, 2.4, and 4.2.8)
- E.6.V-8 effect of site-specific topography on standard overall site arrangement (3.1)
- E.6.V-9 flooding protection design requirements (3.3.1)
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- E.6.V-13 potential high-radiation areas, shielding, and measures for minimizing exposure (4.2.8 and 4.2.9)
- E.6.V-14 review of coatings against SRP Section 6.1.2 (4.2.10 and 4.3.2)
- E.6.V-15 use of epoxy-coated reinforcing bars at intake structures (4.2.11)
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- E.6.V-21 details of design of BWR reactor building (4.4.2)
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- E.6.V-25 details of design of radwaste facility (4.6.3)
- E.6.V-26 details of emergency onsite power supply facility (4.6.4)
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- E.10.V-21 minimum tests for continuous on-line testing (3.6.1)
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- E.10.V-35 guidance on inadvertent actuation of controls at local control stations (4.9.2)
- E.10.V-36 design of emergency operations facility (4.9.4)
- E.10.V-37 modification of security boundaries during an emergency (4.9.4)
- E.10.V-38 data storage methods (4.9.4)
- E.10.V-39 compliance of perimeter intrusion alarm system with 10 CFR 73.55(h) (5.2.1)
- E.10.V-40 guidance on data system characteristics (5.2.2)
- E.10.V-41 signal transport delay (5.2.5)
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- E.10.V-47 configuration control of software purchased through software clearinghouses (6.1.2)
- E.10.V-48 guidance on convolution of software structure (6.1.3)
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- E.10.V-54 specific methods used to meet the requirement for diversity (6.1.6)
- E.10.V-55 elimination of EMI (6.2.2)
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- E.10.V-57 signal validation methodology (6.2.2)
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- E.10.V-60 EMI/RFI considerations for wiring shields (6.2.9)
- E.10.V-61 restoration state of control system components after loss of power (6.3.2)
- E.10.V-62 setting resolution for control parameters (6.3.3)
- E.10.V-63 requirements for signal reconstruction (6.3.3)
- E.10.V-64 use of interrupts (6.3.3)
- E.10.V-65 continuous self-testing of actuation logic (8.3.2)
- E.10.V-66 radiation monitor placement, calibration frequency, and emergency power provisions (10.2.1)
- E.10.V-67 compliance with Item II.F.1.3 of NUREG-0737 (10.2.1)
- E.10.V-68 criteria for airborne radioactivity monitors (10.2.1)

- E.10.V-69 14-day maintenance criteria for M-MIS for reactor protection system, plant control system, and plant information and monitoring systems (GSI 75) (Appendix B)
- E.10.V-70 procedures to assess unscheduled reactor shutdowns (GSI 75) (Appendix B)
- E.10.V-71 safety implication of instrumentation and control systems (USI A-47, GSI 76) (Appendix B)
- E.10.V-72 inclusion of computer specialist on design and review teams (3.1 of Appendix D)
- E.10.V-73 establishment of Q-list and associated equipment list (GSI 75) (Appendix B)
- E.10.V-74 handling of vendor interface (GSI 75) (Appendix B)
- E.10.V-75 evaluate neutron monitoring system M-MIS (7.4)
- E.10.V-76 reliable operation of reactor trip breaker (GSI 75) (Appendix B)
- E.10.V-77 design of BWR water level instrumentation (GSI 101) (Appendix B)
- E.10.V-78 operator training and emergency operating procedures concerning feed-and-bleed operations (GSI 122.2) (Appendix B)
- E.10.V-79 human factors organization (3.1 of Appendix D)
- E.10.V-80 acoustical environments in operating control areas (3.7.6 of Appendix D)
- E.10.V-81 design reference documents include IEEE P1023/D5 (3.7.6 of Appendix D)

#### Chapter 11 - Electric Power Systems

- E.11.V-1 environmental qualification test criteria for electrical power system (2.2)
- E.11.V-2 safety classification of loads (2.2.1)
- E.11.V-3 minimization of Class 1E components (2.2.4)
- E.11.V-4 instrumentation and controls for electric motors (2.2.5)
- E.11.V-5 compliance with NFPA Codes and Standards (2.2.6)
- E.11.V-6 integrity of electrical cable penetration seals during a fire (2.2.6)
- E.11.V-7 integrity of bus duct penetrations during a fire (2.2.6)
- E.11.V-8 review of IEEE standards not endorsed by regulatory guides (2.2.7)

- E.11.V-9 review of the actual setpoint criteria used for sizing thermal overloads (2.2.9)
- E.11.V-10 limitation of total voltage distortion to 3 percent (4.2.4)
- E.11.V-11 effects of electrical faults on the coastdown capability of the reactor coolant pumps and reactor internal pumps (4.2.5)
- E.11.V-12 use of combustion turbine generator as alternate power source during shutdown (5.2.1)
- E.11.V-13 continuous rating versus short-term rating for sizing the combustion turbine generator (5.2.3)
- E.11.V-14 inclusion of the pressurizer heaters in the diesel generator power analysis (5.2.4)
- E.11.V-15 continuous rating of the diesel generators to include emergency lighting (5.2.4)
- E.11.V-16 capability of the diesel generators to power safety buses in a protected bus configuration (5.2.5)
- E.11.V-17 emergency diesel engine starting system (5.2.6)
- E.11.V-18 emergency diesel engine fuel oil storage and transfer system (5.2.6)
- E.11.V-19 allowed outage time for load center (6.2)
- E.11.V-20 impact of loss of ac or dc bus on single-failure protection in safety-related systems (7.2.1)
- E.11.V-21 outage time for dc safety buses in a BWR plant design (7.2.2)
- E.11.V-22 common backup ac power sources for safety-related uninterruptible power supplies (7.2.4)
- E.11.V-23 design of the continuous ac lighting in safety-related areas and access routes outside the main control room (8.2.1 and 8.2.2)
- E.11.V-24 method of integrating the emergency lighting system with the normal lighting in the main control room (8.2.3)
- E.11.V-25 acceptability of lighting system for closed-circuit television system (8.2.4)

## Chapter 12 - Radioactive Waste Processing Systems

- E.12.V-1 inputs and releases from the radioactive waste processing systems (2.2.1)
- E.12.V-2 use of demonstrated technology (2.2.1)



- E.12.V-3 offsite dose calculation manual (2.2.1)
- E.12.V-4 fuel source term parameters for design of radioactive waste processing systems (2.2.2)
- E.12.V-5 estimate of personnel radiation exposure (2.2.4)
- E.12.V-6 control, monitoring and sampling of liquid and radioactive waste processing and effluent streams (2.2.9)
- E.12.V-7 interface between BWR HVAC systems and GRWP systems (3.3.2)
- E.12.V-8 use of HEPA filters downstream of charcoal adsorbers (3.3.3)
- E.12.V-9 potentially explosive mixtures of hydrogen and oxygen (3.3.4)
- E.12.V-10 piping layout and design and operating procedures for filters and ion exchangers in liquid radioactive waste processing systems (4.2)
- E.12.V-11 shipping container design (5.5)

#### Chapter 13 - Main Turbine-Generator System

- E.13.V-1 60-year design life for major components of the main turbine-generator (2.2)
- E.13.V-2 use of seismic experience data base for seismic qualification (3.1.1)
- E.13.V-3 performance and safety requirements for main turbine (3.1.3)
- E.13.V-4 turbine maintenance program
- E.13.V-5 effect of other duty cycles on long-term integrity of the turbine (3.1.4)
- E.13.V-6 fracture toughness properties of turbine casing material (3.1.4)
- E.13.V-7 part-machining inspection of one-piece rotor (3.1.5)
- E.13.V-8 need for prototype testing of new or significantly changed designs (3.1.6 and 4.1.1)
- E.13.V-9 adequacy of turbine control system (2.3)
- E.13.V-10 inservice inspection intervals for main stop and control valves and reheat stop and intercept valves (3.3)
- E.13.V-11 seal clearances of gland seal system (3.4)

## 5.2 Vendor- or Utility-Specific Items Pertaining to the Requirements Document for Passive Plant Designs

The following is a list of vendor- or utility-specific items that were identified in the DSEP on the Requirements Document for passive plant designs.

### Chapter 1 - Overall Requirements

- P.1.V-1 implementation of design characteristics intended to enhance accident resistance (2.2)
- P.1.V-2 bounding analysis by standard site design parameters (2.3.1)
- P.1.V-3 selection of initiating events and their frequency categorization (2.3.2)
- P.1.V-4 acceptance criteria for transient and accident analysis (2.3.2)
- P.1.V-5 passive plant anticipated transient without scram response analysis (2.3.2)
- P.1.V-6 operator actions 72 hours after accident (2.3.2)
- P.1.V-7 use of 72-hour design basis (2.3.2)
- P.1.V-8 technical basis for severe-accident management program and emergency operating procedures guidelines (2.3.4)
- P.1.V-9 acceptability of analytical codes and methodologies for safety analysis (2.5)
- P.1.V-10 deferred-in-depth analysis (2.5 and 3.5)
- P.1.V-11 60-year plant life (3.3, 4.8.2, 8.2 and 11.3)
- P.1.V-12 operation of PWR with a secured reactor coolant pump (3.5)
- P.1.V-13 fuel burnup requirements (3.6)
- P.1.V-14 extended operating life of control blades and control rod assemblies (3.6)
- P.1.V-15 safety classification (4.3.1)
- P.1.V-16 seismic qualification by experience (4.3.2 and 4.8.1)
- P.1.V-17 non-seismic building structures (4.3.2.3 and 4.7.2.10)
- P.1.V-18 structural design and construction codes (4.4 and 4.4.1)
- P.1.V-19 elimination of operating-basis earthquake from design (4.4.3, 4.7.3, and Appendix B)

- P.1.V-20 definition of support group (4.4.3)
- P.1.V-21 use of Appendix N of ASME Code, Section III (4.4.3 and 4.7.3)
- P.1.V-22 analysis of vibratory loads with significant high-frequency input (4.4.3)
- P.1.V-23 use of nonlinear analysis to account for gaps between pipes and piping supports (4.4.3)
- P.1.V-24 probabilistic approach for changing existing loads and/or loading combinations (4.5.1)
- P.1.V-25 recurrence interval for wind loadings (4.5.2.1)
- P.1.V-26 maximum ground water level (4.5.2.2)
- P.1.V-27 precipitation for roof design (4.5.2.2)
- P.1.V-28 snow loading (4.5.2.2)
- P.1.V-29 detailed quantification of soil parameters (4.5.2.3)
- P.1.V-30 minimum margin against liquefaction (4.5.2.3)
- P.1.V-31 external hazards evaluation (4.5.2.3)
- P.1.V-32 number of full-stress cycles (4.5.2.4 and 4.8.1)
- P.1.V-33 site-specific safe shutdown earthquake (SSE) (4.5.2.4)
- P.1.V-34 power spectrum density function of the time history (4.5.2.4)
- P.1.V-35 design temperature (4.5.2.7)
- P.1.V-36 protection against surface vehicle bombs (4.5.3)
- P.1.V-37 design against internal-missile generation (4.5.5)
- P.1.V-38 design of concrete containment (4.6.1.1)
- P.1.V-39 load combinations for Category I buildings and structures (4.6.1.2)
- P.1.V-40 design of Category I steel structures (4.6.1.2)
- P.1.V-41 combination of pipe rupture loads with seismic loads for seismic Category I structures (4.6.1.3 and 4.6.1.4)
- P.1.V-42 combination of LOCA and SSE loads (4.6.1.7)
- P.1.V-43 load combinations for safety-related portions of the plant (4.6.2)
- P.1.V-44 dynamic analysis techniques (4.7.2.3)

- P.1.V-45 methodology for generating design spectra or time histories (4.7.2.5)
- P.1.V-46 structural damping values (4.7.2.6)
- P.1.V-47 masonry walls in Category I buildings (4.7.2.7)
- P.1.V-48 use of expansion anchor bolts - compliance with Office of Inspection and Enforcement Bulletin 79-02 (4.7.2.8 and 4.7.3)
- P.1.V-49 stability of shell-type structures under compression (4.7.2.9)
- P.1.V-50 use of ASME Code Cases N-411 and N-420 in same analysis (4.7.3)
- P.1.V-51 use of ASME Code Case N-411 (4.7.3)
- P.1.V-52 construction of core support structures (4.7.3)
- P.1.V-53 design fatigue curves (4.7.3)
- P.1.V-54 use of zinc to reduce radiation fields (5.2.7)
- P.1.V-55 grinding controls for PWRs (5.3.1.1)
- P.1.V-56 use of Alloy 600 (5.3.1.3)
- P.1.V-57 effect of fabrication processes on intergranular stress corrosion cracking (5.3.1.8)
- P.1.V-58 selection of seal, gaskets, and protective coatings (5.3.5)
- P.1.V-59 aging of cable insulations and other electrical materials (5.3.6)
- P.1.V-60 use of hydrogen water chemistry for the advanced BWR design (5.5.2)
- P.1.V-61 plant-specific reliability assurance program (6.5)
- P.1.V-62 inspection of construction activities (7 and 11.13)
- P.1.V-63 installed operating-phase security system (7)
- P.1.V-64 reliability of modular construction (7)
- P.1.V-65 inspection and verification of security locks robotically (8.3)
- P.1.V-66 compliance of FDA/DC applications with Commission's regulations and guidance (10)
- P.1.V-67 issue resolution for FDA/DC reviews (10)
- P.1.V-68 inspections, tests, analyses, and acceptance criteria (10)
- P.1.V-69 implementation of simplification objective (11.4)

- P.1.V-70 implementation of standardization objective (11.5)
- P.1.V-71 inservice testing requirements for the essential non-safety-related components (12.2.1 and 12.2.3)
- P.1.V-72 quarterly testing of pumps and valves (12.2.2)
- P.1.V-73 check valve testing methods (12.2.2)
- P.1.V-74 full-flow testing of check valves (12.2.2)
- P.1.V-75 provisions to test hydraulically and pneumatically operated valves under design-basis differential pressure and flow (12.2.2)
- P.1.V-76 qualification testing of active and non-active motor-operated valves (MOVs) (12.2.2)
- P.1.V-77 technical concerns regarding MOVs (12.2.2)
- P.1.V-78 leak rate testing for individual containment isolation valve (12.2.2)
- P.1.V-79 frequency and extent of disassembly and inspection of safety-related pumps (12.2.3)

Appendix A to Chapter 1 - PRA Key Assumptions and Groundrules

- P.1A.V-1 long-term decay heat removal in the PRA (1.6)
- P.1A.V-2 justification of mission items and success criteria (2.10)
- P.1A.V-3 reliability data (2.11)
- P.1A.V-4 review of core-damage-sequence binning (4.1)
- P.1A.V-5 review of actual groupings of the accident sequences into plant damage states (4.2)
- P.1A.V-6 review of the evaluation of containment leakage paths (4.3)
- P.1A.V-7 computer codes for in-plant sequence assessment (4.4)
- P.1A.V-8 verification that the reference site parameters identified in Annex B are consistent with revised 10 CFR Part 100 (5.2)
- P.1A.V-9 differences in computer codes used for calculating offsite consequences (5.2)
- P.1A.V-10 source terms for representative accident sequences bounded by the physically based source term (6.3)

Appendix B to Chapter 1 - Licensing and Regulatory Requirements and Guidance

- P.1B.V-1 compliance of FDA/DC applications with Commission's regulations and guidance (1.2)
- P.1B.V-2 issue resolution for FDA/DC reviews (1.2)
- P.1B.V-3 dynamic seismic analysis of main steam piping and condenser (2.3.1 and Item II.E of Annex A)
- P.1B.V-4 main steamline piping classification (2.3.1 and Item II.E of Annex A)
- P.1B.V-5 seismic analysis of turbine building (2.3.1 and Item II.E of Annex A)
- P.1B.V-6 plateout considerations for main steam piping and valves (2.3.1 and Item III.F of Annex A)
- P.1B.V-7 reactor vessel level instrumentation system (2.4.1)
- P.1B.V-8 dedicated containment vent penetration (2.5.4 and Item I.K of Annex A)
- P.1B.V-9 fission product leakage control (2.5.2 and Item III.F of Annex A)
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- P.1B.V-11 automatic emergency core cooling system switch to recirculation (Generic Safety Issue 24) (3.2.11)
- P.1B.V-12 bolting degradation or failure (Generic Safety Issue 29) (3.2.12)
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- P.1B.V-15 adequate leak test requirements for pressure isolation valves in inservice testing programs and technical specifications (3.2.22)
- P.1B.V-16 identification and design of interfacing systems (3.2.22)
- P.1B.V-17 implementation of procedures for electrical power reliability (3.2.27)
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P.3.V-8 specific design requirements for reactor vessel level instrumentation system (3.5)

P.3.V-9 design details of the man-machine interface system for steam generator water level control (4.5)

P.3.V-10 design details to mitigate excessive leakage of main steam isolation valves (5.4)

P.3.V-11 design details for automatic reactor vessel overfill protection (5.5)

P.3.V-12 design details for PWR auxiliary systems, including chemical and volume control system, against criterion in Standard Review Plan Section 9.3.4 (6)

P.3.V-13 design details for reactor shutdown cooling pump seals (9)

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- P.4.V-1     boration of water for fuel handling and storage (2.2.8)
- P.4.V-2     fuel assembly reconstitution (2.3.3)
- P.4.V-3     condensation carryunder limitation (3.2)
- P.4.V-4     experimental data for divided-chimney design (3.2 and 4.2.1)
- P.4.V-5     BWR stability (2.2.4 and 4.2.1)
- P.4.V-6     decay ratio limits and analysis methods and procedures (4.2.1)
- P.4.V-7     LOCA analysis methodology (4.2.1 and 7.2.1)
- P.4.V-8     load-following and maneuvering capability (4.2.1 and 7.2.1)
- P.4.V-9     methodology to achieve BWR stability (4.2.1)
- P.4.V-10    fuel burnup requirements (4.2.2 and 7.2.2)
- P.4.V-11    two-cycle fuel channel lifetime (4.2.4)
- P.4.V-12    control rod assembly lifetime (4.2.6 and 7.2.3)
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- P.4.V-16    thermal shield removal (6.3)
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- P.5.V-6 system design to minimize condensation water hammer (4.2)
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- P.6.V-2 evaluation of the engineering backfill (2.1.1)
- P.6.V-3 use of American National Standards Institute (ANSI) 10.4-1987 (2.1.1)
- P.6.V-4 structural modules to be used in construction (2.2)
- P.6.V-5 redundant non-safety-grade auxiliary systems within the plant protected area (2.3.3)
- P.6.V-6 review of site-unique security and contingency plans (2.3.6)
- P.6.V-7 programs for controlling and storing toxic materials (2.3.7)
- P.6.V-8 shielding design requirements, shielding computer codes, and radioactive material sources (2.4)
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P.7.V-2 high-radiation areas (2.3.7)

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P.8.V-1 design requirements for the chilled water system (8)

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P.9.V-6 sabotage vulnerability analysis (5.2.2)

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P.9.V-8 safety classification of fuel facility ventilation supply subsystem (8.2.4)

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- P.10.V-8 independence of verification and validation review teams (3.1.2)
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- P.10.V-12 quantitative reliability criteria (3.5)
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- P.10.V-30 signal transport delay (5.2.5)
- P.10.V-31 analog-to-digital and digital-to-analog converters (5.7)
- P.10.V-32 software requirement specification (6.1.2 and 6.1.6)
- P.10.V-33 verification of software (6.1.2)
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- P.10.V-35 configuration control of software purchased through software clearinghouses (6.1.2)
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- P.10.V-38 signal validation methodology (6.2.2)
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- P.10.V-42 selection of variables for automatic actuation (8.2.3)
- P.10.V-43 radiation monitor placement, calibration frequency, and emergency power provisions (10.2.1)
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- P.11.V-1 reliance on the non-safety electrical systems beyond 72-hour period (2.2.2)
- P.11.V-2 reliance on the non-safety electrical systems to achieve cold shutdown (2.2.2)
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- P.11V-4 minimization of Class 1E components (2.2.4)

- P.11.V-5 use of revisions of IEEE standards not endorsed by the staff (2.2.7)
- P.11.V-6 operating conditions of all plant loads for all relevant grid conditions and the design of the bus voltage protection schemes (3.2.4)
- P.11.V-7 design of the standby power source starting system (5.2.6)
- P.11.V-8 design of the standby power source fuel oil storage and transfer system (5.2.6)
- P.11.V-9 design of the electrical separation of dc and vital ac power supply systems (7.2.5)
- P.11.V-10 integration of the exterior lighting system with the closed-circuit television system (8.2.4)

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- P.12.V-1 requirements for radioactive waste processing systems and effluent paths (2.2.8)
- P.12.V-2 gaseous radioactive waste processing system hydrogen control design (3.3.4)
- P.12.V-3 design of dry waste shipping containers (5.5)

#### Chapter 13 - Main Turbine-Generator Systems

- P.13.V-1 use of seismic experience data base and analysis for SSE loading conditions (3.1.1)
- P.13.V-2 one piece rotor design part machining inspection requirements (3.1.5)
- P.13.V-3 prototype testing of new or significantly changed turbine-generator designs (3.1.6 and 4.1.1)

## 6 CONCLUSION

### Requirements Document for Evolutionary Plant Designs

Subject to the resolution of the identified outstanding policy issues and vendor- and utility-specific items discussed in the SER (Volume 2 of this report), the staff concludes that the requirements established in the Requirements Document for evolutionary plant designs (Volume II) do not conflict with current regulatory guidelines and are acceptable. However, by themselves they do not provide sufficient information for the staff to determine if the plant design will be adequate. Therefore, applicants referencing the Requirements Document will be required to demonstrate compliance with the additional guidance provided in the Standard Review Plan (NUREG-0800), or provide justification for alternative means of implementing the associated regulatory requirements.

In the staff requirements memorandum (SRM) of August 24, 1989, the Commission instructed the staff to provide an analysis detailing where the staff proposes deviations from current regulations or where the staff is substantially supplementing or revising interpretive guidance applied to currently licensed light water reactors (LWRs). The staff considers these to be policy issues. Appendix B to Chapter 1 of Volume 2 of this report gives the staff's regulatory analysis of those issues identified for these designs. These issues have been addressed in SECY-90-016 and SECY-91-078, and in draft Commission papers, "Issues Pertaining to Evolutionary and Passive Light Water Reactors and Their Relationship to Current Regulatory Requirements," and "Design Certification and Licensing Issues Pertaining to Passive and Evolutionary Advanced Light Water Reactor Designs," which were issued on February 27 and July 6, 1992, respectively.

In its SRMs dated June 26, 1990, and April 15, 1991, the Commission provided its decisions on SECY-90-016 and SECY-91-078 as they apply to evolutionary designs.

The February 27 and July 6, 1992, draft Commission papers have been forwarded to the Advisory Committee on Reactor Safeguards. The staff will include its views in the final papers and document its final positions before seeking Commission approval. When the staff finalizes these Commission papers, the Commission will complete its review of the basis for the approach that the staff is proposing for those issues and, accordingly, may at some future point in the review determine that such issues involve policy questions that the Commission may wish to consider. The approaches to resolving these issues have not been reviewed by the Commission, and, therefore, do not represent agency positions.

Therefore, the staff concludes that EPRI's ALWR Utility Requirements Document for evolutionary plant designs (Volume II) specifies requirements that, subject to the resolution of the identified outstanding policy issues and vendor- and utility-specific items, if properly translated into a design and constructed and operated in accordance with the NRC regulations in force at the time the design is submitted, should result in a nuclear power plant that

will have all the attributes required to ensure that there is no undue risk to the health and safety of the public or to the environment. In addition to complying with existing regulations, such a facility would also be consistent with the Commission's policies on severe-accident protection.

#### Requirements Document for Passive Plant Designs

Subject to the resolution of the identified outstanding issues and vendor- and utility-specific items listed in Sections 1.4 and 1.5 of each DSER chapter or appendix issued on April 24, 1992, the staff concludes that the requirements established in the Requirements Document for passive plant designs (Volume III) do not conflict with current regulatory guidelines and are acceptable. However, by themselves they do not provide sufficient information for the staff to determine if the plant design will be adequate. Therefore, applicants referencing the Requirements Document will be required to demonstrate compliance with the additional guidance provided in the Standard Review Plan (NUREG-0800), or provide justification for alternative means of implementing the associated regulatory requirements.

In its August 24, 1989, SRM, the Commission instructed the staff to provide an analysis detailing where the staff proposes departure from current regulations or where the staff is substantially supplementing or revising interpretive guidance applied to currently licensed LWRs. The staff considers these to be policy issues. Appendix B to the DSER on Chapter 1 of the Requirements Document for passive plant designs gives that analysis. The staff forwarded these issues to the Commission in draft Commission papers dated February 17 and July 6, 1992. When the staff finalizes these Commission papers, the Commission will complete its review of the basis for the approach that the staff is proposing for those issues and, accordingly, may at some future point in the review determine that such issues involve policy questions that the Commission may wish to consider. The approaches to resolving these issues have not been reviewed by the Commission, and, therefore, do not represent agency positions.

In addition, certain technical issues still have to be resolved before the staff can complete its review.

The following conclusions are based on the staff's review as documented in the April 1992 draft SER (Volume 3 of this report). The final SER, scheduled to be issued in September 1993, will give the final results of the staff's review of EPRI's ALWR Utility Requirements Document for passive ALWR designs.

Therefore, on the basis of its review to date, the staff concludes that EPRI's ALWR Utility Requirements Document for passive plant designs (Volume III) specifies requirements that, subject to the resolution of the identified outstanding issues and vendor- and utility-specific items, if properly translated into a design and constructed and operated in accordance with the NRC regulations in force at the time the design is submitted, should result in a nuclear power plant that will have all the attributes required to ensure that there is no undue risk to the health and safety of the public or to the environment. In addition to complying with existing regulations, such a facility would also be consistent with the Commission's policies on severe-accident protection.

## APPENDIX A

### CHRONOLOGY OF CORRESPONDENCE

This appendix contains a chronological listing of routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and the Electric Power Research Institute (EPRI) and other correspondence related to Project 669.

- July 14, 1981 Letter from J. C. Mark, Advisory Committee on Reactor Safeguards (ACRS), to NRC submitting suggestions regarding potential safety improvements for incorporation into new designs for nuclear power plants. NRC should give appropriate priority and resources to developing safety requirements for future LWRs.
- September 15, 1982 Letter from S. Burstein, EPRI, to NRC discussing proposed NRC involvement in steering committee program for developing standardized LWR design as discussed at July 20, 1982, meeting. Participation required in policy committee and program group.
- October 20, 1982 Letter from H. R. Denton, NRC, to EPRI, responding to September 15, 1982, letter requesting NRC participation in EPRI's Standardized LWR Design Program. NRC involvement in program to prove beneficial to both NRC and EPRI. Meeting requested.
- October 27, 1982 Letter from C. O. Thomas, NRC, to EPRI, summarizing October 21, 1982, meeting with EPRI regarding LWR standardization program. Development of LWR plant baseline designs and approach that could be used by vendors in obtaining certification of plant design emphasized in EPRI program.
- December 20, 1982 Letter from S. Burstein, EPRI, to NRC, requesting that meeting between Utility Steering Committee for EPRI's Standardized LWR Design Program and NRC Policy Committee be held on February 9, 1983, in Bethesda, Maryland, to discuss plans for standardized design. Related information enclosed.
- January 21, 1983 Letter from D. H. Moran, NRC, to EPRI, summarizing January 12, 1983, meeting with EPRI in Bethesda, Maryland, regarding review of licensing issues to be considered in LWR standardization program.
- January 27, 1983 Letter from R. E. Nickell, EPRI, to NRC, confirming high-priority safety and licensing issues selected at meeting



on January 12, 1983, with emphasis on revision of Appendix R to 10 CFR Part 50, decay heat removal (DHR), and high-strength bolting. Possible items for discussion at February 9, 1983, meeting suggested.

- February 21, 1983 Letter from EPRI to NRC, requesting meeting between NRC Policy Committee and Utility Steering Committee for EPRI's Standardized LWR Design Program.
- February 28, 1983 Letter from D. H. Moran, NRC, to EPRI, summarizing February 14, 1983, meeting with EPRI in Bethesda, Maryland, regarding current status and progress to date of LWR standardization program.
- March 10, 1983 Letter from H. Denton, NRC, to EPRI, responding to February 21, 1983, request for meeting between NRC Policy Committee and Utility Steering Committee for EPRI's Standardized LWR Design Program. Meeting to be held on April 6, 1983, in Bethesda, Maryland.
- March 10, 1983 Letter from D. H. Moran, NRC, to EPRI, summarizing February 22, 1983, meeting with EPRI and Sol Levy Associates in Palo Alto, California, regarding final priority sequence and relegation of nonapplicable safety issues to inactive status and consolidation of information on resolution of unresolved issues.
- May 14, 1983 Letter from S. Burstein, NRC, to EPRI, confirming action items resulting from meeting with Utility Steering Committee for EPRI Standardized LWR Plant Design Evaluation Program on April 6, 1983, meeting. Formal plan should be developed for cooperative efforts between NRC and EPRI. Related information enclosed.
- May 25, 1983 Letter from D. H. Moran, NRC, to EPRI, forwarding (1) draft task action plan, Revision 2 for Task A-45 regarding shutdown DHR requirements and (2) a paper on same subject presented before Swiss Federal Institute for Reactor Research in late April 1983.
- June 23, 1983 Letter from R. E. Nickell, EPRI, to NRC, acknowledging receipt of Revision 2 of draft task action plan for Task A-45 regarding shutdown DHR requirements and giving detailed program plan discussed at June 7-15, 1983, meetings. Related information enclosed.
- September 16, 1983 Letter from D. H. Moran, NRC, to EPRI, summarizing August 11, 1983, meeting with Utility Steering Committee for EPRI Standardized LWR Plant Design Evaluation Program in Bethesda, Maryland, regarding progress of standardized design program.
- November 4, 1983 Letter from H. R. Denton, NRC, to EPRI, forwarding review of EPRI list of generic issues not applicable to

certification of future LWR standardized plants, as committed to at August 11, 1983, meeting. Results to be discussed at November 7, 1983, meeting.

- November 29, 1983 Letter from D. H. Moran, NRC, to EPRI, summarizing November 7, 1983, meeting with EPRI Utility Steering Committee for LWR Standardized Plant Design Evaluation Program regarding corroboration of issues not applicable to certification of future LWR plants. Agenda and viewgraphs enclosed.
- April 3, 1984 Letter from D. H. Moran, NRC, to EPRI, summarizing February 16, 1984, meeting with EPRI in Bethesda, Maryland, regarding evaluation of LWR standardized plant design. List of attendees, agenda, and viewgraphs enclosed.
- April 20, 1984 Letter from H. R. Denton, NRC, to ACRS, requesting that ACRS comment on correctness of categorization of generic safety and licensing issues, identifying which issues affect future LWR standardized plant designs.
- June 12, 1984 Letter from D. H. Moran, NRC, to EPRI, summarizing NRC Policy Committee and EPRI Utility Steering Committee for LWR Standardization Plant Design Evaluation fifth quarterly meeting on May 23, 1984, in Bethesda, Maryland. List of attendees and viewgraphs enclosed.
- September 11, 1984 Letter from J. C. Ebersole, ACRS, to NRC, discussing proposed categorization of generic safety and licensing issues, identifying which issues affect future LWR standardized plant designs. EPRI's plan for issue resolution would require considerable resource allocation.
- October 17, 1984 Letter from H. R. Denton, NRC, to ACRS, responding to ACRS September 11, 1984, letter regarding EPRI categorization of generic safety and licensing issues. Resource plan being drafted to consider resources required for appropriate review.
- January 23, 1985 Letter from D. H. Moran, NRC, to EPRI, summarizing December 5, 1984 meeting with EPRI Utility Steering Committee for LWR Standardized Plant Design Evaluation. Commission approval of resource expenditures contingent on EPRI presentation showing rapid progress.
- February 7, 1985 Transcript of Commission February 7, 1985, meeting in Washington, DC, regarding NRC briefing on standard design process. Pp 1-66. Supporting documentation enclosed.
- April 4, 1985 Letter from S. Burstein, EPRI, to NRC, forwarding expanded writeups for shutdown DHR, emergency core cooling system methodology, and high strength bolting

topics. Discussion of expanded format and agenda of April 11, 1985, NRC Policy Committee and EPRI Utility Steering Committee meeting requested.

- June 4, 1985 Letter from D. H. Moran, NRC, to EPRI, summarizing April 4, 1985, meeting with EPRI Utility Steering Committee for LWR Standard Plant Design Evaluation in Bethesda, Maryland, regarding status of EPRI/industry ALWR program and of safety and licensing issues.
- October 15, 1985 Letter from D. H. Moran, NRC, to EPRI, summarizing August 27 and 28, 1985, working meetings in Bethesda, Maryland of EPRI and NRC project and task managers regarding listed generic safety issues affecting EPRI/industry ALWR Utility Requirements Document. Agenda and summary of remaining and forecast issues enclosed.
- October 15, 1985 Letter from D. H. Moran, NRC, to EPRI, summarizing September 12, 1985, quarterly meeting with EPRI Utility Steering Committee for LWR Standardized Plant Design Evaluation regarding status of ALWR program. Agenda, viewgraphs, and list of attendees enclosed.
- December 2, 1985 Letter from D. H. Moran, NRC, to EPRI, summarizing October 28-30, 1985, working meetings with EPRI and NRC project managers regarding resolution of generic safety and licensing issues. Agenda, list of attendees, and summary of remaining and new issues enclosed.
- December 3, 1985 Letter from C. F. Sears, EPRI, to NRC, forwarding draft "NRC Issue and Document Review Process for EPRI/Industry Advanced LWR Program." Comments requested by January 15, 1986.
- December 27, 1985 Letter from D. H. Moran, NRC, to EPRI, summarizing EPRI Utility Steering Committee for LWR Standardized Plant Design Evaluation and NRC Policy Committee meeting on December 3, 1985, in Bethesda, Maryland, regarding status of ALWR program. List of attendees, agenda, and handouts enclosed.
- January 24, 1986 Letter from T. P. Speis, NRC, to EPRI, forwarding comments on topical report submitted on December 3, 1985, regarding ALWR Requirements Document, Chapter 1.
- March 7, 1986 Letter from T. P. Speis, NRC, to EPRI, commenting on draft material regarding ALWR program and NRC review process. Draft submittal good description of program to date and good base to develop NUREG on ALWR program.
- March 24, 1986 Letter from C. F. Sears, EPRI, to NRC, forwarding "Advanced LWR Plant Optimization Subjects for Chapter 1 of Requirements Document." Optimization subjects

addressed current regulations that might be overly conservative. Response requested by April 30, 1986.

- June 5, 1986 Letter from D. H. Moran, NRC, to EPRI, summarizing March 12, 1986, meeting with ALWR Utility Steering Committee regarding current status of ALWR program. List of attendees, agenda, and related information enclosed.
- June 6, 1986 Letter from T. P. Speis, NRC, to EPRI, responding to request for review and opinion of "Advanced LWR Plant Optimization Subjects for Chapter 1 of Requirements Document." Optimization subjects in conformance with August 8, 1985 severe-accident policy.
- June 10, 1986 Letter from D. H. Moran, NRC, to EPRI, forwarding trip report of attendance at May 5-7, 1986, working meetings with EPRI regarding draft Chapter 2 of Utility Requirements Document and NUREG-1197, "Advanced Light Water Reactor Program - Program Management and Staff Review Methodology." Viewgraphs, agenda, and related information enclosed.
- June 30, 1986 Letter from EPRI to NRC, forwarding executive summary of ALWR Utility Requirements Document.
- July 8, 1986 Letter from C. F. Sears, EPRI, to NRC, discussing program to develop requirements for ALWRs to resolve generic safety and licensing issues applicable to future LWRs, through NRC, EPRI, and ALWR Utility Steering Committee efforts.
- July 8, 1986 Letter from C. F. Sears, EPRI, to NRC, forwarding information on four safety and licensing issues from generic list of issues being evaluated for resolution via EPRI ALWR program, for comment.
- September 9, 1986 Letter from D. H. Moran, NRC, to EPRI, summarizing ALWR Utility Steering Committee and NRC Policy Committee July 8, 1986, meeting in Bethesda, Maryland, regarding enclosed list of agenda items, including ALWR program support. Supporting documentation enclosed.
- October 15, 1986 Letter from C. F. Sears, EPRI, to NRC, forwarding Chapter 2 of ALWR Utility Requirements Document." Chapter contained utility requirements for main and extraction steam, feedwater and condensate, chemical addition, condensate makeup purification, and auxiliary steam.
- December 9, 1986 Letter from T. P. Speis, NRC, to EPRI, responding to July 8, 1986, request for comments on topic papers regarding Chapter 3 of ALWR Utility Requirements Document. Recommended that pump seal issue be resolved.

January 5, 1987 Letter from T. P. Speis, NRC, to EPRI, forwarding questions and comments resulting from review of EPRI ALWR Utility Requirements Document, Chapter 1. Response requested by February 28, 1987, to support NRC completion of draft safety evaluation report (DSER) on Chapter 1.

January 15, 1987 Letter from W. Kerr, ACRS, to NRC, summarizing ACRS 321st meeting on January 8-10, 1987, regarding improved safety requirements and objectives for future LWRs.

February 2, 1987 Letter from T. P. Speis, NRC, to EPRI requesting that EPRI submit comments via ALWR Utility Steering Committee regarding ACRS recommendations on improved safety requirements and objectives for future LWR plants. Comments requested by February 27, 1987.

February 9, 1987 Letter from R. M. Bernero, NRC, to EPRI, forwarding ACRS January 15, 1987, letter presenting recommendations on improved safety design features for future LWRs. Comments in support of NRC and ACRS review of General Electric's Advanced Boiling Water Reactor (ABWR) requested by February 27, 1987.

February 26, 1987 Letter from H. R. Denton, NRC, to multiple recipients, forwarding executive summary of ALWR Utility Requirements Document. Document to provide specific attributes desired for plants of 1990s and beyond.

March 2, 1987 Letter from L. J. Ybarrondo, NRC contractor, to NRC, forwarding "Independent Assessment of 'Advanced LWR Utility Requirements Document Chapter 1: Overall Requirements'".

March 5, 1987 Letter from D. H. Moran, NRC, to EPRI, summarizing October 15, 1986, quarterly meeting with ALWR Utility Steering Committee and NRC Policy Committee. List of attendees, agenda, and viewgraphs enclosed.

March 11, 1987 Letter from T. P. Speis, NRC, to EPRI, forwarding questions and comments from Sections 2 and 3 of Scientech Report SCIE-022-87 for January 1987. EPRI response to questions and comments requested by March 31, 1987. Report not enclosed.

March 18, 1987 Letter from T. P. Speis, NRC, to EPRI, requesting additional information regarding review of ALWR Utility Requirements Document, Chapter 1. Response requested by April 15, 1987.

March 27, 1987 Letter from E. F. Kintner, EPRI, to NRC, forwarding responses to independent review comments on ALWR Utility Requirements Document, Chapter 1, in response to January 5, 1987, letter. Chapters 3 and 4 to be submitted in June 1987.

March 27, 1987 Letter from E. E. Kintner, EPRI, to NRC, forwarding comments on ACRS recommendations. Opportunity welcomed for early dialogue with NRC and ACRS on important safety issues in ALWR program.

April 10, 1987 Letter from H. D. Curet, EPRI, to NRC, "Preliminary Comments on ALWR Utility Requirements Document, Chapter 2: Power Generation System."

April 15, 1987 Letter from D. A. Meneley, University of Fredericton, New Brunswick, to NRC, responding to H. Denton request for comments dated February 26, 1987, regarding executive summary of ALWR Utility Requirements Document. Program of regular measurement and reporting of reliability data for key safety systems at each plant recommended.

April 22, 1987 Letter from H. D. Curet, EPRI, to NRC, forwarding suggested modifications of Page 3 of Modification 2 to Contract NRC-03-86-057, "Independent Assessment of Advanced LWR Utility Requirements Documentation," and revised comments on Chapter 2 of ALWR Utility Requirements Document.

April 23, 1987 Letter from H. D. Curet, EPRI, to NRC, forwarding replacement pages 1-3 of "Preliminary Comments on Advanced LWR Utility Requirements Document, Chapter 2: Power Generation System."

April 29, 1987 Letter from M. M. Yedidia, EPRI, to NRC, forwarding abstracts for Chapters 2-13 of ALWR Utility Requirements Document.

May 6, 1987 Letter from R. T. Dewling, NRC contractor, to NRC, responding to H. R. Denton request for views on ALWR Utility Requirements Document. Convincing evidence needed that ALWRs major step forward in improving plant safety.

May 15, 1987 Letter from L. J. Ybarrondo, NRC contractor, to NRC, forwarding "Technical Evaluation of Chapter 2: Power Generation System of Advanced LWR Utility Requirements Document."

May 18, 1987 Letter from H. D. Curet, EPRI, to NRC, forwarding "Technical Evaluation of Chapter 2: Power Generation System of Advanced LWR Utility Requirements Document."

May 21, 1987 Letter from D. Crutchfield, NRC, to EPRI, requesting description of quality assurance (QA) program applied during preparation of ALWR Utility Requirements Document and QA program to be applied to ensure that future changes would be made in controlled fashion. NUREG-0800 and Regulatory Guide 1.28 enclosed.

May 27, 1987 Letter from P. H. Leech, NRC, to EPRI, requesting additional information on Chapter 2 of ALWR Utility Requirement Document. Comments and questions by NRC and Scientech, Inc., provided in Enclosures 1 and 2 respectively. Response expected by September 1, 1987.

May 31, 1987 Letter from Duke Power Company, Westinghouse Electric Corporation, and CYGNA Energy Services, to NRC, forwarding EPRI NP-5159 "Guidelines for Specifying Integrated Computer-Aided Engineering Applications for Electric Power Plants," .

June 1, 1987 Letter to NRC forwarding comments on the executive summary for EPRI's ALWR Utility Requirements Document.

June 5, 1987 Letter from H. N. Berkow, NRC, to R.T. Dewling, acknowledging receipt of May 6, 1987, letter commenting on ALWR Utility Requirements Document executive summary. Comments forwarded to EPRI for consideration in preparing rest of Requirements Document.

June 5, 1987 Letter from H. N. Berkow, NRC, expressing appreciation for June 1, 1987, comments on ALWR Utility Requirements Document executive summary. Letter forwarded to EPRI for information.

June 9, 1987 Letter from H. D. Curet, EPRI, to NRC, forwarding revised page 4 of "Technical Evaluation of Chapter 2: Power Generation System of Advanced LWR Utility Requirements Document."

June 12, 1987 Letter from P. H. Leech, NRC, to EPRI, requesting additional information on Chapter 2 of ALWR Utility Requirements Document, including description of live loading for valve packing developed by Atomic Energy of Canada, Limited (AECL) for CANDU plants, in accordance with May 27, 1987, request.

June 15, 1987 Letter from L. J. Ybarrondu, NRC contractor, to NRC, forwarding "Independent Assessment of Advanced LWR Utility Requirements Document," final monthly progress report for May 1987.

June 18, 1987 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revisions 0 of Chapters 3 and 4, of ALWR Utility Requirements Document for review.

June 22, 1987 Letter from P. Leech, NRC, to EPRI, summarizing June 17, 1987, meeting with EPRI representatives in Bethesda, Maryland, regarding briefing of new NRC reviewers of ALWR Utility Requirements Document. List of attendees and viewgraphs enclosed.

June 30, 1987 "Standard Plant Reviews Program Plan"

June 30, 1987 Letter from EPRI, to NRC, forwarding Revision 0 of Chapter 4 of ALWR Utility Requirements Document.

June 30, 1987 Letter from EPRI, to NRC, forwarding Revision 0 of Chapter 3 of ALWR Utility Requirements Document.

July 9, 1987 Letter from E. E. Kintner, EPRI, to NRC, forwarding six topic papers on generic issues pertaining to Chapters 1, 3, and 4, and optimization subject paper regarding Chapter 3 of ALWR requirements document.

July 20, 1987 Letter from P. H. Leech, NRC, to EPRI summarizing July 1, 1987, meeting with EPRI and Chairman of ALWR Utility Steering Committee regarding ALWR program. List of attendees and viewgraphs enclosed.

July 22, 1987 Letter from E. E. Kintner, EPRI, to NRC, responding to May 21, 1987, request to provide description of QA program applied during preparation of ALWR Utility Requirements Document. QA program not called for according to SRP Section 17.1 and Regulatory Guide 1.28.

September 17, 1987 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 27 and June 12, 1987, questions and comments on Chapter 2 of ALWR Utility Requirements Document. Chapters 3 and 4 under NRC review. Chapter 5 should be available for review by end of November.

September 24, 1987 Letter from R. W. Hernan, NRC, to ACRS, forwarding September 24, 1987, DS&R on Chapter 1 of ALWR Utility Requirements Document. Additional DS&Rs on subsequent chapters to be provided when complete. Information would support ACRS October 6, 1987, meeting.

September 24, 1987 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding DS&R on Chapter 1 of ALWR Utility Requirements Document. Findings generally favorable to ALWR program.

October 6, 1987 Transcript of ACRS Standardization of Nuclear Facilities Subcommittee meeting on October 6, 1987, in Washington, D.C. Pp 1-205. Supporting documentation enclosed.

October 12, 1987 Letter from J. C. Devine, EPRI, to NRC, commenting on proposed new SRP Section 3.6.3 regarding leak-before-break evaluation procedures. Proposed approach would severely limit application of leak-before-break technology for future plants and not achieve intent of General Design Criterion 4 of Appendix A to 10 CFR Part 50.

November 13, 1987 Letter from P. H. Leech, NRC, to EPRI, requesting additional information on ALWR Utility Requirements



Document, Chapters 3 and 4. Schedule for review of Chapters 3 and 4 based on receipt of response by December 31, 1987.

- November 24, 1987 Letter from A. E. Scherer, Combustion Engineering, Inc., to NRC, forwarding proposed Advanced Reactor Severe Accident Program resolutions for four remaining NRC/Industry Degraded Core Rulemaking (IDCOR) severe-accident issues. Six valid DOE/IDCCR resolutions to be adopted in developing System 80+ design. Concurrence requested.
- December 1, 1987 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding list of significant technical issues that might arise during review of evolutionary standard ALWR plants. Comments requested.
- December 8, 1987 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 0 of ALWR Utility Requirements Document, Chapter 5 for review.
- December 11, 1987 Letter from P. H. Leech, NRC, to EPRI, requesting additional information on Chapters 3 and 4 of ALWR Utility Requirements Document. Notification requested in case response delayed more than 2 to 3 weeks beyond December 31, 1987.
- January 19, 1988 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding status report on technical reviews of standardized plant designs for January 1988. Problem meeting listed input dates requested within 1 week of receipt of letter.
- January 25, 1988 Letter from D. Crutchfield, NRC, to EPRI, forwarding information on ALWR performance goals. Information assembled after discussion with knowledgeable NRC staff members and during January 19, 1988, meeting with EPRI representatives.
- January 25, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding additional information on Chapters 3 and 4 of ALWR Utility Requirements Document in response to all but two questions in November 13 and December 11, 1987 letters.
- January 27, 1988 Letter from L. S. Rubenstein, NRC, to EPRI, requesting additional information regarding design goals addressing severe-accident releases. Response requested within 30 days of letter date.
- February 5, 1988 Letter from Director, Office of Nuclear Reactor Regulation, to EPRI forwarding revised DSER on Chapter 1 of ALWR Utility Requirements Document.
- February 18, 1988 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding DSER on Chapter 2 ALWR Utility Requirements Document.

Utility requirements in Chapter 2 are in general agreement with NRC guidelines and regulatory requirements for power generation system involved.

- February 18, 1988 Letter from L. S. Rubenstein, NRC, to Committee to Review Generic Requirements (CRGR), forwarding DSER on Chapter 2 of ALWR Utility Requirements Document and informing CRGR members and staff of progress in reviewing Requirements Document.
- March 18, 1988 Letter from P. H. Leech, NRC, to EPRI, requesting additional information on Chapter 5 of ALWR Utility Requirements Document. Current schedule of review based on receipt of response by April 29, 1988. Notification expected if delay anticipated.
- March 25, 1988 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding safety evaluation of recommended modifications of Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants." NRC interim position constitutes conservative reduction of design-basis winds for use by EPRI until revision available.
- March 28, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding responses to Questions 36 and 40 to resolve NRC comments regarding ALWR low temperature overpressure protection requirements.
- April 4, 1988 Letter from P. H. Leech, NRC, to EPRI, requesting additional information on Chapter 5 of ALWR Utility Requirements Document. Response to questions requested by April 29, 1988.
- April 5, 1988 Letter from E. E. Kintner, EPRI, to NRC, providing initial response to January 27, 1988, questions on ALWR Utility Requirements Document regarding implementation of public safety criteria. Probabilistic risk assessment (PRA) key assumptions and groundrules to be submitted in September 1988 to provide more detail.
- May 13, 1988 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding DSER on Chapter 3 of ALWR Utility Requirements Document. Document in general agreement with NRC guidelines based on January 25 and March 25, 1988, letters regarding reactor coolant system and nonsafety auxiliary systems.
- May 31, 1988 Letter from Director, Office of Nuclear Reactor Regulation, forwarding DSER on Chapter 3 of ALWR Utility Requirements Document.
- June 8, 1988 Letter from Director, Office of Nuclear Reactor Regulation, Director, forwarding DSER on Chapter 4 of ALWR Utility Requirements Document.

June 10, 1988 Letter from L. S. Rubenstein, NRC, to EPRI, forwarding DSER of Chapter 4 of ALWR Utility Requirements Document on the basis of commitments in January 25 and March 25, 1988, letters.

June 20, 1988 Letter from L. S. Rubenstein, NRC, to ACRS, forwarding DSERs on Chapters 3 and 4 of ALWR Utility Requirements Document. Effort to continue until final SER issued in 1991.

June 30, 1988 Report by Fauske and Associates, Inc., "Technical Support for Hydrogen Control Requirement for EPRI Advanced LWR Requirements Document Task 8.3.5.4," Advanced Reactor Severe Accident Program.

July 31, 1988 Letter from R. Stiger, International Technology Corp., to NRC, "Technical Basis for EPRI Advanced LWR Requirements Document Assumption on Delayed Fission Product Release (Task 8.3.5.2)," Advanced Reactor Severe Accident Program.

August 16, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding responses to March 18 and April 4, 1988, requests for additional information on Chapter 5 of ALWR Utility Requirements Document on station blackout.

September 15, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to NRC Comments 430.1, 430.2, 430.3, and 430.4, regarding ALWR Utility Requirements Document and two reports referenced in responses to NRC Comments 480.5 and 450.1.

September 23, 1988 Letter from W. O. Long, NRC, to EPRI, regarding low-temperature overpressure protection for ALWRs.

September 23, 1988 Letter from C. Y. Cheng, NRC, to EPRI, clarifying position on reactor vessel surveillance program and low temperature overpressure protection in Chapters 3 and 4 of ALWR Utility Requirements Document.

October 26, 1988 Letter from W. O. Long, NRC, to EPRI, clarifying two statements in May 13, 1988, DSER on Chapter 3 of ALWR Utility Requirements Document concerning chemical and volume control system.

November 1, 1988 Letter from W. O. Long, NRC, to EPRI, summarizing October 26, 1988, meeting with EPRI in Rockville, Maryland, regarding NRC recommendations for design of ALWR electrical system. Meeting handout enclosed.

November 17, 1988 Letter from W. O. Long, NRC, to EPRI, advising that open issue regarding suppression pool loads in Section 3.0.D.2 of Chapter 1 of ALWR Requirements Document needed further

clarification. Section not clear on whether proposed leak-before-break proposal consistent with General Design Criterion 4 of Appendix A to 10 CFR Part 50.

November 18, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 0 of ALWR Utility Requirements Document Chapter 6, for review.

November 22, 1988 Letter from D. Crutchfield, NRC, to EPRI, forwarding information regarding scope of safety analysis report for future standardized design applications and NRC review of applications.

December 23, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding ALWR Utility Requirements Document, Chapter 12.

December 30, 1988 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 0 of ALWR Utility Requirement Document, Chapter 8.

January 9, 1989 Letter from B. Lee, Nuclear Management and Resources Council (NUMARC), to NRC, clarifying NUMARC position on need for NRC rulemaking on severe reactor accidents for ALWRs. Rulemaking not necessary and may be counterproductive.

January 11, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding ALWR Requirements Document, Chapter 9, for use in chapter review.

January 31, 1989 Letter from D. G. Harrison, Idaho National Engineering Laboratory, to NRC, forwarding "Interim External Events Integration for EPRI Advanced LWR Requirements Document WBS 4.3.3."

February 2, 1989 Letter from W. O. Long, NRC, to EPRI, discussing proposed resolutions of Generic Safety Issues I.F.1, "Expand QA List," and I.F.5 "Classification of Instrumentation and Electrical Equipment," and suggesting that EPRI reaffirm commitment in its December 3, 1985, letter in order to resolve issues.

February 6, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding ALWR Utility Requirements Document Chapter 13. Chapter incorporated lessons learned from evaluation of LWR technology as applied to generation of electricity.

February 23, 1989 Letter from W. O. Long, NRC, to EPRI, requesting additional information on ALWR Utility Requirements Document, Chapter 6. Information should be provided on level of detail consistent with Regulatory Guide 1.70 for safety analysis report.

February 28, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding ALWR Utility Requirements Document, Chapter 7.

March 21, 1989 Letter from W. O. Long, NRC, to EPRI, summarizing meeting on March 15, 1989, with EPRI and contractors in Palo Alto, California, regarding ALWR issues. List of attendees and handouts enclosed.

March 22, 1989 Letter from W. O. Long, NRC, to EPRI, requesting additional information on ALWR Utility Requirements Document, Chapters 8, 9, 12, and 13. Response requested within 60 days.

March 22, 1989 Letter from W. O. Long, NRC, to EPRI, requesting review of Chapter 7 of ALWR Utility Requirements Document. Schedule for review given.

March 30, 1989 Letter from E. E. Kintner, EPRI, to NRC, responding to open issue in DSER on Chapter 4 of ALWR Utility Requirements Document regarding capability of reactor pressure vessel to withstand multiple natural circulation cooldowns and to similar comment by ACRS on August 9, 1988.

March 30, 1989 Letter from E. E. Kintner, EPRI, to NRC, submitting additional information sufficient to resolve Generic Safety Issue (GSI) II.E.6.1, "In Situ Testing of Valves," ALWR Utility Requirements Document addressed subissues of GSI II.E.6.1. Concurrence on resolution of issue requested.

March 30, 1989 Letter from E. E. Kintner, EPRI, to NRC, responding to March 25, 1988, letter regarding optimization issue on tornado design in Chapter 1 of ALWR Utility Requirements Document. Agreed to use tornado design criteria in Table 2 and Figure 2 of safety evaluation for ALWR.

April 3, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding additional information on outstanding issues in DSERs on Chapters 2, 3, and 4 of ALWR Utility Requirements Document.

April 5, 1989 Letter from E. E. Kintner, EPRI, to NRC, regarding GSIs I.F.1 and II.F.5.

April 10, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding ALWR Requirements Document, Chapter 11. EPRI believed major objectives had been achieved and concerns about station blackout would be virtually eliminated.

April 11, 1989 Letter from EPRI, to NRC, forwarding Revision C of ALWR Utility Requirements Document, Chapter 11.

April 28, 1989 Letter from W. O. Long, NRC, to EPRI, requesting additional information on ALWR Utility Requirements Document, Chapters 6, 7, 8, and 9 in accordance with March 22, 1988, request for additional information.

May 16, 1989 Letter from W. O. Long, NRC, to EPRI, discussing ALWR Utility Requirements Document regarding tornado design. Position on tornado missile barriers given in SRP Sections 3.5.1.4, 3.5.2, and 3.5.3 and in Regulatory Guides 1.76 and 1.117.

May 17, 1989 Letter from W. O. Long, NRC, to EPRI, giving notice of June 22, 1989, meeting with ALWR Utility Steering Committee in Rockville, Maryland, to discuss ALWR issues including program overview, hydrogen generation and ignition, and design-basis-accident source term assumptions.

May 24, 1989 Letter from W. Long to EPRI requesting additional information on Chapter 7, 8, 11, and 12 of the ALWR Requirements Document.

June 8, 1989 Letter from W. O. Long, NRC, to EPRI, requesting additional information on GLs-81-12 and 86-10.

June 14, 1989 Letter from W. O. Long, NRC, to EPRI, regarding GSIs II.G.1 and II.G.23 pertaining to pressurizer equipment electric power and threat of reactor coolant pump seal loss-of-coolant-accident.

July 3, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 0 of ALWR Utility Requirements Document, Appendix A to Chapter 1. Appendix to provide guidance to be used in performing PRA.

July 3, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding Chapter 6 of ALWR Utility Requirements Document.

July 14, 1989 Letter from J. L. Blaha, NRC, to EPRI, forwarding DSER on Chapter 1 of ALWR Utility Requirements Document and actual and estimated review schedule for ALWR project. Estimated dates preliminary and subject to revision after EPRI and NRC discussions.

July 19, 1989 Letter from T. Kenyon, NRC, to EPRI, summarizing June 22, 1989, meeting with EPRI representatives of nuclear power industry and source term and related issues for ALWR program. List of attendees and handouts enclosed.

August 10, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to March 22 and April 28, 1989, letters regarding Chapters 6, 7, 8, 9, 12, and 13 of ALWR Utility Requirements Document.

- September 15, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 24, 1989, request for additional information on Chapters 7, 8, 11, and 12 of ALWR Utility Requirements Document. Power supplies of emergency response facility system to be designed in accordance with NUREG-0696.
- October 19, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding additional information on Chapters 6, 9, and 11 of ALWR Utility Requirements Document in response to June 8, 1989, request. ALWR to be in compliance with NUREG-0800 regarding enhanced fire protection.
- October 26, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding ALWR Utility Requirements Document, Chapter 10, and Topic Paper, "Reactor Pressure Vessel Level Instrumentation for PWRs."
- November 6, 1989 Letter from J. L. Blaha, NRC, to SECY, forwarding correspondence between EPRI and NRC on Chapter 5 of ALWR Utility Requirements Document.
- November 28, 1989 Letter from T. J. Kenyon, NRC, to EPRI, requesting information on reactor safeguards within 60 days of date of letter.
- December 22, 1989 Letter from E. E. Kintner, EPRI, to NRC, forwarding responses to requests for additional information on Chapters 1, 6, 7, 8, 9, 11, and 13 of ALWR.
- December 26, 1989 Letter from E. E. Kintner, EPRI, to NRC, regarding review priorities and process.
- January 18, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding responses to requests for additional information on Chapters 6, 7, 8, 9, 12, and 13 of ALWR Utility Requirements Document regarding physical security, inside and outsider sabotage threats, and controlled access to the containment.
- January 31, 1990 Report by Fauske and Associates, Inc., "Technical Support for Hydrogen Control Requirement for EPRI Advanced LWR Requirements Document."
- February 5, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding "Technical Support for Hydrogen Control Requirement for EPRI Advanced LWR Requirements Document."
- February 22, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding updated Revision 0 of ALWR Utility Requirements Document, Appendix A to Chapter 1. Document reissued to submit Section 3.2.2, "Earthquake," for NRC review.

- February 27, 1990 Letter from K. M. Carr, NRC, to EPRI, responding to December 26, 1989, letter expressing concerns regarding progress of NRC review of ALWR Utility Requirements Document.
- February 28, 1990 Letter from C. L. Miller, NRC, to EPRI, forwarding DSER Chapter 5 on ALWR Utility Requirements Document, including severe-accident prevention and mitigation, hydrogen generation, control source term issues, and station blackout.
- March 16, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to request for additional information on Chapters 8 and 13 of ALWR Utility Requirements Document regarding remote positive indication of correct alignment of manual isolation valve and cast pressure-retaining parts of stop valves, respectively.
- March 29, 1990 Letter from E. E. Kintner, EPRI, to NRC, regarding treatment of generic safety issues for ALWR requirements.
- March 31, 1990 Letter from EPRI to NRC, forwarding Volume I, "ALWR Policy and Summary of Top-Tier Requirements," of ALWR Utility Requirements Document.
- April 10, 1990 Letter from T. J. Kenyon, NRC, to EPRI, requesting additional information on Volume II of ALWR Utility Requirements Document on the basis of staff's review of Appendix A to Chapters 10 and 11. Response requested within 60 days of letter date.
- June 20, 1990 Letter from T. J. Kenyon, NRC, to EPRI, summarizing December 6, 1989, meeting with EPRI regarding Chapter 10 of Volume II of ALWR Utility Requirements Document. List of attendees and viewgraphs enclosed.
- June 30, 1990 Report by Fauske and Associates, Inc., "Technical Support for Debris Coolability Requirements for Advanced LWRs in Utility-EPRI LWR Requirements Document."
- July 3, 1990 Letter from S. H. Smith, Nuclear Power Oversight Committee, to NRC, advising NRC that U.S. utility industry vitally interested in timely certification of both evolutionary and passive ALWR designs currently under review by NRC. Maintaining current certification review schedules important.
- July 3, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding "Technical Support for Debris Coolability Requirements for Advanced LWRs in Utility-EPRI LWR Requirements Document."
- July 13, 1990 Letter from T. J. Kenyon, NRC, to EPRI, requesting information needed to complete review of design criteria.



July 23, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to April 10, 1990, request for additional information on Chapters 1, 10, and 11 of ALWR Utility Requirements Document.

July 23, 1990 Letter from EPRI, to NRC, forwarding "Prevention of Early Containment Failure Due to High Pressure Melt Ejection and Direct Containment Heating for Advanced LWRs."

August 2, 1990 Letter from T. J. Kenyon, NRC, to EPRI, requesting additional information on Chapter 10 of Volume II of ALWR Utility Requirements Document regarding electrical system.

August 2, 1990 Letter from T. J. Kenyon, NRC, to EPRI, summarizing May 31, 1990, meeting with EPRI, NIMARC and standardized plant vendors regarding Volume II of ALWR Utility Requirements Document. List of attendees enclosed.

August 8, 1990 Letter from T. J. Kenyon, NRC, to EPRI, summarizing May 31, 1990, meeting with EPRI regarding source term to be used for future LWR. List of attendees and viewgraphs enclosed.

August 13, 1990 Letter from J. M. Taylor, NRC, to S. H. Smith, Nuclear Power Oversight Committee, responding to July 3, 1990, letter to Chairman K. Carr regarding timely certification of two evolutionary passive designs. Sufficient time needed by NRC staff to identify and evaluate issues to ensure that proposed ALWR designs provide adequate protection.

August 15, 1990 Letter from T. J. Kenyon, NRC, to EPRI, forwarding comments regarding unresolved and generic safety issues addressed in Appendix B to Chapter 10 of Volume II of ALWR Utility Requirements Document.

August 22, 1990 Letter from T. J. Kenyon, NRC, to EPRI, requesting additional information on Volume II of ALWR Utility Requirements Document regarding design criteria. Response requested within 60 days of letter.

August 23, 1990 Letter from T. J. Kenyon, NRC, to EPRI, forwarding summary of July 16, 1990, meeting with EPRI regarding hydrogen generation and containment performance. List of attendees, NRC slides, and EPRI presentation enclosed.

August 27, 1990 Letter from T. J. Kenyon, NRC, to EPRI, forwarding revised request for additional information on Chapter 1 of Volume II of ALWR Utility Requirements Document.

August 30, 1990 Letter from T. J. Kenyon, NRC, to EPRI, requesting additional information on ALWR Utility Requirements Document, Volume I, and Chapters 1, 6, and 10 of Volume II to complete review of design criteria.

August 31, 1990 Letter from EPRI, to NRC, submitting annotated Revision 1 of Volume II to ALWR Utility Requirements Document.

September 7, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding proprietary Revision 1 of Volume II (ALWR evolutionary plant) and Revision 0 of Volume III (ALWR passive plant) of ALWR Utility Requirements Document for safety evaluation review. Documents no longer withheld per March 29, 1991, letter from EPRI.

September 30, 1990 Report by D. E. Leaver and L. P. Tenera, "Licensing Design Basis Source Term Update for Evolutionary Advanced LWR."

October 12, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to July 13 and August 2, 1990, requests for additional information on Chapters 7, 10, and 13 of ALWR Utility Requirements Document.

October 18, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding "Licensing Design Basis Source Term Update for Evolutionary Advanced LWR."

October 29, 1990 Letter from W. R. Sugnet, EPRI, to NRC, forwarding tables listing NRC rules and regulatory guidance not in Appendix B to Chapter 1 of Volumes II and III of Advanced LWR Utility Requirements Document.

November 7, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding additional information on Appendix A to Chapter 1 and Chapter 12 of ALWR Utility Requirement Document.

November 29, 1990 Transcript of closed-session meeting with ALWR Utility Steering Committee on November 29, 1990, with NRC. Pp 64-223. Supporting information enclosed. Transcript no longer proprietary per March 29, 1991 letter from EPRI.

December 6, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding proprietary response to August 30, 1990, request for additional information on human factors considerations. Response addressed questions on ALWR Utility Requirements Document, Volume I, and Chapters 1, 6, and 10 of Volume II. Enclosure no longer withheld per March 29, 1991, letter from EPRI.

December 21, 1990 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to request for additional information on unresolved and generic safety issues and addressing

- questions on Volume II of ALWR Utility Requirements Document. Response no longer withheld per March 29, 1991, letter from EPRI.
- December 21, 1990 Letter from T. H. Boyce, NRC, to EPRI, forwarding notification of January 14, 1991, meeting with EPRI in Rockville, Maryland, to discuss seismic issues for ALWR Utility Requirements Document.
- January 9, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding proprietary information on ALWR seismic design evaluation program. Enclosures no longer withheld per March 29, 1991, letter from EPRI.
- January 15, 1991 Letter from C. L. Miller, NRC, to EPRI, forwarding DSER on Chapters 6, 7, 8, 9, 12, and 13 of Volume II of ALWR Utility Requirements Document.
- January 25, 1991 Letter from T. J. Kenyon, NRC, to EPRI, requesting additional information on Volumes II and III of ALWR Utility Requirements Document regarding quality assurance. Document no longer withheld per March 29, 1991 letter from EPRI.
- January 25, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to request for additional information on reactor vessel level instrumentation system and addressing concerns related to Volume II of ALWR Utility Requirements Document. Response no longer withheld per March 29, 1991 letter from EPRI.
- January 28, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding comparison between Volumes II, and III of ALWR Utility Requirements Document. Enclosures no longer withheld per March 29, 1991 letter from EPRI.
- January 30, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding data base for tracking open issues in DSER for Chapters 1-5 of Volume II of ALWR Utility Requirements Document. Enclosure no longer withheld per March 29, 1991 letter from EPRI.
- January 31, 1991 Report by Jack R. Benjamin and Associates, Inc., "Advanced LWR Seismic Design and Evaluation Program." Report no longer withheld per March 29, 1991 letter from EPRI.
- February 1, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding Revision 1 of "Development of Seismic Hazard Input for Advanced LWR Seismic PRA," in response to NRC request at meeting on January 14, 1991.
- February 4, 1991 Letter from D. Crutchfield, NRC, to EPRI, providing preliminary views on Revision 0 of Volume III of ALWR

- Utility Requirements Document regarding criteria to be used in design for combustible gas control. Document no longer withheld per March 29, 1991 letter from EPRI.
- February 7, 1991 Letter from T. H. Boyce, NRC, to EPRI, providing summary of January 14, 1991 meeting with EPRI in Rockville, Maryland, regarding seismic issues for ALWR Utility Requirements Document. Summary no longer withheld per March 29, 1991 letter from EPRI.
- February 7, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding responses to questions raised at meeting on November 29 and 30, 1990. Numbering scheme for responses also enclosed. Responses no longer withheld per March 29, 1991 letter from EPRI.
- February 22, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding EPRI NP-5159, "Guidelines for Specifying Integrated Computer-Aided Engineered Applications for Electric Power Plants," and EPRI NP-5639, "Guidelines for Piping System Reconciliation (NCIG-05, Revision 1)."
- February 28, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding Sections 1-5 of Chapter 1, Volume II of ALWR Utility Requirements Document to propose level of information to be withheld from public disclosure. Document no longer withheld per March 29, 1991 letter from EPRI.
- February 28, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document.
- February 28, 1991 Report by M. W. McCann, Jack R. Benjamin and Associates, Inc., Revision 1 of "Development of Seismic Hazard Input for Advanced LWR Seismic PRA."
- March 1, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information Volume III of ALWR Utility Requirements Document regarding quality assurance. Document no longer withheld per March 29, 1991 letter from EPRI.
- March 1, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding physical security and safeguards requirements. Document no longer proprietary per March 29, 1991 letter from EPRI.
- March 1, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding plant systems. Document no longer withheld per March 29, 1991 letter from EPRI.

March 1, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on ALWR Utility Requirements Document regarding radiation protection and health physics. Document no longer withheld per March 29, 1991 letter from EPRI.

March 1, 1991 Letter from J. H. Wilson, NRC, to EPRI, providing summary of February 11 and 12, 1991, meetings with EPRI in Rockville, Maryland, to discuss NRC staff review of Volume II of ALWR Utility Requirements Document. List of attendees enclosed.

March 1, 1991 Letter from J. H. Wilson, NRC, to EPRI, correcting summary of February 11 and 12, 1991, meetings in Rockville, Maryland, to discuss NRC staff review of Volume II of ALWR Utility Requirements Document.

March 1, 1991 Letter from W. R. Sugnet, EPRI, to NRC, forwarding industry list of technical issues central to design of ALWR passive plants.

March 8, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding reactor systems. Document no longer withheld per March 29, 1991 letter from EPRI.

March 14, 1991 Letter from E. E. Kintner, EPRI, to NRC, providing perspective of progress on work on ALWR Utility Requirements Document.

March 15, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to January 25, 1991, request for additional information on quality assurance. Response no longer withheld per March 29, 1991 letter from EPRI.

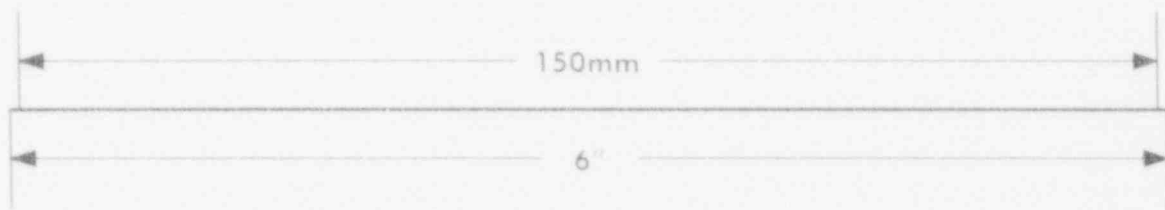
March 15, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to requests for additional information on quality assurance. Enclosure no longer withheld per March 29, 1991 letter from EPRI.

March 19, 1991 Letter from T. H. Boyce, NRC, to EPRI, providing summary of March 5 and 6, 1991, meetings with Combustion Engineering and EPRI in Rockville, Maryland, regarding NRC staff review of Volume II of ALWR Utility Requirements Document. List of attendees and agenda enclosed.

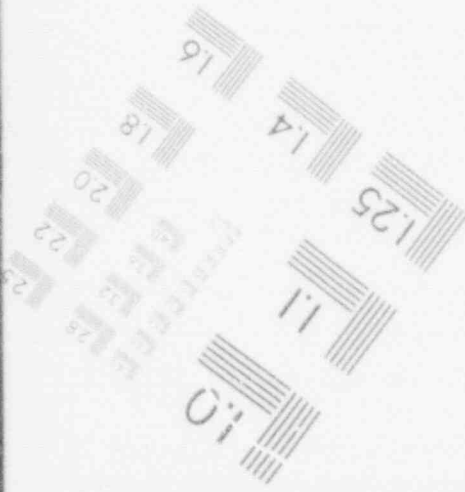
March 28, 1991 Letter from T. H. Boyce, NRC, to EPRI, providing summary of March 28, 1991, meeting with EPRI in Rockville, Maryland, to discuss NRC staff review of Volume II of ALWR Utility Requirements Document.

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## IMAGE EVALUATION TEST TARGET (MT-3)

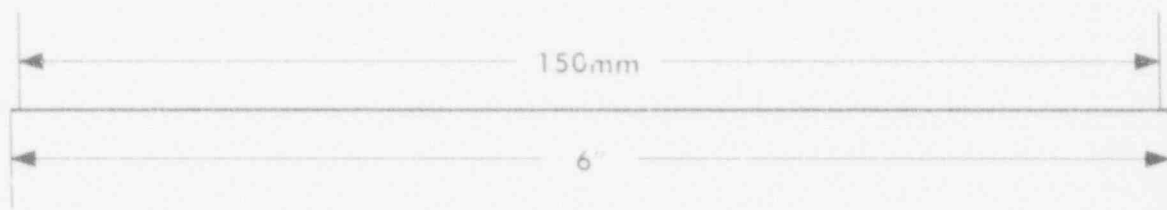


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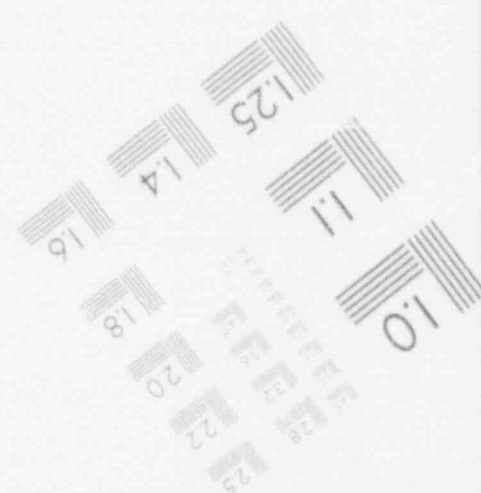


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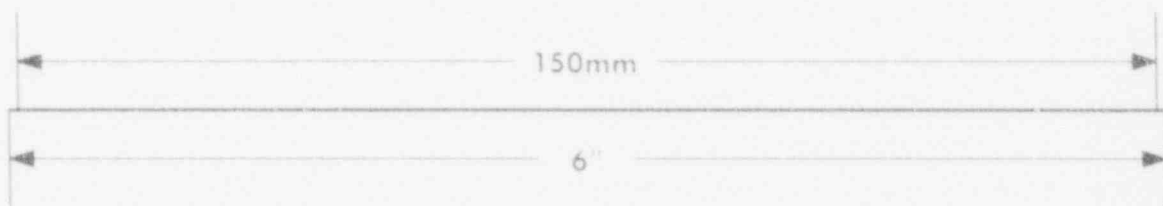
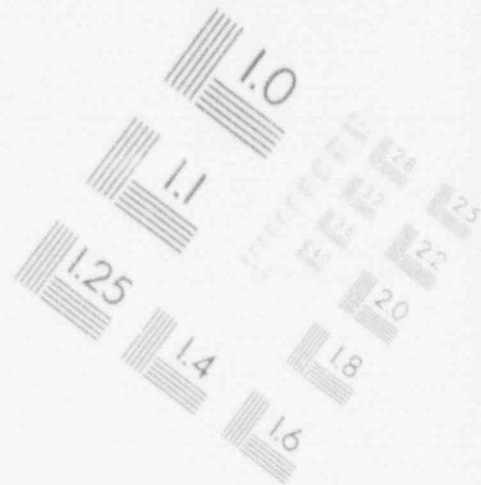


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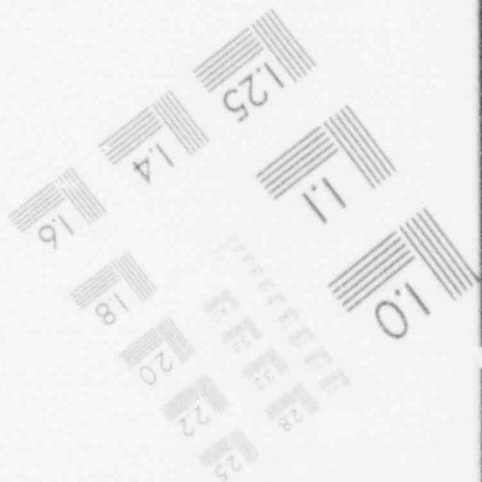


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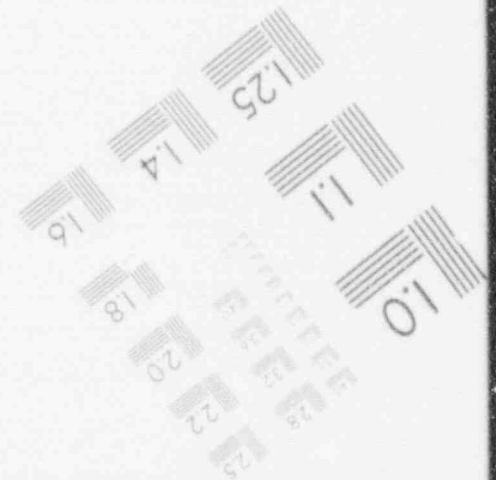
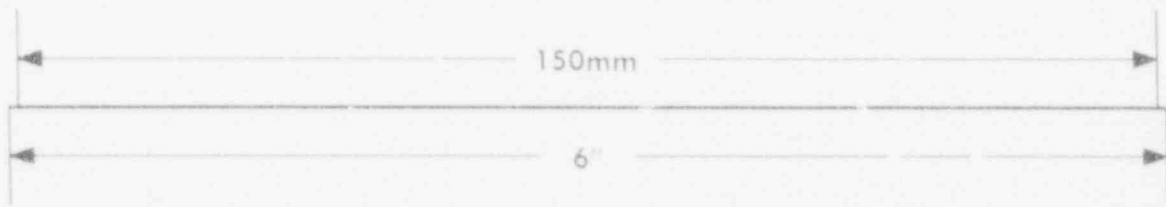
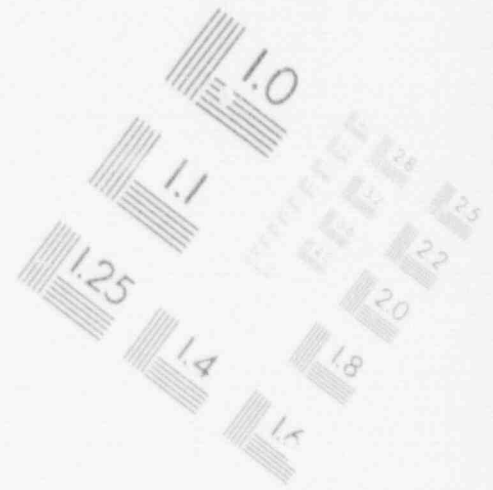
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April 3, 1991 Letter from C. L. Miller, NRC, to EPRI, forwarding DSER on Chapter 11 of Volume II of ALWR Utility Requirements Document.

April 3, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document. Information needed to complete review of design criteria addressed during review of Chapter 9, "Site Support System."

April 5, 1991 Letter from J. H. Wilson, NRC, to EPRI, concluding that regulations and guidance not applicable to design requirements should be added to "applicable" list in Appendix B to Chapter 1 of ALWR Utility Requirements Document. Information given in October 29, 1990, letter should be added to next revision of document.

April 8, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting EPRI's position on changes to criteria in Volume III of ALWR Utility Requirements Document that apply to evolutionary designs.

April 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting information on Volume III of ALWR Utility Requirements Document regarding human factors.

April 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding safeguards.

April 22, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding reactor systems.

April 24, 1991 Letter from K. M. Carr, NRC, to EPRI, responding to March 14, 1991, letter noting significant progress made in last year on ALWR Utility Requirements Document. Agreed that review of advanced passive reactors presented different kind of challenge.

April 24, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding structural engineering concerns.

April 25, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding materials and chemical engineering concerns.

April 25, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to requests for additional information on

Chapters 4 and 7 of Volume III of ALWR Utility Requirements Document regarding reactivity physics, fuel, and fuel storage criticality.

- April 26, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 2 of Volume II and Revision 1 of Volume III of ALWR Utility Requirements Document in response to NRC concerns regarding quality assurances, human factors, generic and unresolved safety issues, and open issues in DSERs. Changes resulting from elimination of operating-basis earthquake also included.
- April 30, 1991 Letter from EPRI, to NRC, submitting copies of Revision 1 of Volume II of ALWR Utility Requirements Document; and Chapter 1 and Appendix B to Chapter 1 updated through Revision 2.
- April 30, 1991 Letter from EPRI, to NRC, transmitting revised pages issued as Revision 2 of Volume II and Revision 1 of Volume III of ALWR Utility Requirements Document.
- April 30, 1991 Letter from EPRI, to NRC, transmitting "Position Paper on Standardization."
- May 6, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding materials engineering concerns.
- May 6, 1991 Letter from D. Crutchfield, NRC, to EPRI, clarifying issues discussed in SECY-90-016.
- May 8, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to April 8, 1991, letter regarding consistent changes to Volumes II and III of ALWR Utility Requirements Document.
- May 8, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to March 8, 1991, request for additional information on Chapter 4 of Volume III of ALWR Utility Requirements Document.
- May 8, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to April 5, 1991, letter regarding regulations and guidance not applicable to ALWR design requirements.
- May 9, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding report describing plant containment performance criteria for evolutionary plant and rationale for their selection. Information provided technical support for Volume II of ALWR Utility Requirements Document.

May 9, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding matrix approach to containment performance criteria for evolutionary plants and rationale for their selection.

May 13, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to March 1, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding measures to be taken to prevent high operational and post-shutdown radiation levels in reactor coolant system piping.

May 13, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to February 28, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding system reliability, quality assurance, and seismic qualification or capability of non-safety-grade active systems.

May 13, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to March 1, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding resolution of GSI A-29 for advanced reactors.

May 13, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding partial response to March 1, 1991, request for additional information on Volume II of ALWR Utility Requirements regarding fire protection.

May 13, 1991 Letter from EPRI, to NRC forwarding response to March 1, 1991, request for additional information on Volume III of ALWR Utility Requirements Document.

May 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Requirements Document regarding mechanical engineering concerns.

May 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding instrumentation and controls.

May 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, forwarding page 15 omitted from April 22, 1991, request for additional information regarding review of Chapter 5 of Volume III of ALWR Utility Requirements Document.

May 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding reactor systems.

May 17, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document submitted on September 7, 1990 regarding safeguards considerations.

May 22, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to request for additional information on Volume III of ALWR Utility Requirements Document regarding plant systems.

May 22, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to request for additional information on Volume III of ALWR Requirements Document regarding radiation protection.

May 22, 1991 Letter from G. Bockhold, EPRI, to NRC, forwarding updated open issues tracking system for Chapters 1-9, 11, and 12 of Volume II of ALWR Utility Requirements Document.

June 5, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on reactor systems to complete review of Volume II of ALWR Utility Requirements Document.

June 13, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to April 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding human factors.

June 24, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding responses to April 3 and 17, 1991, requests for additional information on ALWR Utility Requirements Document regarding safeguards concerns.

July 1, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to requests for additional information on Volume III of ALWR Utility Requirements Document regarding compliance of leak-before-break methodology with acceptance criteria in statement of considerations for final rule, General Design Criterion 4 of Appendix A to 10 CFR Part 50.

July 1, 1991 Letter from E. E. Kintner, EPRI, to NRC, forward response to April 22, 1991, request for additional information on Section 6.2.2 of Chapter 1 of Volume III of ALWR Requirements Document regarding reliability requirements for non-safety critical systems.

July 2, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to April 24, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding safety-margin basis requirements.

July 8, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding emergency planning.

July 22, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding methodology for dedicating commercial software for designing safety-related systems.

July 22, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding site security interfaces in plant security systems and key-locked controls.

July 22, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding safes, single-action valves, security barriers, and intrusion detection systems.

August 1, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to April 22, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding reactor systems.

August 1, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to May 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding mechanical engineering regarding material and chemical engineering concerns.

August 1, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding final response to May 17, 1991, request for additional information Volume III of ALWR Utility Requirements Document.

August 12, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to June 5, 1991, request for additional information on Volume II of ALWR Utility Requirements Document regarding reactor systems.

August 16, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document.

August 19, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding human factors.

August 19, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding safeguards.

August 20, 1991 Letter from T. J. Kenyon, NRC, to EPRI, providing summary of July 17, 1991, meeting to discuss effects of changes in source term on ALWR designs.

August 29, 1991 Letter from D. Crutchfield, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding Question 210.40.

September 5, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume II of ALWR Utility Requirements Document regarding shutdown risks.

September 5, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding shutdown risks.

September 6, 1991 Letter from J. H. Wilson, NRC, to EPRI, transmitting open issues from staff review of Appendix A to Chapter 1 of Volume II of ALWR Utility Requirements Document.

September 11, 1991 Letter from D. E. Leaver, Tenera, L.P. (formerly Tenera Corporation), to NRC, providing additional information for NRC consideration on several ALWR source term matters that came up at August 1991 meeting.

September 11, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document regarding unresolved and generic safety issues.

September 23, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Appendix A to Chapter 1 of Volume III of ALWR Utility Requirements Document.

October 1, 1991 Letter from G. Bockhold, EPRI, to NRC, forwarding Volumes II and III of ALWR Utility Requirements Document consisting of hand-marked page charges in accordance with NRC request.

October 2, 1991 Letter from J. H. Wilson, NRC, to EPRI, summarizing August 27, 1991, meeting with utilities in Rockville, Maryland, regarding development of updated source term for LWRs.

October 2, 1991 Letter from J. H. Wilson, NRC, to EPRI, summarizing August 14 and 15, 1991, meetings with EPRI in Rockville, Maryland, to discuss issues associated with staff review of Volume III ALWR Utility Requirements Document.

October 3, 1991 Letter from R. Chambers, Idaho National Engineering Laboratory, to NRC, forwarding two copies of Advanced Reactor Severe Accident Program report "Interim External Events Integration for EPRI Advanced LWR Requirements Document

WBS 4.3.3," DOE-ID-10227, by D. G. Harrison in response to request by J. D. Trotter of EPRI to support review of Project 669.

- October 8, 1991 Letter from R. C. Pierson, NRC, to EPRI, forwarding DSER on Chapter 10 of Volume II of ALWR Utility Requirements Document.
- October 9, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to August 19, 1991, request for additional information on Volume III of ALWR Utility Requirements Document. Battery rooms to be locked and alarmed, and isolation zone lighting to be designed to permit observation.
- October 10, 1991 Letter from J. H. Wilson, NRC, to EPRI, requesting additional information on Volume III of ALWR Utility Requirements Document submitted on September 7, 1990, regarding the reliability assurance program.
- October 10, 1991 Letter from J. H. Wilson, NRC, to EPRI, forwarding open issues from review of Section 6 of Chapter 1 of Volume II of ALWR Utility Requirements Document.
- October 17, 1991 Letter from G. Bockhold, EPRI, to EPRI, forwarding response to questions raised during teleconference regarding ALWR seismic hazard curve.
- October 23, 1991 Letter from J. H. Wilson, NRC, to EPRI, forwarding corrections for pages 4-10 and 4-11 of DSER on Chapter 10 of Volume II of ALWR Utility Requirements Document transmitted by letter dated October 8, 1991.
- October 30, 1991 Letter from J. H. Wilson, NRC, to EPRI, summarizing September 26, 1991, meeting with EPRI in Rockville, Maryland, to present results of research by NRC and contractors concerning development of updated source term. List of attendees provided.
- November 4, 1991 Letter from R. C. Pierson, NRC, to EPRI, forwarding DSER on Appendix A to Chapter 1 of Volume II of ALWR Utility Requirements Document. Open issues required resolution.
- November 4, 1991 Letter from G. Bockhold, EPRI, to NRC, forwarding information regarding errors and resolutions in response to request for additional information on ALWR Utility Requirements Document.
- November 6, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to August 29, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding mechanical engineering concerns.



- November 15, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to August 19, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding human factors.
- November 20, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to September 11, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding unresolved and generic safety issues.
- November 25, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 3 of Volume II of ALWR Utility Requirements Document.
- November 27, 1991 Letter from E. E. Kintner and J. J. Taylor, EPRI, to NRC, proposing agenda of meetings at senior levels of NRC staff and Utility Steering Committee to discuss remaining generic safety issues in ALWR Utility Requirements Document as discussed at workshop on November 4 and 5, 1991.
- December 2, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to September 5, 1991, request for additional information on Volume II of ALWR Utility Requirements Document regarding shutdown risk.
- December 6, 1991 Letter from EPRI, to NRC, forwarding ALWR positions on central issues pertaining to evolutionary plant identified during July 1991 meeting with NRC. Issues included containment performance, core debris coolability, and seismic hazard.
- December 10, 1991 Letter from J. D. Trotter, EPRI, to NRC, forwarding pen-and-ink changes to Chapters 5, 6, 9, 10, and 11 of Volume II of ALWR Utility Requirements Document regarding security and suggesting working-level meeting during week of January 6, 1992, to resolve any outstanding concerns.
- December 16, 1991 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to September 5, 1991, request for additional information on Chapters 4 and 5 of Volume II of ALWR Utility Requirements Document regarding scope of PRA for operating conditions when plant is at power and general initiating events.
- December 18, 1991 Letter from G. Bockhold, EPRI, to NRC, advising that modification of Figure 12.3-1 in Chapter 12 of Volume II of ALWR Utility Requirements Document was inadvertently omitted from list of changes submitted to NRC in June and October 1991.
- December 20, 1991 Letter from D. Crutchfield, NRC, to EPRI, identifying issues pertaining to evolutionary and passive plant designs. Information provided to initiate discussion of approaches to resolving issues.

- December 20, 1991 Letter from J. D. Trotter, EPRI, to NRC, forwarding summary of technical rationale by C. Negin regarding high-efficiency particulate air filters in radioactive waste off-gas system.
- December 21, 1991 Letter from J. D. Trotter, EPRI, to NRC, forwarding proposed plan for revisions of ALWR Utility Requirements Document addressing open issues pertaining to reactor pressure vessel materials.
- December 26, 1991 Letter from D. Crutchfield, NRC, to EPRI, discussing preparation of final SER on Volume II of ALWR Utility Requirements Documents and requesting that EPRI submit all responses and positions by January 31, 1992, so that staff could complete its technical evaluations.
- January 9, 1992 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to October 10, 1991, request for additional information on open issues resulting from NRC review of Section 6 of Chapter 1 of Volume II of ALWR Utility Requirements Document.
- January 9, 1992 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to October 10, 1991, request for additional information on Volume III of ALWR Requirements Document.
- January 10, 1992 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to August 16, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding electrical systems.
- January 10, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding response to May 17, 1991, request for additional information on Volume III of ALWR Utility Requirements Document regarding core support structures because initial response dated August 1, 1991, was inappropriate.
- January 22, 1992 Letter from D. Crutchfield, NRC, to EPRI, discussing January 30, 1992, meeting with EPRI in Palo Alto, California, concerning resolution of policy and technical issues associated with ALWR Utility Requirements Document.
- January 24, 1992 Letter from J. H. Wilson, NRC, to EPRI, summarizing January 8, 1992, meeting with EPRI in Rockville, Maryland, to discuss EPRI-proposed changes to security requirements.
- January 24, 1992 Letter from E. E. Kintner, EPRI, to NRC, forwarding response to September 23, 1991, request additional information on Appendix A to Chapter 1 of Volume III of ALWR Utility Requirements Document.

- January 24, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding responses to open and confirmatory issues in DSER on Appendix A to Chapter 1 of Volume II of ALWR Utility Requirements Document. Enclosure included both data base summaries for each issue and markups of pages in Volume II pages.
- January 24, 1992 Letter from E. E. Kintner, EPRI, to NRC, submitting changes to Chapters 5, 6, 9, 10, and 11 of Volume II of ALWR Utility Requirements Document that dealt with safeguards-related requirements. Changes should be considered in final SER on Volume II.
- January 24, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding responses to three issues in DSER on Chapter 11 of Volume II of ALWR Utility Requirements Document. Enclosure includes both data base summaries for each issue and markups of pages in Volume II.
- January 28, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding first part of responses to open and confirmatory issues (99 of 126 issues) in DSER on Chapter 10 of Volume II of ALWR Utility Requirements Document. Minor proposed changes to be reflected in Revision 4 of Volume II.
- February 3, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding second part of responses to open and confirmatory issues in DSER on Chapter 10 of Volume II of ALWR Utility Requirements Document and stating that responses had been given for all but four of the issues. Responses to remaining four issues to be provided later this month.
- February 3, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding changes to Volume II of ALWR Utility Requirements Document that addressed DSER open and confirmatory issues or other concerns. Changes to be incorporated into Revision 4 of Volume II.
- February 4, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding proposal for maintenance feed to top-tier electrical bus action.
- February 10, 1992 Letter from T. U. Marston, EPRI, to NRC, suggesting staff-level meetings be held in late February and early March of 1992 to expedite quality closure of DSER issues pertaining to chapters on man-machine interface systems and PRA in Volume II of Utility Requirements Document.
- February 11, 1992 Letter from J. D. Trotter, EPRI, to NRC, discussing miscellaneous items for Project 669 including resolution of steam generator tube ruptures by increasing design pressure.

- February 18, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding responses to four open issues in DSER on Chapter 10 of Volume II of ALWR Utility Requirements Document in response to October 10, 1991, request for additional information and containing both data base and road-map summaries for each issue and markups of pages in Volume II.
- February 27, 1992 Letter from D. Crutchfield, NRC, to EPRI, forwarding draft Commission paper describing major technical and policy issues on evolutionary and passive plant designs. Positions supersede those in February 20, 1991 letter.
- March 2, 1992 Letter from T. J. Kenyon, NRC, to EPRI, summarizing January 30, 1992 senior management meeting with EPRI and nuclear industry representatives on technical issues for evolutionary and passive ALWRs. List of attendees and presentations enclosed.
- March 3, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding February 1992 status report. Significant progress apparent in area of policy issues.
- March 3, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding proposed changes to Chapter 1, Appendix B to Chapter 1, and Chapters 10 and 11 of Volume II of ALWR Utility Requirements Document.
- March 9, 1992 Letter from T. J. Kenyon, NRC, to EPRI, issuing errata to summary of senior management meeting on January 30, 1992 on technical issues for evolutionary and passive ALWRs.
- March 10, 1992 Letter from J. D. Trotter, EPRI, to NRC, forwarding final draft of position paper for passive plant system classification and requirements.
- March 19, 1992 Letter from E. E. Kininger, EPRI, to NRC, forwarding position paper on passive plant system classification and requirements.
- March 19, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding changes to Volume II of ALWR Utility Requirements Document per continuing discussions with NRC.
- March 30, 1992 Letter from G. Bockhold, EPRI, to NRC, submitting changes to Chapter 11 of ALWR Utility Requirements Document in response to NRC concerns associated with electrical distribution policy issue.
- March 31, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding changes to Volume III of ALWR Utility Requirements Document addressing open issues on performance requirement for turbine exhaust boot and design of radial and thrust bearings.

April 3, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding comments on draft NUREG/CR-5747 "Estimate of Radionuclide Release Characteristics into Containment Under Severe Accident Conditions."

April 7, 1992 Letter from G. Bockhold, EPRI, to NRC, submitting response to NRC request for additional information on second source of power to non-safety loads required exclusively for unit operation as discussed in Sections 3.3 and 4.2 of Chapter 11 of DSER.

April 9, 1992 Letter from G. Bockhold, EPRI, to NRC, on diversity against common-mode software failures. Listed elements provided in Chapter 10 of ALWR Utility Requirements Document.

April 9, 1992 Letter from W. Borchardt, NRC, to EPRI, summarizing March 27, 1992 meeting with EPRI in Denver, Colorado on major issues resulting from NRC review of ALWR Utility Requirements Document for evolutionary and passive designs. List of attendees, meeting agenda handouts, and slides enclosed.

April 9, 1992 Letter from G. Bockhold, EPRI, to NRC, submitting summary of methods & assumptions used in development of ALWR 80th percentile meteorological database.

April 17, 1992 Letter from G. Bockhold, EPRI, to NRC, submitting changes to Chapter 3 of Volume II of ALWR Utility Requirements Document concerning testability of third feedwater isolation valve in bwr's. Similar change will be made to Volume III.

April 17, 1992 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 4 to Volume II of ALWR Utility Requirements Document.

April 24, 1992 Letter from D. Crutchfield, NRC, to EPRI, forwarding DSER on Volume III of ALWR Utility Requirements Document.

April 30, 1992 Letter from D. Crutchfield, NRC, to EPRI, discussing topics under consideration for inclusion in Commission paper to discuss additional issues on future reactor designs.

May 1, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding response to open issue on the use of physically-based source term on Volume II of the ALWR Utility Requirements Document.

May 5, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding modifications to ALWR Utility Requirements Document to address general concern of NRC on vulnerability of ALWRs during shutdown & low power operation.

May 5, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding draft of PWR and BWR passive plant system classification. Enclosure submitted to facilitate preparations for May 14, 1992 meeting on regulatory treatment of nonsafety systems.

May 8, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding EPRI's draft positions on additional technical and policy issues on passive and evolutionary plant designs in parallel with Utility Steering Committee review.

May 13, 1992 Letter from E. E. Kintner, EPRI, to NRC, forwarding Revision 3 to Chapters 1-13 of Volume III of the ALWR Utility Requirements Document.

May 15, 1992 Letter from D. Crutchfield, NRC, to EPRI, forwarding draft of SER on Volume II of ALWR Utility Requirements Document.

May 28, 1992 Letter from T. J. Kenyon, NRC, to EPRI, summarizing meeting with EPRI on May 6, 1992 on in-containment fission product removal mechanisms for evolutionary and passive plant designs.

May 26, 1992 Letter from T. J. Kenyon, NRC, to EPRI, summarizing meeting with EPRI on March 20, 1992 on EPRI's initial work on reliability-based technical specifications for passive ALWRs. List of attendees and EPRI presentation included.

June 4, 1992 Letter from E. E. Kintner, EPRI, to NRC, responding to February 27, 1992 letter on major technical and policy issues for evolutionary and passive plant designs

June 15, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding April and May 1992 status report

June 23, 1992 Letter from D. Crutchfield, NRC, to EPRI, discussing EPRI-proposed optimization subject on simplification of off-site emergency planning for ALWRs using passive safety systems.

July 2, 1992 Letter for G. Bockhold, EPRI, to NRC, forwarding data base for issues identified on Chapters 2-10 of Volume III of the ALWR Utility Requirements Document.

July 6, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding discussion of term 'decommissioning' as term relates to ALWR Utility Requirements Document.

July 6, 1992 Letter from D. Crutchfield, NRC, to EPRI, forwarding draft commission paper, "Design Certification and Licensing Policy Issues Pertaining to Passive and Evolutionary Advanced Light Water Reactor designs."

- July 17, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding revised data base for issues on Chapter 9 of Volume III of the ALWR Utility Requirements Document. Issues include balance-of-plant fire protection program, independence of ventilation system inside containment, and requirements for smoke removal capability.
- July 7, 1992 Letter from T.G. Hiltz, NRC, to EPRI, summarizing meeting with EPRI on June 11, 1992 on generic system classification, reliability-based technical specifications, and shutdown risk considerations for ALWRs.
- August 3, 1992 Letter from G. Bockhold, EPRI, to NRC, forwarding supporting information on charcoal filters per teleconference with NRC.

## APPENDIX B

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## APPENDIX C

### LIST OF ABBREVIATIONS

The following is a list of abbreviations used throughout this report and the DSER.

ac	alternating current
AAC	alternate ac
ABWR	advanced boiling water reactor
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
A/D	analog to digital
ADS	automatic depressurization system
AEOD	Office for Analysis and Evaluation of Operational Data
AFW	auxiliary feedwater
AHU	air handling unit
AIF	Atomic Industrial Forum, Inc.
AISC	American Institute of Steel Construction
ALARA	as low as is reasonably achievable
ALWR	advanced light water reactor
ANS	American Nuclear Society
ANSI	American National Standards Institute
AOO	anticipated operational occurrence
ARSAP	Advanced Reactor Severe Accident Program
ASCE	American Society of Civil Engineers
ASD	adjustable speed drive
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	anticipated transient(s) without scram
AWS	American Welding Society
BE	best estimate
BEIR	Biological Effects of Ionizing Radiation, Committee on the
BOP	balance of plant
BTP	branch technical position
B&W	Babcock and Wilcox
BWG	British Wire Gauge
BWR	boiling water reactor
BWROG	Boiling Water Reactor Owners Group
C-I	Category I
C-II	Category II
CAE	computer-aided engineering
CAGS	compressed air and gas system
CAS	central alarm system
CCDF	complementary cumulative distribution function
CCFP	conditional containment failure probability
CCIC	core coolant inventory control
CCTV	closed-circuit television

CCW	component cooling water
CCWS	component cooling water system
CDF	core damage frequency
CDWS	chilled water system
CE	Combustion Engineering, Inc.
CET	containment event tree
CFR	<u>Code of Federal Regulations</u>
CIV	containment isolation valve
CMEB	former NRC Office of Nuclear Reactor Regulation Chemical Engineering Branch
CMT	core makeup tank
COL	combined construction and operating license
CPU	control processing unit
CRA	control rod assembly
CRD	control rod drive
CRDM	control rod drive mechanism
CRGR	Committee to Review Generic Requirements
CS	containment spray
CSS	containment spray system
CT	combustion turbine
CTSI	condensate treatment systems influent
CVC	chemical and volume control
CVCS	chemical and volume control system
CWS	circulating water system
D/A	digital to analog
DBA	design-basis accident
DBT	design-basis tornado
DC	design certification
DC	direct current
DCH	direct containment heating
DDACS	digital data acquisition and control system
DEGB	double-ended guillotine break
DHR	decay heat removal
DNBR	departure from nucleate boiling ratio
DOD	Department of Defense
D-RAP	design reliability assurance program
DS	drywell spray
DSER	draft safety evaluation report
DWST	demineralized water storage tank
ECCS	emergency core cooling system
ECWS	essential chilled water system
EDG	emergency diesel generator
EFU	emergency filter unit
EFW	emergency feedwater
EFWS	emergency feedwater system
EFWST	emergency feedwater storage tank
EMI	electromagnetic interference
EMS	environmental monitoring system
EOF	emergency operations facility
EOP	emergency operating procedure
EPA	electric protective assembly
EPA	Environmental Protection Agency

EPG	emergency procedures guideline
EPRI	Electric Power Research Institute
ERF	emergency response facility
ESF	engineered safety feature(s)
ESFAS	engineered safety feature actuation system
ESI	Energy Systems Group
EsW	essential service water
ESWS	essential service water system
FDA	final design approval
FIVE	fire vulnerability evaluation
FN	ferrite number
FPCCS	fuel pool cooling and cleanup system
FPLC	fission product leakage control
FPLCS	fission product leakage control system
FPS	fire protection system
FSER	final safety evaluation report
GDC	general design criterion(a)
GE	General Electric Company
GI	generic issue
GIMCS	generic issues management control system
GIP	Generic Implementation Procedure
GL	generic letter
GPM	gallon(s) per minute
GRWPS	gaseous radioactive waste processing system
GSI	generic safety issue
HCLPF	high confidence/low probability of failure
HEPA	high-efficiency particulate air
HF	human factors
HPCI	high-pressure coolant injection
HPI	high-pressure injection
HRA	human reliability analysis
HVAC	heating, ventilating, and air conditioning
HWC	hydrogen water chemistry
IASCC	irradiation-assisted stress corrosion cracking
I&C	instrumentation and controls
ICC	inadequate core cooling
ICS	integrated control system
iCST	influent to condensate storage tank
IDCOR	Industry Degraded Core Rulemaking
IE	Office of Inspection and Enforcement
I&E	Office of Inspection and Enforcement
IEB	Office of Inspection and Enforcement bulletin
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IES	Illumination Engineering Society
IGA	intergranular attack
IGSCC	intergranular stress corrosion cracking
IIT	incident investigation team
ILRT	integrated leak rate test
IMS	information management system

IN	NRC information notice
INPO	Institute of Nuclear Power Operations
IPCEA	Insulated Power Cable Engineers Association
IPE	individual plant evaluation
IRWST	in-containment refueling water storage tank
ISI	inservice inspection
ISLOCA	intersystem loss-of-coolant accident
IST	inservice testing
ITAAC	inspections, tests, analyses, and acceptance criteria
LBB	leak before break
LBHS	large-bore hydraulic snubber
LCO	limiting condition(s) for operation
LCS	leakage control system
LCS	local control station
LDB	licensing design basis
LDR	load definition report
LLNL	Lawrence Livermore National Laboratory
LOCA	loss-of-coolant accident
LOFT	loss-of-fluid test
LOOP	loss of offsite power
LRB	licensing review basis
LRFD	load and resistance factor design
LRWPS	liquid radioactive waste processing system
LTOP	low-temperature overpressure protection
LWR	light water reactor
MAAP	modular accident analysis program
MCC	motor control center
MCPR	minimum critical power ratio
MCR	main control room
MF	moderate frequency
MFW	main feedwater
M-MI	man-machine interface
M-MIS	man-machine interface system(s)
MOV	motor-operator valve
MPA	multiplant action
MSIV	main steam isolation valve
MSIVLCS	main steam isolation valve leakage control system
MTC	moderator temperature coefficient
MWD/MTU	megawatt-day(s) per metric ton of uranium
MWSE	makeup water systems effluent
MWSG	makeup water to steam generator
MWST	makeup water storage tank
NCC	natural convection cooldown
NCIG	Nuclear Construction Issues Group
NDE	nondestructive examination
NDT	nil ductility temperature
NECWS	nonessential chilled water system
NESWS	nonessential service water system
NFPA	National Fire Protection Association
NNS	nuclear safety

NPHS	normal power heat sink
NPRDS	nuclear power plant reliability data system
NPSH	net positive suction head
NRC	U.S. Nuclear Regulatory Commission
NS	non-seismic
NSAC	Nuclear Safety Analysis Center
NSSS	nuclear steam supply system
NUMARC	Nuclear Utility Management and Resources Council
N/VT	neutron(s)/square meter
OBE	operating-basis earthquake
ODCM	offsite dose calculation manual
O-RAP	operations reliability assurance program
OSHA	Occupational Safety and Health Administration
PAP	personnel access portal
PASS	postaccident sampling system
PCCS	passive containment cooling system
PDHR	passive decay heat removal
PDHRS	passive decay heat removal system
PGA	peak ground acceleration
PGC	power generation complex
PGP	procedures generation package
PIN	project information network
PIV	pressure isolation valve
PM	preventive maintenance
PMF	probable maximum flood
PMP	probable maximum precipitation
PORV	power-operated relief valve
PRA	probabilistic risk assessment
PSD	power spectrum density
PSF	performance shaping factor
PSIS	passive safety injection system
PVC	polyvinylchloride
PWR	pressurized water reactor
PWSCC	primary water stress corrosion cracking
QA	quality assurance
RAI	request for additional information
RAM	random-access memory
RAP	reliability assurance program
RCA	radiological control area
RCIC	reactor core isolation cooling
RCP	reactor coolant pump
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RFI	radio frequency interference
RFPY	reactor full-power year
RG	regulatory guide
RHR	residual heat removal
RIP	reactor internal pump
RISCC	radiation-induced stress corrosion cracking
ROM	read-only memory

RPS	reactor protection system
RPV	reactor pressure vessel
RSDC	reactor shutdown cooling
RTB	reactor trip breaker
RTD	resistance temperature detector
RT <sup>NPT</sup>	nil ductility temperature
RTS	reactor trip system
RV	reactor vessel
RVLIS	reactor vessel level instrumentation system
RWCS	reactor water cleanup system
RWCU	reactor water cleanup
SAFDL	specified acceptable fuel design limit
SAR	safety analysis report
SAS	secondary alarm station
SBWR	simplified boiling water reactor
SCA	sneak circuit analysis
SCC	stress corrosion cracking
SDV	safety depressurization and vent
SDV	scram discharge volume
SDVS	safety depressurization and vent system
SECY	NRC Office of the Secretary (of the Commission)
SEP	Systematic Evaluation Program
SER	safety evaluation report
SFA	single-failure analysis
SFC	single-failure criterion
SG	steam generator
SGI	safeguards information
SGOF	steam generator overfill
SGTR	steam generator tube rupture
SGTS	safety gas treatment system
SHARP	systematic human action reliability procedure
SI	safety injection
SIS	safety injection system
SLC	standby liquid control
SLCS	standby liquid control system
SMB	safety margin basis
SOER	significant operating event report
SPDS	safety parameter display system
SQAP	Software Quality Assurance Program
SQUG	Seismic Qualification Utilities Group
SRM	staff requirements memorandum(a)
SROA	safety-related operator action
SRP	Standard Review Plan (NUREG-0800)
SRV	safety/relief valve
SSAR	standard safety analysis report
SSC	structures, systems, and components
SSE	safe shutdown earthquake
SSI	soil-structure interaction
SSW	safety service water
STCP	Source Term Code Package
SWAP	Service Water Assistance Program
SWS	service water system

TBCCWS	turbine building component cooling water system
TDI	Transamerica Delaval, Inc.
THERP	technique for human error rate prediction
TID	technical information document
TIP	traversing in-core probe
TMI	Three Mile Island
TMI-2	Three Mile Island Unit 2
TS	technical specification(s)
TSC	technical support center
UBC	Uniform Building Code
UHS	ultimate heat sink
UPS	uninterruptible power supply
URS	ultimate rupture strength
USI	unresolved safety issue
UT	ultrasonic test
UV	undervoltage
V	volt
V&V	verification and validation
WS	wetwell spray



APPENDIX D

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## APPENDIX E

### COMMISSION PAPERS APPLICABLE TO ADVANCED LIGHT WATER REACTORS

- SECY-77-439, "Single Failure Criterion," August 17, 1977.
- SECY-86-228, "Introduction of Realistic Source Term Estimates Into Licensing," August 6, 1986.
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- SECY-89-013, "Design Requirements Related to the Evolutionary Advanced Light Water Reactors (ALWRs)," January 19, 1989.
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- SECY-90-241, "Level of Detail Required for Design Certification Under Part 52," July 11, 1990.
- SECY-90-307, "Impacts of Source Term Timing on NRC Regulatory Positions," August 30, 1990.
- SECY-90-313, "Status of Accident Management Programs and Plans for Implementation," September 5, 1990.
- SECY-90-329, "Comparison of the General Electric Advanced Boiling Water Reactor (ABWR) Design and the Electric Power Research Institute's (EPRI's) Advanced Light Water Reactor (ALWR) Requirements Document," September 20, 1990.
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SECY-91-074, "Prototype Decisions for Advanced Reactor Designs," March 19, 1991.

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SECY-91-229, "Severe Accident Mitigation Design Alternatives for Certified Standard Designs," July 31, 1991.

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APPENDIX F

REPORT BY THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

August 18, 1992

The Honorable Ivan Selin  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Chairman Selin:

SUBJECT: ELECTRIC POWER RESEARCH INSTITUTE ADVANCED LIGHT WATER  
REACTOR UTILITY REQUIREMENTS DOCUMENT -- VOLUME II,  
EVOLUTIONARY PLANTS

During the 387th and 388th meetings of the Advisory Committee on Reactor Safeguards, July 9-11 and August 6-8, 1992, we reviewed the NRC staff's Final Safety Evaluation Report (FSER) for Volume II of the Electric Power Research Institute's (EPRI) Advanced Light Water Reactor (ALWR) Utility Requirements Document (URD) for Evolutionary Plants. Our Subcommittee on Improved Light Water Reactors held meetings on June 17-18 and July 27, 1992, to review this subject. During these meetings, we had the benefit of discussions with representatives of the NRC staff and EPRI. We also had the benefit of the documents referenced.

In the early 1980s, EPRI established the ALWR program to support the United States utility industry efforts to ensure a viable nuclear power generation option for the 1990s and beyond. The objective of the program was to ensure that future nuclear power plants would be safer, simpler, more robust with greater margins, more easily operated and maintained, and more certain of being constructed and licensed without delays. This was accomplished using utility experience, by establishing design philosophy, producing design criteria and guidance to achieve the objective, and addressing the policies and regulations of the NRC.

The EPRI ALWR URD is a compendium of technical requirements for design, construction, and performance of ALWR nuclear power plants for the 1990s and beyond. The URD consists of three volumes:

- Volume I, "ALWR Policy and Summary of Top-Tier Requirements," is a management-level synopsis of the URD, including the design objectives and philosophy, the overall physical configuration and features of a future nuclear plant design, and the steps necessary to take the proposed ALWR design criteria beyond the conceptual design state to a completed, functioning power plant.

- Volume II, "ALWR Evolutionary Plant," consists of 13 chapters and contains utility design requirements for an evolutionary nuclear power plant (approximately 1350 Mwe).
- Volume III, "ALWR Passive Plant," contains utility design requirements for passive nuclear power plants (approximately 600 Mwe).

We have followed the development of the EPRI ALWR program from its inception and offered suggestions regarding safety improvements on several occasions. We also held numerous subcommittee and Committee meetings to consider and discuss the development of the EPRI URD program and the NRC staff's reviews.

The staff's review of the URD was conducted as described in NUREG-1197. As noted therein, the staff used NUREG-0800, "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plant," for review guidance. In addition, the staff's review reflects the requirements of 10 CFR 52, the Commission's policy statements on severe accidents, and the safety goals.

Although the SRP was used by the staff as guidance, the level of detail in the EPRI submittal did not permit a review of its completeness. (The SRP was written to support the review of safety analysis reports on specific plant designs for which a significant amount of design and construction information was available.) The staff conducted its review with the understanding that EPRI design criteria would meet all current regulations, except where deviations were identified. The staff's review of the URD focused primarily on determining whether the EPRI criteria did or did not conflict with current regulatory requirements.

In its review of Volume II of the URD, the staff identified a number of issues that will require additional information before the staff can reach a final conclusion. Initially, the staff divided the outstanding issues into three categories: (1) open policy issues on which the staff has proposed a position, but for which the Commission has not yet provided guidance, (2) open issues that must be satisfactorily resolved before the staff can complete its review of the URD, or (3) confirmatory issues for which the staff will ensure follow up of commitments in the URD.

At this date the staff has identified 21 open policy issues that are included in a draft Commission paper, "Issues Pertaining to Evolutionary and Passive Light Water Reactors and Their Relationship to Current Regulatory Requirements" that was issued on February 27, 1992. We provided our recommendations on the open policy issues pertaining to evolutionary plants in our letters which addressed SECY-90-016, SECY-91-078, and the draft SECY paper of February 7, 1992.



The staff has handled the remaining 410 open issues which were identified in the FSER for Volume II by classifying them as "Vendor or Utility Specific Items" which must be satisfactorily addressed during the staff's review of a vendor- or utility-specific application. The staff plans to issue a supplement to the FSER after all evolutionary policy issues have reached final resolution. The staff indicated that they plan to interact with EPRI in an attempt to resolve significant open issues which may be resolved generically, and to include in a supplement any which are resolved.

We recommend generic resolution of as many of these issues as possible.

We commend EPRI for developing a comprehensive set of requirements. These will aid in the design of nuclear plants which will be safer, simpler, more robust, and more easily operated and maintained.

We commend the NRC staff for a very thorough review of the EPRI ALWR Evolutionary URD, and its work with EPRI to identify and resolve many issues relevant to licensing future LWRs. We recognize the NRC staff's position that its review necessarily is incomplete.

Sincerely,



David A. Ward  
Chairman

References:

1. SECY-92-172, dated May 12, 1992, from James M. Taylor, Executive Director for Operations, for the Commissioners, Subject: Final Safety Evaluation Report for Volume II of the Electric Power Research Institute's Advanced Light Water Reactor Requirements Document, including the following enclosures:
  - Draft Safety Evaluation Report for Volume I, "Program Summary of the NRC Review of the Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document," prepared by the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, dated May 1992
  - Safety Evaluation Report for Volume II, "NRC Review of the Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document for Evolutionary Plant Designs," prepared by the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, dated May 1992

2. Advanced Light Water Reactor Utility Requirements Document, Volume II, "ALWR Evolutionary Plant," Chapters 1-13, through Revision 4, dated April 1992, Prepared for Electric Power Research Institute

**BIBLIOGRAPHIC DATA SHEET**

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11. ABSTRACT (200 words or less)

The staff of the U.S. Nuclear Regulatory Commission has prepared Volume 1 of a safety evaluation report (SER), "NRC Review of Electric Power Research Institute's Advanced Light Water Reactor Utility Requirements Document - Program Summary," to document the results of its review of the Electric Power Research Institute's "Advanced Light Water Reactor Utility Requirements Document." This SER provides a discussion of the overall purpose and scope of the Requirements Document, the background of the staff's review, the review approach used by the staff, and a summary of the policy and technical issues raised by the staff during its review.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

advanced light water reactor (ALWR)	policy issues
Utility Requirements Document (URD)	optimization subjects
Electric Power Research Institute (EPRI)	licensability
final design approval (FDA)	10 CFR Part 52
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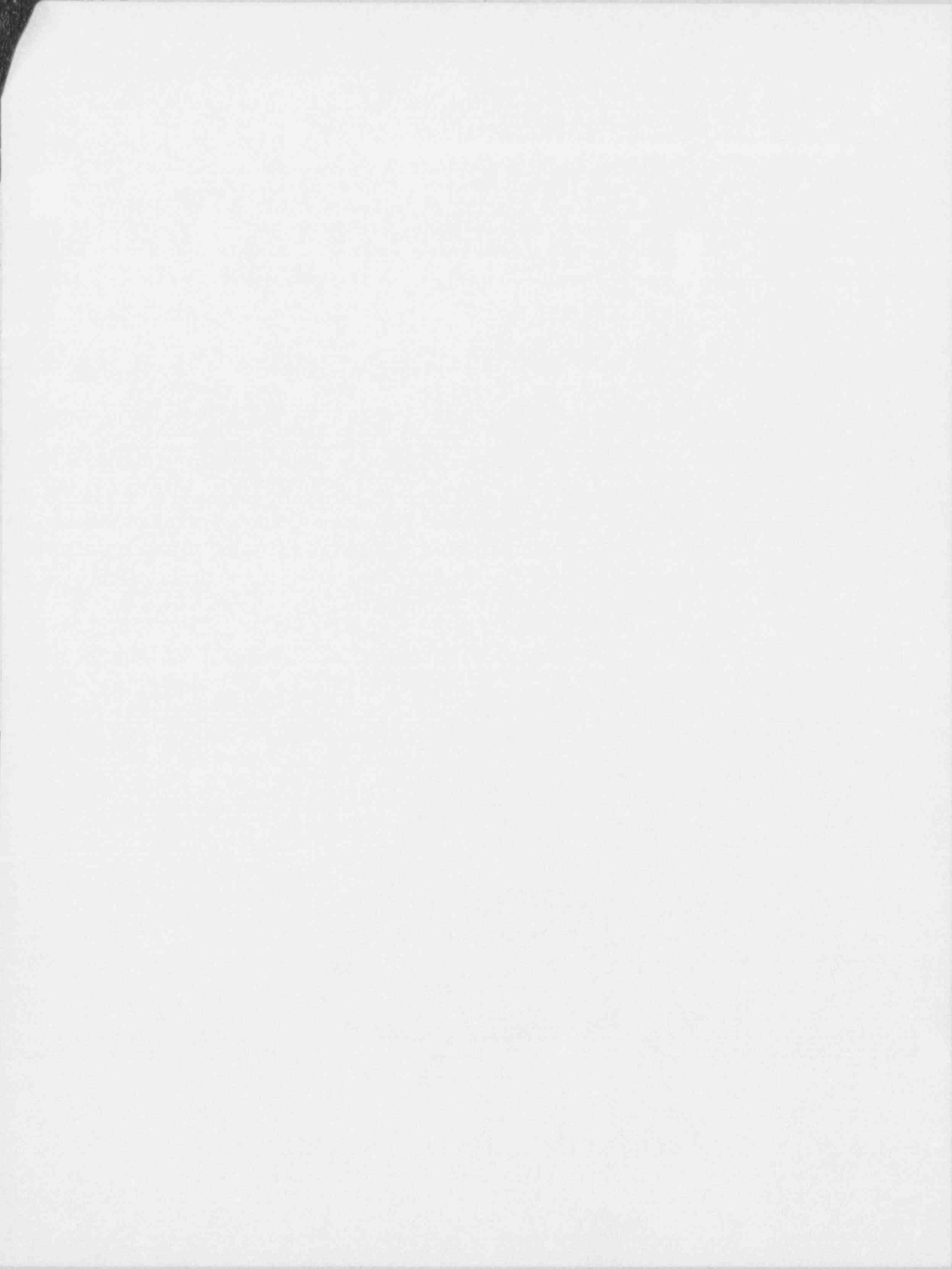
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