ATTACHMENT 1

ET-NRC-92-3784
NSRA-APSL-92-0265

AP600 CONFORMANCE ASSESSMENT

WITH THE

ADVANCED LIGHT WATER REACTOR
UTILITY REQUIREMENTS DOCUMENT, VOLUME III
REVISION 3

DECEMBER 15, 1992

INTRODUCTION

The purpose of the Advanced Light Water Reactor (ALWR) Utility Requirements Document (URD) is to present a clear, complete statement of utility desires for their next generation of nuclear plants. The Requirements Document consists of a comprehensive set of design requirements for future LWRs. One of the anticipated uses of the Requirements Document is to establish a stabilized regulatory basis for future LWRs which includes the NRC's agreement on resolution of outstanding licensing issues and severe accident issues, and which provides high assurance of licensability.

The Requirements Document is divided into three volumes. The first volume contains the policy and summary of top-tier requirements. The second volume contains the detailed technical requirements for evolutionary plants. The third volume contains the detailed technical requirements for passive plants.

The Nuclear Regulatory Commission Staff Requirements Memorandums of December 15, 1989 and March 5, 1991 request that a comparison be provided between the URD and plant designs submitted for design certification.

This report presents the results of a conformance assessment between the AP600 plant design, as described in the AP600 Standard Safety Analysis Report (SSAR), and Volume III of the ALWR URD. The assessment was performed against Revision 3 of the URD, dated May 13, 1992.

AP600 URD CONFORMANCE ASSESSMENT PROCESS

The process implemented in this conformance assessment considered each of the 8559 requirements in Volume III of the URD. The assessment was performed by the AP600 system design engineers, who were also the SSAR/PRA/ITAAC authors.

A copy of the URD was supplied to Westinghouse by the EPRI ALWR staff in a form that could be included in a computer database. Software was developed that presented each URD requirement to an assigned engineer for a conformance assessment against the AP600 design. Since the URD addresses many areas that are outside the scope of design certification, the process which was developed first selected those requirements that are subject to design certification. The AP600 plant design was then compared to these requirements. Differences identified between the AP600 design and the URD requirements were categorized by a management review team as high, medium or low based on the following criteria:

HIGH

The item is related to a part of a safety related system, defense-in-depth system, important support system or plant design process. Agreement has not been reached on either a design change or URD revision. Discussions with the EPRI ALWR staff will continue.

MEDIUM

A course of action to reach resolution is under active discussion with the EPRI ALWR staff.

LOW

The item is resolved in a planned revision to the URD. The assessment for some requirements minor in nature, was that either the requirement was not clear or the designer could not clearly confirm compliance. These items will be the subject of further discussions with the EPRI ALWR staff.

During the conformance assessment, it was obvious that the dynamic nature of the URD development process would result in an apparently large number of "low" priority nonconformances. Many of these nonconformances will be resolved with the issuance of revision 4 of Volume III of the URD. Westinghouse is engaged in continuous dialogue with the ALWR staff to resolve differences between the AP600 design and the URD.

OVERALL STATUS

The following table summarizes the number of nonconformances identified during this process:

PRIORITY	NUMBER
HIGH	5
MEDIUM	19
LOW	86

DESCRIPTION OF HIGH PRIORITY FINDINGS

Attachment A provides a summary of the assessment of those nonconformances that were catagorized as "high".

CONCLUSION

The ALWR Utility Requirements were compared to the AP600 plant design as described in the SSAR. A small number of nonconformances were identified. Each of these nonconformances is currently a subject of discussion between Westinghouse and the EPRI ALWR staff.

The Westinghouse goal is to resolve all differences between the AP600 design and Volume III of the ALWR URD by the time the AP600 FDA is issued.

Attachment A
AP600 URD Conformance Assessment

Chapter: 01 **Paragraph: 4.5.2.1.2**

URD Requirement:

Appropriate importance factors shall be selected to adjust the ANSI A58.1 design wind speed to a mean recurrence interval of 100 years. Geometrical shapes not addressed in ANSI A58.1 shall be evaluated using ASCE Paper No. 3269, - Wind Forces on structures.

Rationale: W. ıd speeds shown in ANSI A58.1 are for a 50-year recurrence interval, but provisions have been made in A58.1 to adjust to other recurrence intervals by selection of the importar.. factor. The 100-year interval has been selected based upon current LWR design. The use of ASCE Paper No. 3269 is standard practice for considering wind loading in designs.

Nonconformance Description:

Table 1.2-6 of the URD specifies an Importance Factor of 1.0 for non safety buildings ... importance Factor of 1.11 for safety buildings. This corresponds to recurrence intervals of .. and 100 years respectively. This is in...istent with the above requirement which specifies a mean recurrence interval of 100 years with no ...on between safety and non-safety buildings. The AP600 plant design meets the wind design requirements of Table 1.2-6 of the URD (e.g. 100 year recurrence interval for safety related buildings and 50 year recurrence interval for non-safety related buildings).

Plan to Reach Resolution:

This item i being discussed with the EPRI/ALWR staff.

Attachment A
AP600 URD Conformance Assessment

Chapter: 01 **Paragraph: 4.5.5.2.3**

URD Requirement:

Leak-before-break evaluations shall be applicable only to an entire piping system or analyzable portion thereof.

Rationale: When leak-before-break methods are used, all potential pipe rupture locations are examined. The examination is not limited to those postulated pipe rupture locations determined from SRP 3.6.2. This requires the entire piping system to be evaluated. Analyzable portions of a piping system are typically segments located between anchor points.

Nonconformance Description:

The Leak-before-break (LBB) criteria is not applied to the portions of systems in the break exclusion zone in the main steam tunnel. This applies to the main steam and main feedwater piping. For these systems, the LBB criteria is applied from the steam generator nozzle to the flued head inboard weld at the containment penetration.

Plan to Reach Resolution:

This item is being discussed with the EPRI/ALWR staff.

Attachment A
AP600 URD Conformance Assessment

Chapter: 01 **Paragraph: 4.6.1**

URD Requirement:

A containment event tree shall comprise the important phenomenological issues associated with containment loading and/or source term evolution.

Rationale: A containment event tree provides an excellent means to identify and quantify important phenomena. Elements which have been addressed in past large, dry containment PWR and in BWR PRAs and which should be considered for the ALWR in the development of the containment event tree include (but are not limited to): Potential for early and late hydrogen burns; Pressure and Temperature loadings on the cavity/drywell following reactor vessel failure; Containment loadings due to noncondensible gas generation and gas generation during corium-concrete interaction; Potential for direct interaction between corium and containment; Availability of containment scrubbing, pool scrubbing, and containment/pool heat removal; Standby gas treatment system operability (BWR); Fire suppression system (BWR); Containment inertability (BWR); Ability to flood and replenish the cavity/drywell region of the containment; Hydrogen generation rates and core blockage model; Adiabatic burn temperature; Debris coolability (amount of water required); Location and size of containment break; Size and timing of containment failure prior to RPV melt through; Hydrogen concentration in secondary building (BWR); Suppression pool; scrubbing; Operation of the standby gas treatment system (BWR); Revaporization and composition of Iodine (CSOH and CSI); Variation of iodine compounds; Presence of water in the reactor cavity at the time of failure of reactor vessel; Vapor suppression function; Containment isolation; Potential for in-vessel and ex-vessel steam explosions; Excessive preexisting leakage; Pressure in the reactor vessel at the time of its failure; High-pressure melt ejection.

Nonconformance Description:

Phenomenological events are not explicitly included in the AP600 containment event tree structure. Phenomena-related nodes are excluded because of the subjectivity involved in assigning probabilities for such nodes. However, the impact of important phenomenological issues on fission products release to the environment are fully addressed in the AP600 PRA. This is accomplished by performing detailed evaluations to examine the likelihood and the probable consequence from key severe accident phenomena. These evaluations are documented in the Westinghouse topical report, WCAP-13388, "AP600 Phenomenological Evaluation Summaries."

Plan to Reach Resolution:

This item is being discussed with the EPRI/ALWR staff.

Attachment A
AP600 URD Conformance Assessment

Chapter: 01 **Paragraph: 3.4.3.5.3**

URD Requirement:

The design of the main and auxiliary spray systems, including such features as the nozzles and piping, shall be such that for practical purposes the operators will not be limited in their use of the main or auxiliary spray for normal operation and moderate frequency events. That is, it shall not be necessary for the operators to maintain records and to modify their operating practices to control the cumulative usage factor as the thermal cycles occur. The Plant Designer shall perform and document analyses which specifically demonstrate that the design complies with this requirement. These analysis shall specifically define the conditions under which spray operation will be needed and the basis for the number and magnitude of the cycles which are assumed.

Rationale: The stresses that the main and auxiliary spray systems will be subjected to are dependent on: spray flow rates and pressures, temperature distributions, and piping configurations/designs. The Plant Designer is required to evaluate these factors to confirm that it is not necessary to place a limit on the number of spray cycles over the life of the plant. This will be accomplished by showing that the allowable number of thermal cycles adequately exceeds the projected number of thermal cycles. There will be no requirement to determine a cumulative usage factor as thermal cycles occur. If the plant designer's evaluation shows that the allowable number of thermal cycles is not adequate, the use of separate main and auxiliary spray nozzles may be necessary. It is not the intent of this requirement to provide for unnecessary spray cycling which does not comply with the operating procedures provided by the plant designer.

Nonconformance Description:

The EPRI URD requires no limitations on the number of auxiliary spray transients experienced by the pressurizer spray nozzle. The AP600 pressurizer spray nozzle is designed for a specified number of auxiliary spray transients.

Plan to Reach Resolution:

This item is being discussed with the EPRI/ALWR staff.

Attachment A
AP600 URD Conformance Assessment

Chapter: 05 **Paragraph: 2.2.14.2**

URD Requirement:

Check valves shall be testable to verify proper valve operation. Provisions shall be provided to leak test check valves. The specific valves required to be leak tested shall be determined by the Plant Designer. Check valve testability requirements are provided in chapter 1.

Nonconformance Description:

The AP600 meets this requirement for the check valves in the passive safety-related systems where these valves function as reactor coolant system pressure boundary valves and are leak-tested as required by the ASME Code. Some check valves in nonsafety-related systems are not designed to include test connections to conduct leak testing.

Plan to Reach Resolution:

This item is being discussed with the EPRI/ALWR staff.