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AP1000 Standard Combined License Technical Report

AP1000 As-Built COL Information Items

Revision 0

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AP1000 As-Built Col Information Items

Introduction

The AP1000 Design Control Document (DCD) (Reference 1) contains some COL Information Items that require as-built information or conditions to be completed. These items require inspections, testing, walkdowns, analysis, etc. of installed structures, systems, and components that can not be completed at the time of the COL application. These items can not be completed until after the COL is issued and construction is complete or nearly complete. This report identifies COL information items that require as-built information and provides, for each applicable item, a COL application assessment that can be used generically for any COL application referencing the AP1000 Design Certification.

Some of the items require analysis or evaluations of the as-built configuration. In most cases evaluations or analysis of as-designed configurations will be completed in support of the COL application and construction. In several cases the activities and requirements in COL information items are redundant with AP1000 ITAACs and NRC regulations.

The activities in these COL Information Items are deferred until the structures, systems or components are completed and the activity can be completed. These would become license commitments. Where a COL information items is redundant with AP1000 ITAACs or NRC regulations, deletion of the item is proposed.

The following discussion provides for each of the applicable COL items a technical justification, a regulatory impact and a suggested revision of DCD language and a COL commitment when appropriate. Changes to the DCD and deferral of COL information items are reviewed against the change criteria of VIII. B. 5. c in Appendix D to 10 CFR Part 52. Each evaluation also considers the impact on severe accident mitigation features in DCD Subsection 1.9.5. and Appendix 19B.

A mark-up of DCD Tier 2 Section 1.8 and Table 1.8-2 is provided at the end of this document to reflect the deferral and deletion of COL Information Items.

COL Information Item 3.6-1

Background

COL Information Item 3.6-1 (NRC FSER (Reference 2) Combined License Action Item 3.6.2.3-1) is associated with the evaluation of pipe break effects.

Combined License applicants referencing the AP1000 certified design will complete the final pipe whip restraint design and address as built reconciliation of the pipe break hazards analysis in accordance with the criteria outlined in subsections 3.6.1.3.2 and 3.6.2.5. The as-built pipe rupture hazard analysis will be documented in an as-built Pipe Rupture Hazards Analysis Report.

The COL Information Item requires the COL applicant to complete the final pipe whip restraint design and to address reconciliation of the pipe break hazards analysis against as-built conditions. The timing of the reconciliation of the pipe break hazard analysis is such that that the reconciliation can not be provided by an applicant for a COL. This reconciliation will be done prior to operation of the plant. The completion of the as-built pipe break hazard analysis report will be completed by the COL Holder. The

pipe whip restraint design remains an activity to be completed at or prior to COL application. The design of the pipe whip restraint will be addressed generically in a separate COL technical report.

Technical Justification

A pipe hazard analysis is part of the piping design. It is used to identify postulated break locations and layout changes, support design, whip restraint design and jet shield design. These activities are completed prior to fabrication and installation of the piping and connected components.

The as-built reconciliation of the pipe rupture hazard report includes activities that require fabrication and installation of the piping including evaluation of changes in support locations and construction deviations from the design. The as-built reconciliation of the of the pipe break hazard analysis will be completed after completion of the construction of the associated piping systems. Preparing the report after completion of the construction does not alter the methods of evaluations documented in the report including stress and fatigue analysis of the pipe.

Regulatory Impact

The FSER in Subsection 3.6.2.3 discusses the pipe break hazard analysis. The FSER includes information on what is included in the reconciliation of the pipe break hazard analysis. The information to be included in the report is not altered by clarifying the timing of the preparation of the report. The information in FSER Subsection 3.6.2.3 about the selection of postulated pipe breaks, identification of targets, application of leak-before-break criteria, and protection from pipe breaks is not altered by clarifying the timing of the pipe break hazard analysis preparation. The conclusions about postulating and evaluating pipe ruptures in FSER Subsection 3.6.2.4 are not altered by clarifying the timing of the report.

This change does not alter the design of the piping or supports. There is no change to the design function of the piping, supports, and any whip restraints or jet shields. The change does not involve a change to a procedure that adversely affects how the design functions of the systems containing the high energy piping are performed or controlled. The methodology for piping analyses and evaluation of postulated pipe ruptures is not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.6.4.1 Pipe Break Hazard Analysis

Combined License applicants referencing the AP1000 certified design will complete the ~~final~~ pipe whip restraint design. ~~and~~

The Combined License holder will address-complete as built reconciliation of the pipe break hazards analysis in accordance with the criteria outlined in subsections 3.6.1.3.2 and 3.6.2.5 prior to fuel load. The as-built pipe rupture hazard analysis will be documented in an as-built Pipe Rupture Hazards Analysis Report.

COL Information Item 3.6-3

Background

COL Information Item 3.6-3 (NRC FSER Combined License Action Item 3.6.3.1-1) is associated with the as-built evaluation of leak-before-break characteristics in piping systems.

Combined License applicants referencing the AP1000 certified design will address: 1) verification that the as-built stresses, diameter, wall thickness, material, welding process, pressure, and temperature in the piping excluded from consideration of the dynamic effects of pipe break are bounded by the leak-before-break bounding analysis; 2) a review of the Certified Material Test Reports or Certifications from the Material Manufacturer to verify that the ASME Code, Section III strength and Charpy toughness requirements are satisfied; and 3) complete the leak-before-break evaluation by comparing the results of the final piping stress analysis with the bounding analysis curves documented in Appendix 3B. The leak-before-break evaluation will be documented in a leak-before-break evaluation report.

COL Information Item 3.6-3 requires availability of actual material properties and performance of as built reconciliation of the pipe stress analysis. The timing of the reconciliation of the leak-before-break evaluation is such that that the reconciliation can not be provided by an applicant for a COL. This evaluation is done prior to operation of the plant. The COL information item requiring completion of the as-built evaluation is redundant with several ITAAC items. An as-designed evaluation of leak-before-break characteristics is identified as COL Information Item 3.6-2. Because this COL Information Item is redundant with ITAACs COL Information Item 3.6-3 may be deleted.

Technical Justification

The as-built evaluation of leak-before-break characteristics includes activities that require fabrication and installation of the piping including evaluation of changes in support locations and construction deviations. The as-built evaluation of leak-before-break characteristics will be completed after construction of the associated piping systems as required by the ITAACs. Deleting the redundant COL information item requiring completion of the as-built evaluation does not alter the methods of evaluations documented in the report including stress and fatigue analysis and preparation of floor response spectra and seismic analysis. Deleting the redundant COL information item requiring completion of the as-built evaluation does not alter the as-designed leak-before-break evaluation.

Regulatory Impact

The FSER in Subsection 3.6.3.1 discusses the evaluation of leak-before-break characteristics. It includes information on what is included in the evaluation of leak-before-break characteristics. The information to be included in the evaluation is not altered since these evaluations are required by ITAACs. The information in FSER Subsection 3.6.3.1 about the LBB evaluation including acceptance criteria, safety factors, evaluation of piping system using bounding analysis curves, limitations on leak-before-break, leakage detection capability, candidate high-energy piping, and material restrictions is not altered by deleting the redundant COL information item requiring completion of the as-built evaluation of leak-

before-break characteristics. The conclusions about the evaluation of leak-before-break characteristics in FSER Subsection 3.6.3.1 are not altered by deleting the redundant COL information.

An as-built evaluation of leak-before-break characteristics is required for the following ITAAC items in Tier 1 of the DCD: Item #6 in Table 2.1.2-4 for the reactor coolant system, Item #6 in Table 2.2.3-4 for the passive core cooling system, Item #6 in Table 2.2.4-4 for the steam generator system, and Item #6 in Table 2.3.6-4 for the normal residual heat removal system. Deleting the redundant COL information item does not alter the ITAAC requirements in Tier 1 of the DCD.

This change does not alter the design of the piping or support. There is no change to the design function of the piping, supports, or leak detection system. The change does not involve a change to a procedure that adversely affects how the design functions of the systems containing the high energy piping are performed or controlled. The design methodology for evaluation of leak-before-break characteristics is not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

Deleting the redundant COL information item does not alter barriers or alarms that control access to protected areas of the plant. Deleting the redundant COL information item does not alter requirements for security personnel. Therefore, deleting the redundant COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.6.4.3 Leak-before-Break Evaluation of as-Built Piping

~~Deleted Combined License applicants referencing the AP1000 certified design will address: 1) verification that the as-built stresses, diameter, wall thickness, material, welding process, pressure, and temperature in the piping excluded from consideration of the dynamic effects of pipe break are bounded by the leak before break bounding analysis; 2) a review of the Certified Material Test Reports or Certifications from the Material Manufacturer to verify that the ASME Code, Section III strength and Charpy toughness requirements are satisfied; and 3) complete the leak before break evaluation by comparing the results of the final piping stress analysis with the bounding analysis curves documented in Appendix 3B. The leak before break evaluation will be documented in a leak before break evaluation report.~~

COL Information Item 3.7-3

Background

COL Information Item 3.7-3 (NRC FSER Combined License Action Item 3.7.5-3) is associated with the review of seismic interaction.

The seismic interaction review will be updated by the Combined License applicant. This review is performed in parallel with the seismic margin evaluation. The review is based on as-procured data, as well as the as-constructed condition.

The COL Information Item requires the availability of as-procured data, as well as the as-constructed condition. The timing of the as-built review of seismic interaction is such that that it can not be provided by an applicant for a COL. The as-built review will be done prior to fuel load by the COL holder.

Technical Justification

The safety functions of seismic Category I structures, systems, and components are protected from interaction with nonseismic structures, systems, and components; or their interaction is evaluated. Protection against nonseismic/seismic interaction is provided by separation (with physical barriers) or segregation (by routing) of seismic Category I piping from nonseismic SSCs. An impact analysis may be performed to demonstrate that a potential nonseismic SSCs identified as an impact source would not cause unacceptable damage to the target.

The design criteria and guidelines for performing the review for seismic interactions is discussed in DCD subsection 3.7.3.13. The 3D computer model and composites developed for the piping layout are used during the design process of the systems and components in the plant, to aid in evaluating and documenting the review. An as-designed seismic interaction review is completed as part of the activities in support of the COL application. The review of the seismic interaction is consistent with the guidance and criteria included in DCD Subsection 3.7.3.13.

The deferral of the as-built seismic interaction review until as-built and as-procured information is available does not alter the piping design criteria, stress analysis acceptance criteria, requirements for pipe break hazard protection, or design function of the piping systems.

Regulatory Impact

The FSER in Subsection 3.12.3.7 discusses nonseismic/seismic interaction. The FSER includes information on how interaction is evaluated and how seismic structures, systems, and components may be protected from seismic effects of nonseismic structures, systems, and components. The FSER notes that that the COL applicant will update the seismic interaction review. Clarifying the timing of the as-built evaluation does not alter the evaluation of seismic interaction. Clarifying the timing of the as-built seismic interaction review does not alter the discussion in FSER Subsection 3.12.3.7 about the seismic interaction. Clarifying the timing of the as-built seismic interaction review does not alter the conclusions about seismic interaction in FSER Subsection 3.12.3.7.

This change does not alter the design of the piping, connected components, or supports. There is no change to the design function of the piping, connected component, and supports. The change does not involve a change to a procedure that adversely affects how the design functions of the systems included in the review are performed or controlled. The methodology for piping analyses, seismic analyses, and seismic interaction review is not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.7.5.3 Seismic Interaction Review

The seismic interaction review will be updated by the Combined License applicant holder for as-built information. This review is performed in parallel with the seismic margin evaluation. The review is based on as-procured data, as well as the as-constructed condition. The as-built seismic interaction review is not provided with the COL application but is completed prior to fuel load.

COL Information Item 3.7-4

Background

COL Information Item 3.7-4 (NRC FSER Combined License Action Item 3.7.5-1) is associated with the reconciliation of seismic analyses.

The Combined License applicant will reconcile the seismic analyses described in subsection 3.7.2 for detail design changes at rock sites such as those due to as-procured equipment information. Deviations are acceptable based on an evaluation consistent with the methods and procedure of Section 3.7 provided the amplitude of the seismic floor response spectra including the effect due to these deviations, do not exceed the design basis floor response spectra by more than 10 percent.

The reconciliation is based on design changes during procurement and construction, as well as the as-constructed deviations. The timing of the as-built reconciliation of seismic analyses is such that that it can not be provided by an applicant for a COL. The as-built review will be completed prior to fuel load.

Technical Justification

The methods used for the seismic analyses supporting the AP1000 design are described in DCD Section 3.7.2. The parameters and design response spectra used in the seismic analyses are also described in Section 3.7.1. This information is used to develop the spectra at floor and support locations that are required for the seismic evaluation of systems and components.

The response spectra at the floor and supports may be impacted by changes in the mass and center of gravity of components and the location and configuration of piping and equipment supports. These spectra may also be affected by changes in internal structures including the thickness and location of walls and floors.

A reconciliation of the seismic analyses is required as part of the COL licensing process. Most of the changes that may impact the seismic analyses will be identified as part of the detailed design activity in support of the COL application. Changes due to procurement of the components and as-built deviations are expected to have a minor effect on the results of the seismic analyses. The 3D computer model and composites developed for the plant layout and analysis are used during the final design and evaluation process for the systems and components in the plant, to aid in evaluating and documenting the reconciliation.

The reconciliation of seismic analyses does not alter the piping design criteria, stress analysis acceptance criteria, requirements for pipe break hazard protection, or design function of the piping systems.

Regulatory Impact

The FSER in Subsection 3.7.2 discusses seismic system analysis. This discussion considers seismic analysis methods, natural frequencies, response loads, development of floor response and spectra combination of modal responses. The seismic analysis and the reconciliation of seismic analyses are not altered by clarifying the timing of the reconciliation. The discussion in FSER Subsection 3.7.2 about the seismic analysis is not altered by clarifying the timing of the reconciliation of seismic analyses. The conclusions about seismic system analysis in FSER Subsection 3.7.2 are not altered by clarifying the timing of the reconciliation of seismic analyses.

This change does not alter the design of the piping, connected components, or supports. There is no change to the design function of the piping, connected component, and supports. The change does not involve a change to a procedure that adversely affects how the design functions of the systems and components are performed or controlled. The methodologies for piping analyses and seismic analyses are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.7.5.4 Reconciliation of Seismic Analyses of Nuclear Island Structures

The Combined License applicant-holder will reconcile the seismic analyses described in subsection 3.7.2 for detail design changes at rock sites such as those due to as-procured or as-built changes in component mass, center of gravity, and support configuration based on as-procured equipment information. Deviations are acceptable based on an evaluation consistent with the methods and procedure of Section 3.7 provided the amplitude of the seismic floor response spectra including the effect due to these deviations, do not exceed the design basis floor response spectra by more than 10 percent. The Combined License holder will complete this reconciliation prior to fuel load.

COL Information Item 3.8-2

Background

COL Information Item 3.8-2 (NRC FSER Combined License Action Item 3.8.6-1) is associated with the examination of the passive containment cooling water storage tank.

The Combined License applicant will examine the structures supporting the passive containment cooling storage tank on the shield building roof during initial tank filling as described in subsection 3.8.4.7.

The examination requires completion of the containment shield building, installation of the tank liner and the supporting systems used to fill and drain the tank. The timing of the examination of the passive containment cooling water storage tank is such that that the examination can not be provided by an applicant for a COL. The completion of the examination is required by ITAAC item 10 of Tier 1 Table 3.3-6. Because this COL Information Item is redundant with an ITAAC the COL Information Item may be deleted.

Technical Justification

The passive containment cooling water storage tank is an integral part of the containment shield building. The examination of the passive containment cooling water storage tank requires that it be filled with water and includes activities that require construction of the containment shield building and fabrication and installation of piping. The examination of the passive containment cooling water storage tank will be completed after construction of the containment shield building and associated piping systems. Completing the examination after completion of the construction does not alter the design of the passive containment cooling water storage tank or associated systems or how they are operated.

Regulatory Impact

The FSER in Subsection 3.8.4 discusses the design of the containment shield building and the passive containment cooling water storage tank. It includes information on loading conditions and analysis requirements. Deleting the COL information item for the examination of the passive containment cooling water storage tank that is redundant with an ITAAC does not alter this information. Deleting the COL information item does not alter the conclusions about design and loading conditions of the passive containment cooling water storage tank in FSER Subsection 3.8.4.7.

The requirement to examine the passive containment cooling water storage tank is redundant with ITAAC Item 10 of Tier 1 Table 3.3-6. Eliminating the redundant COL information item does not alter the ITAAC requirement.

This change does not alter the design of the passive containment cooling water storage tank or associated piping. There is no change to the design function of the passive containment cooling water storage tank. The change does not involve a change to a procedure that adversely affects how the design functions of the passive containment cooling water storage tank are performed or controlled. The methodology for analysis and evaluation of the passive containment cooling water storage tank is not altered. This change does not alter a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design of the passive containment cooling storage tank or how water is delivered from the passive containment cooling storage tank. Delivery of water from the passive containment cooling storage tank to the containment shell is a design feature associated with mitigation of severe accidents. This change does not require a license amendment based on the criteria of VIII. B. 5. c. of Appendix D to 10 CFR Part 52.

The deletion of the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deletion of the COL information item does not alter requirements for security personnel. Therefore, deletion of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.8.6.2 Passive Containment Cooling System Water Storage Tank Examination

~~The Combined License applicant will examine the structures supporting the passive containment cooling storage tank on the shield building roof during initial tank filling as described in subsection 3.8.4.7.~~

COL Information Item 3.8-3

Background

COL Information Item 3.8-3 (NRC FSER Combined License Action Item 3.8.6-2) is associated with an as-built summary report of internal containment structures, other Category I structures (including the shield building and auxiliary building), and the nuclear island basemat.

The Combined License applicant will evaluate deviations from the design due to as-procured or as-built conditions and will summarize the results of the evaluation in an as-built summary report as described in subsections 3.8.3.5.7, 3.8.4.5.3 and 3.8.5.4.2.

The evaluation of deviations requires completion of the identified structures. The timing of the examination of this as-built summary report is such that that it can not be provided by an applicant for a COL. The completion of an as-built summary report is required for nuclear island structures by ITAAC Item 2.a) i) of Tier 1 Table 3.3-6. Because this COL Information Item is redundant with an ITAAC the COL Information Item may be deleted.

Technical Justification

The preparation of the as-built summary report of other Category I structures requires that construction of the shield building, auxiliary building, and the nuclear island basemat be complete. The preparation of the as-built summary report will be completed after the construction of these structures. Completing the as-built summary report after the construction of these structures does not alter the design or analysis of the shield building, auxiliary building, and the nuclear island basemat.

Regulatory Impact

The FSER in Subsection 3.8.4 discusses the design of other seismic Category I structures including the shield building, auxiliary building, and the nuclear island basemat. This discussion includes information on loading conditions and analysis requirements. This information is not altered by clarifying the timing of the preparation of the as-built summary report. The conclusions about other seismic Category I structures in FSER Subsection 3.8.4.7 are not altered by clarifying the timing of the as-built summary report.

The requirement to prepare an as-built summary report is redundant with ITAAC Item 2.a) i) of Tier 1 Table 3.3-6. Eliminating the redundant COL information item does not alter the ITAAC requirement.

This change does not alter the design of the shield building, auxiliary building, and the nuclear island basemat. There is no change to the design function of the other seismic Category I structures. The change does not involve a change to a procedure that adversely affects how the design functions of the other seismic Category I structures are performed or controlled. The methodology for analysis and evaluation of the other seismic Category I structures is not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not affect resolution of a severe accident issue and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

Deleting the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deletion of the COL information item does not alter requirements for security personnel. Therefore, the deletion of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.8.6.3 As-Built Summary Report

~~The Combined License applicant will evaluate deviations from the design due to as-procured or as-built conditions and will summarize the results of the evaluation in an as-built summary report as described in subsections 3.8.3.5.7, 3.8.4.5.3 and 3.8.5.4.2~~

COL Information Item 3.8-4

Background

COL Information Item 3.8-4 (NRC FSER Combined License Action Item 3.8.6-3) is associated with the inservice inspection of the containment.

The Combined License applicant will perform in-service inspection of the containment according to the ASME Code Section XI, Subsection IWE, as described in subsection 3.8.2.7.

In-service inspection requires completion of the containment. Inservice inspection is not performed until after the containment is constructed and operation commences. The timing of the inservice inspection of the containment is such that that it can not be provided by an applicant for a COL. Inservice inspection is required by NRC Regulations including 10CFR 50.55a. Because this COL Information Item is redundant with NRC Regulations the COL Information Item may be deleted.

Technical Justification

The containment and appurtenances such as containment penetrations and entrance hatches provide a barrier to the postulated accidental release of radiation. The design and construction of the containment satisfies the criteria of the ASME boiler and pressure Vessel Code, Section III. The inservice inspection of the containment requires that construction of the containment be complete. Section XI of the ASME Code establishes requirements for inservice inspection of the containment. The inservice inspection of the containment is not required until after containment is constructed and operation of the plant has

begun. Completing the inservice inspection after completion of the construction does not alter the design of the containment or appurtenances or how they are operated.

Regulatory Impact

The FSER in Subsection 3.8.2 discusses the design of the containment. The FSER includes information on loading conditions and analysis requirements. This information is not altered by deleting a COL information item requirement for inservice inspection of the containment that is redundant with NRC Regulations. The conclusions about the design of the containment in FSER Subsection 3.8.2.8 are not altered by deleting the COL information item. Inservice inspection of the containment is required by NRC regulations including 10 CFR 50.55a.

Inservice inspection of the containment pressure vessel is required by NRC regulations. The deletion of this COL information item does not alter the NRC regulation requiring inservice inspection of the containment.

This change does not alter the design of the containment or associated appurtenances. There is no change to the design function of the containment. The change does not involve a change to a procedure that adversely affects how the design functions of the containment are performed or controlled. The methodology for analysis and evaluation of the containment is not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

Deleting the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deletion of the COL information item does not alter requirements for security personnel. Therefore, the deletion of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.8.6.4 In-Service Inspection of Containment Vessel

~~Deleted. The Combined License applicant will perform in-service inspection of the containment according to the ASME Code Section XI, Subsection IWE, as described in subsection 3.8.2.7.~~

COL Information Item 3.9-2

Background

A portion of COL Information Item 3.9-2 (NRC FSER Combined License Action Item 3.9.2.4-1) is associated with the reconciliation of the as-built ASME Code, Section III Class 1, 2, and 3 piping systems.

Combined License applicants referencing the AP1000 design will have available for NRC audit the design specifications and design reports prepared for ASME Section III

components. Combined License applicants will address consistency of the reactor vessel core support materials relative to known issues of irradiation-assisted stress corrosion cracking or void swelling (see subsection 4.5.2.1). [*The design report for the ASME Class 1, 2, and 3 piping will include the reconciliation of the as-built piping as outlined in subsection 3.9.3. This reconciliation includes verification of the thermal cycling and stratification loadings considered in the stress analysis discussed in subsection 3.9.3.1.2.*]*

The reconciliation of the as-built piping systems requires final fabrication and installation of the piping systems and connected components. The timing of the reconciliation of the as-built piping systems is such that it can not be provided by an applicant for a COL. This evaluation will be done prior to operation of the plant. The completion of the as-built reconciliation is required by several ITAAC items.

Technical Justification

The requirements for ASME Code, Section III Class 1, 2, and 3 piping systems include a certified design report that includes reconciliation of the as-built conditions and fabrication and installation deviations. The as-built reconciliation of the piping systems includes activities that require fabrication and installation of the piping including evaluation of changes in support locations and construction deviations. The configuration of the piping system must be verified against the design configuration or the deviation evaluated. The reconciliation of the as-built piping systems will be completed after completion of the construction of the associated piping systems. Completing as-built reconciliation of the piping systems after completion of the construction does not alter the design of the piping systems. Completing as-built reconciliation of the piping systems after completion of the construction does not alter the methods of evaluations documented in the report. Evaluations to be addressed in the as-built reconciliation are defined in DCD Tier2, Subsection 3.9.3.

Regulatory Impact

The FSER in Subsection 3.8.1 discusses the design transient and computer programs used in the piping and component stress analyses. The FSER in Subsection 3.9.3 discusses the piping analysis including loading combinations, fatigue evaluation, and stress limits. DCD Tier 2, Subsection 3.9.3 includes information on what is included in the as-built reconciliation of the piping systems. The information to be included is not altered by clarifying the timing of the preparation of the as-built reconciliation of the piping systems. The selection of load combinations and stress limits is not altered by clarifying the timing of the as-built reconciliation of the piping systems.

The COL item requirement for a design report of the piping, including reconciliation of as-built conditions, is redundant with ITAAC items that require ASME Code Section III design reports for the as-built piping. These include Item 2.b in Table 2.1.2-4 for the reactor coolant system; Item 2.b in Table 2.2.1-3 for the containment system; Item 2.b in Table 2.2.2-3 for the passive containment cooling system; Item 2.b in Table 2.2.3-4 for the passive core cooling system; Item 2.b in Table 2.2.4-4 for the steam generator system; Item 2.b in Table 2.2.5-5 for the main control room emergency habitability system, Item 2.b in Table 2.3.2-4 for the chemical and volume control system; Item 2.b in Table 2.3.6-4 for the normal residual heat removal system; Item 2.b in Table 2.3.7-4 for the spent fuel pool cooling system, Item 2.b in Table 2.3.10-4 for the liquid radwaste system, and Item 2.b in Table 2.7.1-4 for the nuclear island nonradioactive ventilation system. Clarifying the timing of the as-built reconciliation of the piping systems does not alter these ITAACs.

This change does not alter the design of the piping systems, supports, or components. There is no change to the design function of the piping, supports, and component. The change does not involve a change to a procedure that adversely affects how the design functions of the systems and components are performed or controlled. The methodology for piping analyses and evaluation of connected component is not

altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

3.9.8.2 Design Specifications and Reports

Combined License applicants referencing the AP1000 design will have available for NRC audit the design specifications and design reports prepared for ASME Section III components. Combined License applicants will address consistency of the reactor vessel core support materials relative to known issues of irradiation-assisted stress corrosion cracking or void swelling (see subsection 4.5.2.1). *[The design report for the ASME Class 1, 2, and 3 piping will include the reconciliation of the as-built piping as outlined in subsection 3.9.3. This reconciliation includes verification of the thermal cycling and stratification loadings considered in the stress analysis discussed in subsection 3.9.3.1.2.]**

The final design reports including the reconciliation of the as-built piping are completed by the COL holder after the construction of the piping systems and prior to fuel load.

COL Information Item 5.3-1

Background

COL Information Item 5.3-1(NRC FSER Combined License Action Item 5.2.2.2-1) is associated with the preparation of plant specific pressure-temperature limit curves.

The pressure-temp. curves shown in Figures 5.3-2 and 5.3-3 are generic curves for AP1000 reactor vessel design, and they are the limiting curves based on copper and nickel material composition. However, for a specific AP1000, these curves will be plotted based on material composition of copper and nickel. Use of plant-specific curves will be addressed by the Combined License applicant during procurement of the reactor vessel. As noted in the bases to Technical Specification 3.4.14, use of plant-specific curves requires evaluation of the LTOP system. This includes evaluating the setpoint pressure for the RNS relief valve.

Pressure-temperature limit curves are used to place limits on reactor vessel pressure and temperature combinations during heat-up and cool-down. These limits are established to minimize the potential for brittle fracture of the reactor vessel. Elements that exist as contaminants in the reactor vessel base material and welds may be acted on by the neutrons exiting the reactor core and result in material properties that are less resistant to brittle fracture. The AP1000 reactor vessel design and material requirements have been established to minimize this effect. The AP1000 DCD includes generic pressure-

temperature limit curves based on these design and material requirements. These curves must be verified using actual material properties from the materials used to fabricate each reactor vessel.

Technical Justification

Heatup and cooldown pressure-temperature limit curves are required as a means of protecting the reactor vessel during startup and shut down to minimize the possibility of fast fracture. Beltline material properties degrade with radiation exposure, and this degradation is measured in terms of the adjusted reference nil ductility temperature, which includes a reference nil ductility temperature shift (ΔRT_{NDT}), initial RT_{NDT} and margin. The extent of the RT_{NDT} shift is enhanced by certain chemical elements (such as copper and nickel). In the event of activation of the passive core cooling system, large volumes of relatively cool water may flood into and cool the reactor vessel to temperatures at which the potential for brittle fracture may need to be addressed.

Predicted ΔRT_{NDT} values are derived considering the effect of fluence and copper and nickel content for the reactor vessel steels exposed to 550°F temperature. U.S. NRC Regulatory Guide 1.99 is used in calculating adjusted reference temperature. The heatup and cooldown curves are developed considering a sufficient magnitude of radiation embrittlement so that no unirradiated ferritic materials in other components of the reactor coolant system will be limiting in the analysis.

The pressure-temperature curves are developed considering a radiation embrittlement of up to 54 effective full power years (EFPY) consistent with the plant design objective of 60 years with 90 percent availability. The copper and nickel content amount and initial RT_{NDT} for materials in the reactor vessel beltline region and the reactor vessel flange and the closure head flange region are included in the evaluation to establish these curves. These values are not known until the reactor vessel is fabricated.

Regulatory Impact

The FSER in Subsection 5.3.2 discusses the design and material requirements. The FSER in Subsection 5.3.2 discusses the use and development of the pressure temperature curves. This information is not altered by clarifying the timing of the preparation of the plant specific pressure temperature curves. The conclusions in FSER Subsection 5.3.3.3 about the pressure-temperature limits are not altered by clarifying the timing of the development of the plant specific curves.

This change does not alter the design of the reactor vessel and connected piping system. There is no change to the design function of the reactor vessel, reactor coolant system or passive core cooling system. The change does not involve a change to a procedure that adversely affects how the design functions of the reactor vessel and connected systems are performed or controlled. The methodologies for stress analysis of the reactor vessel analyses and evaluation of pressure temperature limits are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter the response of the reactor pressure vessel to postulated severe accidents and does not impact other design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

5.3.6.1 Pressure-Temperature Limit Curves

The pressure-temp. curves shown in Figures 5.3-2 and 5.3-3 are generic curves for AP1000 reactor vessel design, and they are the limiting curves based on copper and nickel material composition. However, for a specific AP1000, these curves will be plotted based on material composition of copper and nickel. Use of plant-specific curves will be addressed by the Combined License applicant holder during procurement and fabrication of the reactor vessel. As noted in the bases to Technical Specification 3.4.14, use of plant-specific curves requires evaluation of the LTOP system. This includes an evaluating-evaluation of the setpoint pressure for the RNS relief valve by the Combined License holder to determine if the setpoint pressure needs to be changed based on the plant specific pressure-temperature curves. The development of plant specific curves and evaluation of the setpoint pressure is required prior to fuel load.

COL Information Item 5.3-4

Background

COL Information Item 5.3-4 (NRC FSER Combined License Action Item 5.3.4.3-1) is associated with the determination of plant specific reactor vessel belt line material properties.

The Combined License applicant will address verification of plant-specific belt line material properties consistent with the requirements in subsection 5.3.3.1 and Tables 5.3-1 and 5.3-3. The verification will include a pressurized thermal shock evaluation based on as-procured reactor vessel material data and the projected neutron fluences for the plant design objective of 60 years. This evaluation report will be submitted for NRC staff review.

The verification will include structural analysis of the AP1000 reactor vessel insulation and support structure.

Verification of plant-specific belt line material requires final fabrication of the reactor vessel. The alloying and contaminant elements in the ferritic materials of the reactor vessel beltline are restricted to reduce sensitivity to irradiation embrittlement in service. The as-fabricated reactor vessel beltline material properties must be determined to verify that the material requirements are satisfied and to provide information for a plant specific thermal shock evaluation. The timing of the verification of plant-specific belt line material properties is such that that the verification can not be provided by an applicant for a COL.

Technical Justification

The response of the reactor vessel to the introduction of cold water while at pressure (pressurized thermal shock) is dependent in part on material properties of the steel used to fabricate the vessel. The pressurized thermal shock evaluation considers the measured material properties for the material used to fabricate the vessel and the projected effect on the material properties on this material. The properties included in the evaluation include the reference nil ductility temperature (ΔRT_{NDT}). The reactor vessel is designed and analyzed for response to pressurized thermal shock using design minimum specified

material properties. The evaluation required in COL Information Item 5.3-4 requires material properties from testing of material used in the fabrication of the vessel.

Beltline material properties degrade with radiation exposure, and this degradation is measured in terms of the adjusted reference nil ductility temperature, which includes a reference nil ductility temperature shift (ΔRT_{NDT}), initial RT_{NDT} and margin. The extent of the RT_{NDT} shift is enhanced by certain chemical elements (such as copper and nickel). Ferritic reactor vessel materials must comply with the fracture toughness requirements of Section 50.55a and Appendices G and H of 10 CFR 50. The ferritic materials of the reactor vessel beltline are restricted to the maximum limits. Copper, nickel, and phosphorus content is restricted to reduce sensitivity to irradiation embrittlement in service.

The COL holder must verify that the materials used to fabricate the reactor vessel satisfy the limits on the reactor vessel materials. The plant specific thermal shock evaluation is based on as-fabricated material parameters. The as-fabricated values of the material properties are used in plant specific calculation of irradiation embrittlement estimates.

Regulatory Impact

The FSER in Subsection 5.3.2 discusses the design and material requirements. The FSER in Subsection 5.3.4 discusses the evaluation of pressurized thermal shock. This information is not altered by clarifying the timing of the verification of plant specific reactor vessel beltline material properties. The conclusions in FSER Subsection 5.3.4.3 about the pressure-temperature limits are not altered by clarifying the timing of the verification of plant specific reactor vessel beltline material properties.

This change does not alter the design of the reactor vessel and connected piping system. There is no change to the design function of the reactor vessel, reactor coolant system or passive core cooling system. The change does not involve a change to a procedure that adversely affects how the design functions of the reactor vessel and connected systems are performed or controlled. The methodologies for stress analysis of the reactor vessel analyses and evaluation of pressure temperature limits are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

5.3.6.4 Reactor Vessel Materials Properties Verification

The Combined License ~~applicant-holder~~ will ~~address-complete prior to fuel load~~ verification of plant-specific belt line material properties consistent with the requirements in subsection 5.3.3.1 and Tables 5.3-1 and 5.3-3. The verification will include a pressurized thermal shock evaluation based on as-procured reactor vessel material data and the projected neutron fluences for the plant design objective of 60 years. This evaluation report will be submitted for NRC staff review.

COL Information Item 10.2-1

Background

COL Information Item 10.2-1 (NRC FSER Combined License Action Item 10.5-2) is associated with the turbine rotor integrity.

The Combined License holder will submit to the staff for review and approval within 3 years of obtaining a Combined License, and then implement a turbine maintenance and inspection program. The program will be consistent with the maintenance and inspection program plan activities and inspection intervals identified in subsection 10.2.3.6. The Combined License holder will have available plant-specific turbine rotor test data and calculated toughness curves that support the material property assumptions in the turbine rotor analysis.

Plant-specific turbine rotor test data and calculated toughness curves require availability of material properties from the fabrication of the turbine rotor. As-fabricated turbine rotor materials properties are determined from actual material samples and can not be provided by an applicant for a COL.

The turbine maintenance and inspection program includes turbine valve inspection and testing frequency. The information on the valve reliability may be used to reduce the frequency of valve testing and inspection. Because the turbine maintenance and inspection program inspection and testing intervals should be based on operating experience data from valves and other components that are as similar as possible to the AP1000 specific turbine valve reliability data it can not be provided by an applicant for a COL.

Technical Justification

The probability of a missile generated by a turbine failure is minimized by requirements on the number and size of defects and fracture toughness of the turbine rotor and by turbine features that minimize the potential for a turbine overspeed. The assumptions used for defects and material properties for the turbine rotor need to be validated by the results of material property tests from the actual rotor. This requires as-built data for the turbine rotor and can not be provided at the time of the COL application.

The design features that minimize the potential for a turbine overspeed include stop valves that rapidly close in the event of a turbine overspeed. The reliability of these valves closing when required is included in the calculation of the probability of a destructive turbine overspeed. These valves are subject to periodic testing and disassembly and inspection to maintain a high reliability. The probability of a failure of a valve to close is related to the frequency of the testing and inspection. In 10.2.3 of the DCD, a maintenance and inspection program plan is outlined including the frequencies of valve in-service testing, turbine inspection and turbine valve inspection. A turbine maintenance and inspection program that is consistent with the frequencies in Subsection 10.2.3 does not need further approval from the NRC. The testing and inspection frequency in DCD Subsection 10.2.3 are supported by evaluations that are based on operating and inspection program experience in operating nuclear power plants.

Ongoing collection of information on valve testing and inspection results are expected to support longer intervals for in-service valve testing and inspections requiring dismantlement. This is identified in DCD Subsection 10.2.3.6. To support a maintenance and inspection plan with longer testing or inspection intervals than found in Subsection 10.2.3.6, industry inspection experience with turbine valves and other turbine components must be included in the submittal to the NRC. This collection of additional information is not required to support the frequency of testing outlined in DCD Subsection 10.2.3

Regulatory Impact

The FSER in Subsection 10.2.8 discusses the turbine rotor integrity. This discussion includes information about turbine rotor material properties and reliability of turbine overspeed protection. This information is not altered by clarifying the timing of the preparation of a turbine maintenance and inspection program or by clarifying the timing of collecting the turbine rotor inspection or material information. FSER Subsection 10.2.8 also indorses the testing or inspection intervals found in DCD Subsection 10.2.3.6. The conclusions in FSER 10.2.9 about the design of the turbine, materials used for the turbine rotor, and protection from turbine missiles are not altered by clarifying the timing of the development of a turbine maintenance and inspection program or collecting the turbine rotor inspection or material information.

This change does not alter the design of the turbine, turbine valves, and connected piping systems. There is no change to the design function of the turbine, turbine valves, or connected piping systems. The change does not involve a change to a procedure that adversely affects how the design functions of the turbine, turbine valves, and connected piping systems are performed or controlled. This change does not alter the requirement for NRC review and approval of an increase in the interval of testing and inspection. The methodologies associated with reliability of turbine valves and probability of a turbine rotor failure are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

10.2.6 Combined License Information on Turbine Maintenance and Inspection

The Combined License holder will submit to the NRC staff for review ~~and approval~~prior to fuel load within 3 years of obtaining a Combined License, and then implement a turbine maintenance and inspection program. The program will be consistent with the maintenance and inspection program plan activities and inspection intervals identified in subsection 10.2.3.6.

The Combined License holder will have available plant-specific turbine rotor test data and calculated toughness curves that support the material property assumptions in the turbine rotor analysis prior to fuel load after the fabrication of the turbine.

COL Information Item 13.6-2

Background

COL Information Item 13.6-2 (NRC FSER Combined License Action Item 13.6.13.1-1) is associated with vital equipment.

Combined License applicants referencing the AP1000 certified design will verify that the as-built location of vital equipment is inside the vital areas identified in Reference 6.

This information item requires that vital equipment be fabricated and installed in the vital area. As-built location of vital equipment can not be verified at the submittal of a COL application.

Technical Justification

The AP1000 is protected from radiological sabotage in part by locating vital equipment in the vital area and protecting the vital area. The vital areas and a listing of the vital equipment are provided in the AP1000 Security Assessment.

Regulatory Impact

The FSER in Subsection 13.6.5 discusses the vital equipment and vital area. This discussion includes information about physical barriers and control of access into the vital area. This information is not altered by clarifying the timing of the verification of the location of the vital equipment. The conclusions in FSER Subsection 13.6.15 about the effect of the design features on onsite physical protection system and security organization are not altered by clarifying the timing of the verification of the location of the vital equipment.

This change does not alter the design of the physical protection or the equipment in the vital area. There is no change to the design function of the vital equipment of the walls doors and other features that provide protection of vital equipment. The change does not involve a change to a procedure that adversely affects how the design functions of the vital equipment are performed or controlled. The methodologies associated with protection of vital equipment and security are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

13.6.13.2 Vital Equipment

The Combined License ~~applicants-holder referencing the AP1000-certified design~~ will verify that the as-built location of vital equipment is inside the vital areas identified in Reference 6 ~~after the installation of the vital equipment prior to fuel load.~~

COL Information Item 14.4-6

Background

COL Information Item 14.4-6 (NRC FSER Combined License Action Item 14.4-6) is associated with test that must be conducted on the first plant or on the first three plants.

*[The COL applicant or holder for the first plant and the first three plants will perform the tests listed in subsection 14.2.5. For subsequent plants, the COL applicant or licensee shall either perform the tests listed in subsection 14.2.5, or shall provide a justification that the results of the first-plant-only tests or first-three-plant tests are applicable to the subsequent plant.]**

The subject tests require installation of the components and systems to be tested. Because this testing requires installed equipment the report on testing can not be provided by an applicant for a COL.

Technical Justification

Tests to verify performance of the AP1000 design features are performed for either the first or first three plants. These tests are listed in Section 14.2.5 of the AP1000 DCD. These tests verify the performance of the AP1000 design and do not change the design parameters or operation of the AP1000.

Regulatory Impact

The FSER in Subsection 14.3 discusses the verification testing. The FSER in Section 14.4 identifies testing to be completed by the combined license holder. This information is not altered by clarifying the timing of the testing.

Some of these activities related to reactor vessel internals are in conformance with guidance in Regulatory Guide 1.20. These testing activities do not alter conformance with the regulatory guide.

This change does not alter the design of the components and systems to be tested. There is no change to the design function of the components or systems. The change does not involve a change to a procedure that adversely affects how the design functions of the tested components and systems are performed or controlled. The methodologies associated with the design, analyses, and testing of these components and systems are not altered. This change does not alter the requirements for a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

14.4.6 First-Plant-Only and Three-Plant-Only Tests

*[The COL applicant or holder for the first plant and the first three plants will perform the tests listed in subsection 14.2.5. For subsequent plants, the COL applicant or licensee shall either perform the tests listed in subsection 14.2.5, or shall provide a justification that the results of the first-plant-only tests or first-three-plant tests are applicable to the subsequent plant.]**

The Combined License holder will perform the tests or provide the information defined above prior to fuel load.

COL Information Item 19.59.10-1

Background

COL Information Item 19.59.10-1 (NRC FSER Combined License Action Item 19A.2-1 and 19A.2-2) is associated with as-built SSC HCLPF comparison to seismic margin evaluation

The Combined License applicant referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated to determine if there is a significant adverse effect on the seismic margins analysis results. Spatial interactions are addressed by COL information item 3.7-3. Details of the process will be developed by the Combined License applicant.

The Combined License applicant referencing the AP1000 certified design should compare the as-built SSC HCLPFs to those assumed in the AP1000 seismic margin evaluation. Deviations from the HCLPF values or assumptions in the seismic margin evaluation should be evaluated to determine if vulnerabilities have been introduced. The requirements to which the equipment is to be purchased are included in the equipment specifications. Specifically, the equipment specifications include:

1. Specific minimum seismic requirements consistent with those used to define the Table 19.55-1 HCLPF values.
This includes the known frequency range used to define the HCLPF by comparing the required response spectrum (RRS) and test response spectrum (TRS). The range of frequency response that is required for the equipment with its structural support is defined.
2. Hardware enhancements that were determined in previous test programs and/or analysis programs will be implemented.

The review requires completion of fabrication, installation, and construction of structures, systems, and components. The timing of the as-built review of the seismic margin evaluation is such that that the review can not be completed by an applicant for a COL.

Technical Justification

Chapter 55 of the AP1000 Probabilistic Risk Assessment (PRA, Reference 3) discusses the seismic margin evaluation. The write-up includes discussion of assumptions, methodology, results, and insights. The results include high confidence, low probability of failure (HCLPF) values for structures, systems and components in the AP1000. An evaluation of the as-built differences from the certified design is

required to determine if any assumptions, methodology, results, and insights in the seismic margin evaluation are impacted by the differences.

Regulatory Impact

The FSER in Subsection 19A discusses the seismic margin analysis. The conclusions in FSER Section 19A.5 about the seismic margin analysis is not altered by clarifying the timing of the testing.

This change does not alter the design of the components and systems considered in the seismic margins analysis. There is no change to the design function of the components or systems. The change does not involve a change to a procedure that adversely affects how the design functions of components and systems are performed or controlled. The methodologies associated with the seismic margins evaluation are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

Revise the first and second paragraphs of 19.59.10.5 as follows:

The Combined License applicant-holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated to determine if there is a significant adverse effect on the seismic margins analysis results. Spatial interactions are addressed by COL Information Item 3.7-3. Details of the process will be developed by the Combined License applicant.

The Combined License applicant-holder referencing the AP1000 certified design should compare the as-built SSC HCLPFs to those assumed in the AP1000 seismic margin evaluation prior to fuel load. Deviations from the HCLPF values or assumptions in the seismic margin evaluation due to the as-built configuration and final analysis should be evaluated to determine if vulnerabilities have been introduced. The requirements to which the equipment is to be purchased are included in the equipment specifications. Specifically, the equipment specifications include:

1. Specific minimum seismic requirements consistent with those used to define the Table 19.55-1 HCLPF values.

This includes the known frequency range used to define the HCLPF by comparing the required response spectrum (RRS) and test response spectrum (TRS). The range of frequency response that is required for the equipment with its structural support is defined.

2. Hardware enhancements that were determined in previous test programs and/or analysis programs will be implemented.

COL Information Item 19.59.10-2

Background

COL Information Item 19.59.10-2 is associated with evaluation of as-built plant versus design in AP1000 PRA and site-specific PRA external events

The Combined License applicant referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 PRA and Table 19.59-18. If the effects of the differences are shown, by a screening analysis, to potentially result in a significant increase in core damage frequency or large release frequency, the PRA will be updated to reflect these differences. Based on site-specific information, the COL should also reevaluate the qualitative screening of external events (PRA Section 58.1). If any site-specific susceptibilities are found, the PRA should be updated to include the applicable external event.

The review of as-built differences requires completion of fabrication, installation, and construction of structures, systems, and components. The timing of the evaluation of as-built plant differences is such that that the as-built review can not be provided by an applicant for a COL.

Technical Justification

The AP1000 PRA is based on the AP1000 design defined in the DCD. Significant changes to the design during detailed design and construction could alter the results and assumptions in the PRA. An evaluation of the as-built differences from the certified design is required to determine if any assumptions, methodology, results, and insights in the PRA are impacted by the differences.

Clarifying the timing of the evaluation of as-built plant differences does not alter the requirements for evaluation of as-built differences.

The last two sentences of the COL information item require review of site-specific information for impact on the PRA. This site-specific review is expected to be completed at the time of the COL application.

Regulatory Impact

The FSER in Chapter 19 discusses the evaluation of the AP1000 PRA. The evaluation of the PRA including assumptions, methodology, results, and insights is not altered by clarifying the timing of the evaluation of as-built plant differences.

This change does not alter the design of the components and systems to be tested. There is no change to the design function of the components or systems. The change does not involve a change to a procedure that adversely affects how the design functions of the tested components and systems are performed or controlled. The methodologies associated with the design and analyses of these components and systems are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

Revise the third paragraph of 19.59.10.5 as follows:

The Combined License ~~applicant-holder~~ referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 PRA and Table 19.59-18 ~~prior to fuel load~~. If the effects of the differences are shown, by a screening analysis, to potentially result in a significant increase in core damage frequency or large release frequency, the PRA will be updated to reflect these differences.

Based on site-specific information, the COL ~~applicant~~ should also reevaluate the qualitative screening of external events (PRA Section 58.1). If any site-specific susceptibilities are found, the PRA should be updated to include the applicable external event.

COL Information Item 19.59.10-3

Background

COL Information Item 19.59.10-3 (NRC FSER Combined License Action Item 19.1.5.2.1-1, 19.1.5.3-1, and 19.1.8.1-1) is associated with Internal Fire and Internal Flood Analyses

The Combined License applicant referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis. Differences will be evaluated to determine if there is significant adverse effect on the internal fire and internal flood analysis results.

The review of as-built differences requires completion of fabrication, installation, and construction of structures, pipe routing, door locations, and flood barriers cable routing, as well as final door and equipment locations, and fire detection and suppression system locations. The timing of the evaluation of as-built plant differences on the internal fire and internal flood analysis is such that that the review can not be completed by an applicant for a COL.

Technical Justification

Chapter 56 of the AP1000 PRA discusses the internal flooding analysis. The write-up includes discussion of assumptions, methodology, results, and insights of the internal flooding analysis. The as-built assessment verifies that the as-procured and installed equipment including pipe routing, door locations, and flood barriers is consistent with the assessment that is the basis of the PRA.

Chapter 57 of the AP1000 PRA discusses the fire risk assessment. The write-up includes discussion of assumptions, methodology, results, and insights of the fire risk assessment. The as-built assessment verifies that the as-procured and installed equipment including cable routing, door, equipment, fire

detection, and suppression system locations is consistent with the assessment that is the basis of the PRA. The as-built assessment also verifies that the as-built condition has been searched for internal fire vulnerabilities.

Regulatory Impact

The FSER in Subsection 19.1.5.2 discusses the internal fire risk analysis. The FSER in Subsection 19.1.5.3 discusses the internal flooding risk analysis. Clarifying the timing of the as-built evaluation of the fire and flood analysis does not alter the information and conclusions in these subsections.

This change does not alter the design of the components and systems evaluated in the PRA analysis of fire and flood. There is no change to the design function of the components or systems. The change does not involve a change to a procedure that adversely affects how the design functions of the evaluated components and systems are performed or controlled. The methodologies associated with the PRA evaluation of these components and systems are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact design features associated with mitigation of severe accidents and does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

Revise the fourth paragraph of 19.59.10.5 as follows:

The Combined License ~~applicant-holder~~ referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis ~~prior to fuel load~~. Differences will be evaluated to determine if there is significant adverse effect on the internal fire and internal flood analysis results.

COL Information Item 19.59.10-5

Background

COL Information Item 19.59.10-5 (NRC FSER Combined License Action Item 19.2.3.3.7.3-1) is associated with Equipment Survivability

The Combined License applicant referencing the AP1000 certified design will perform a thermal lag assessment of the as-built equipment required to mitigate severe accidents (hydrogen igniters and containment penetrations) to provide additional assurance that this equipment can perform its severe accident functions during environmental conditions resulting from hydrogen burns associated with severe accidents. This assessment is required only for equipment used for severe accident mitigation that has not been tested at severe accident conditions. The Combined License

applicant will assess the ability of the as-built equipment to perform during severe accident hydrogen burns using the Environment Enveloping method or the Test Based Thermal Analysis method discussed in EPRI NP-4354 (Reference 19.59-2).

The as-built thermal lag assessment requires procurement and installation of components evaluated for equipment survivability. The timing of the evaluation of as-built plant differences on equipment survivability is such that that evaluation can not be provided by an applicant for a COL.

Technical Justification

Equipment in the AP1000 that is relied on to mitigate severe accidents is evaluated for environmental conditions associated with the severe accidents. These environmental conditions include the effects of a hydrogen burn. PRA Appendix D discusses the evaluation of equipment survivability. Included in the evaluation is an assessment of the response of the equipment to the temperatures associated with a hydrogen burn. Of particular interest is the effect on hydrogen igniters and electrical penetrations. The as-built assessment verifies that the as-procured and installed equipment is consistent with the assessment that is the basis of the PRA. Clarifying the timing of the thermal assessment does not alter the requirements for evaluation of equipment survivability.

Regulatory Impact

The FSER in Subsection 19.2.3.3.7 discusses equipment survivability of equipment used to mitigate severe accidents. Accident scenarios and the equipment used to mitigate the accidents are identified. The FSER in Subsection 19.2.3.3.7.3 provides conclusions about equipment survivability that are based in part on an as-built thermal response assessment of equipment used to mitigate severe accidents. The thermal response assessment includes the effects of a hydrogen burn. The information on equipment survivability and conclusions in FSER Subsection 19.2.3.3.7 are not altered by clarifying the timing of the assessment.

This change does not alter the design of the components and systems used to mitigate severe accidents and considered in the thermal lag assessment. There is no change to the design function of components or systems. The change does not involve a change to a procedure that adversely affects how the design functions of the components and systems are performed or controlled. The methodologies associated with evaluation of equipment survivability and the thermal lag assessment of these components and systems are not altered. This change does not involve a test or experiment. The DCD change does not require a license amendment per the criteria of VIII. B. 5. b. of Appendix D to 10 CFR Part 52.

The DCD change does not impact the design of features associated with mitigation of severe accidents. The methodology and requirements for the thermal lag assessment are not altered by clarifying the timing of the assessment. The subject change does not require a license amendment based on the criteria of VIII. B. 5. c of Appendix D to 10 CFR Part 52.

The deferral of the activities in the COL information item does not alter barriers or alarms that control access to protected areas of the plant. The deferral of the activities in the COL information item does not alter requirements for security personnel. Therefore, the deferral of the COL information item activities does not have an adverse impact on the security assessment of the AP1000.

DCD Mark-up

The following DCD markup identifies how COL application FSARs should be prepared to incorporate the subject change.

Revise the sixth paragraph of 19.59.10.5 as follows:

The Combined License ~~applicant-holder~~ referencing the AP1000 certified design will perform a thermal lag assessment of the as-built equipment required to mitigate severe accidents (hydrogen igniters and containment penetrations) to provide additional assurance that this equipment can perform its severe accident functions during environmental conditions resulting from hydrogen burns associated with severe accidents. This assessment is performed prior to fuel load and is required only for equipment used for severe accident mitigation that has not been tested at severe accident conditions. The Combined License applicant will assess the ability of the as-built equipment to perform during severe accident hydrogen burns using the Environment Enveloping method or the Test Based Thermal Analysis method discussed in EPRI NP-4354 (Reference 19.59-2).

REFERENCES

1. APP-GW-GL-700, AP1000 Design Control Document, Revision 15
2. NUREG-1793, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design, September 2004.
3. APP-GW-GL-022, AP1000 Probabilistic Risk Assessment, Revision 8

DCD Mark-up

Revise the final paragraph of Section 1.8 as follows:

Combined License Information

Combined License applicants referencing the AP1000 certified design will be required to provide site-specific information, verification that interface criteria are satisfied, information related to operating procedures, and other information required to support the AP1000 Design Certification. The description of information to be provided by the Combined License applicant is found in the DCD sections applicable to the specific information. Table 1.8-2 is a listing of the Combined License information items and the DCD location of the description of the information. In some cases the activity required by a COL information item requires as-built information or other conditions that are not available when the COL application is submitted. These items are noted in the applicable DCD sections and Table 1.8-2. These activities are completed prior to fuel load.

Revise Sheets 2 through 7 of Table 1.8-2 as follows:

Table 1.8-2 (Sheet 2 of 7)

**SUMMARY OF AP1000 STANDARD PLANT
COMBINED LICENSE INFORMATION ITEMS**

Item No.	Subject	Subsection
2.5-13	Subsurface Instrumentation	2.5.4.5.10
2.5-14	Stability of Slopes	2.5.5
2.5-15	Embankments and Dams	2.5.6
3.3-1	Wind and Tornado Site Interface Criteria	3.3.3
3.4-1	Site-Specific Flooding Hazards Protective Measures	3.4.3
3.5-1	External Missile Protection Requirements	3.5.4
3.6-1	Pipe Break Hazards Analysis <u>(Post App.)*</u>	3.6.4.1
3.6-2	Leak-Before-Break Evaluation of as-Designed Piping	3.6.4.2
3.6.3	Deleted Leak-Before-Break Evaluation of as-Built Piping	3.6.4.3 Deleted
3.6-4	Primary System Inspection Program for Leak-Before-Break Piping	3.6.4.4
3.7-1	Seismic Analysis of Dams	3.7.5.1
3.7-2	Post-Earthquake Procedures	3.7.5.2
3.7-3	Seismic Interaction Review <u>(Post App.)*</u>	3.7.5.3
3.7-4	Reconciliation of Seismic Analyses of Nuclear Island Structures <u>(Post App.)*</u>	3.7.5.4
3.7-5	Location of Free-Field Acceleration Sensor	3.7.5.5
3.8-1	Containment Vessel Design Adjacent to Large Penetrations	3.8.6.1
3.8-2	Deleted Passive Containment Cooling System Water Storage Tank Examination	3.8.6.2 Deleted
3.8-3	Deleted As-Built Summary Report	3.8.6.3 Deleted
3.8.4	Deleted In-Service Inspection of Containment Vessel	3.8.6.4 Deleted
3.9-1	Reactor Internal Vibration Response	3.9.8.1
3.9-2	Design Specification and Reports <u>(Post App.)*</u>	3.9.8.2
3.9-3	Snubber Operability Testing	3.9.8.3
3.9-4	Valve Inservice Testing	3.9.8.4
3.9-5	Surge Line Thermal Monitoring	3.9.8.5
3.9-6	Piping Benchmark Program	3.9.8.6
3.10-1	Experience-Based Qualification	3.10.6
3.11-1	Equipment Qualification File	3.11.5

*Activities identified as Post App. are provided by the COL holder prior to fuel load.

Table 1.8-2 (Sheet 3 of 7)

**SUMMARY OF AP1000 STANDARD PLANT
COMBINED LICENSE INFORMATION ITEMS**

Item No.	Subject	Subsection
4.2-1	Changes to Reference Reactor Design	4.2.5
4.3-1	Changes to Reference Reactor Design	4.3.4
4.4-1	Changes to Reference Reactor Design	4.4.7
4.4-2	Confirm Assumptions for Safety Analyses DNBR Limits	4.4.7
5.2-1	ASME Code and Addenda	5.2.6.1
5.2-2	Plant Specific Inspection Program	5.2.6.2
5.3-1	Reactor Vessel Pressure – Temperature Limit Curves <u>(Post App.)*</u>	5.3.6.1
5.3-2	Reactor Vessel Materials Surveillance Program	5.3.6.2
5.3-3	Surveillance Capsule Lead Factor and Azimuthal Location Confirmation	5.3.6.3
5.3-4	Reactor Vessel Materials Properties Verification <u>(Post App.)*</u>	5.3.6.4
5.3-5	Reactor Vessel Insulation	5.3.6.5
5.4-1	Steam Generator Tube Integrity	5.4.15
6.1-1	Procedure Review for Austenitic Stainless Steels	6.1.3.1
6.1-2	Coating Program	6.1.3.2
6.2-1	Containment Leak Rate Testing	6.2.6
6.3-1	Containment Cleanliness Program	6.3.8.1
6.3-2	Verification of Containment Resident Particulate Debris Characteristics	6.3.8.2
6.4-1	Local Toxic Gas Services and Monitoring	6.4.7
6.4-2	Procedures for Training for Control Room Habitability	6.4.7
6.4-3	Main Control Room Inleakage Test Frequency	6.4.7
6.6-1	Inspection Programs	6.6.9.1
6.6-2	Construction Activities	6.6.9.2
7.1-1	Setpoint Calculations for Protective Functions	7.1.6
7.1-2	Resolution of Generic Open Items and Plant-Specific Action Items	7.1.6
7.2-1	FMEA for Protection System	7.2.3
8.2-1	Offsite Electrical Power	8.2.5
8.2-2	Technical Interfaces	8.2.5

*Activities identified as Post App. are provided by the COL holder prior to fuel load.

Table 1.8-2 (Sheet 4 of 7)

**SUMMARY OF AP1000 STANDARD PLANT
COMBINED LICENSE INFORMATION ITEMS**

Item No.	Subject	Subsection
8.3-1	Grounding and Lightning Protection	8.3.3
8.3-2	Onsite Electrical Power Plant Procedures	8.3.3
9.1-1	New Fuel Rack	9.1.6
9.1-2	Criticality Analysis for New Fuel Rack	9.1.6
9.1-3	Spent Fuel Racks	9.1.6
9.1-4	Criticality Analysis for Spent Fuel Racks	9.1.6
9.1-5	Inservice Inspection Program of Cranes	9.1.6
9.1-6	Radiation Monitor	9.1.6
9.3-1	Air Systems (NUREG-0933 Issue 43)	9.3.7
9.4-1	Ventilation Systems Operations	9.4.12
9.5-1	Qualification Requirements for Fire Protection Program	9.5.1.8
9.5-2	Fire Protection Analysis Information	9.5.1.8
9.5-3	Regulatory Conformance	9.5.1.8
9.5-4	NFPA Exceptions	9.5.1.8
9.5-5	Operator Actions Minimizing Spurious ADS Actuation	9.5.1.8
9.5-6	Verification of Field Installed Fire Barriers	9.5.1.8
9.5-7	Fire Resistance Test Data	9.5.1.8
9.5-8	Establishment of Procedures to Minimize Risk for Fire Areas Breached During Maintenance	9.5.1.8
9.5-9	Offsite Interfaces	9.5.2.5.1
9.5-10	Emergency Offsite Communications	9.5.2.5.2
9.5-11	Security Communications	9.5.2.5.3
9.5-12	Cathodic Protection	9.5.4.7
9.5-13	Fuel Degradation Protection	9.5.4.7
10.1-1	Erosion-Corrosion Monitoring	10.1.3
10.2-1	Turbine Maintenance and Inspection <u>(Post App.)*</u>	10.2.6
10.4-1	Circulating Water Supply	10.4.12.1
10.4-2	Condensate, Feedwater and Auxiliary Steam System Chemistry Control	10.4.12.2

*Activities identified as Post App. are provided by the COL holder prior to fuel load.

Table 1.8-2 (Sheet 5 of 7)

**SUMMARY OF AP1000 STANDARD PLANT
COMBINED LICENSE INFORMATION ITEMS**

Item No.	Subject	Subsection
10.4-3	Potable Water	10.4.12.3
11.2-1	Liquid Radwaste Processing by Mobile Equipment	11.2.5.1
11.2-2	Cost Benefit Analysis of Population Doses	11.2.5.2
11.2-3	Identification of Ion Exchange and Adsorbent Media	11.2.5.3
11.2-4	Dilution and Control of Boric Acid Discharge	11.2.5.4
11.3-1	Cost Benefit Analysis of Population Doses	11.3.5.1
11.3-2	Identification of Adsorbent Media	11.3.5.2
11.4-1	Solid Waste Management System Process Control Program	11.4.6
11.5-1	Plant Offsite Dose Calculation Manual (ODCM)	11.5.7
11.5-2	Effluent Monitoring and Sampling	11.5.7
11.5-3	10 CFR 50, Appendix I	11.5.7
12.1-1	ALARA and Operational Policies	12.1.3
12.2-1	Additional Contained Radiation Sources	12.2.3
12.3-1	Administrative Controls for Radiological Protection	12.3.5
12.3-2	Criteria and Methods for Radiological Protection	12.3.5
12.5-1	Radiological Protection Organization and Procedures	12.5.5
13.1-1	Organizational Structure of Combined License Applicant	13.1.1
13.2-1	Training Program for Plant Personnel	13.2.1
13.3-1	Emergency Planning and Communications	13.3.1
13.3-2	Activation of Emergency Operations Facility	13.3.1
13.4-1	Operational Review	13.4.1
13.5-1	Plant Procedures	13.5.1
13.6-1	Security Plans, Organization and Testing	13.6.13.1
13.6-2	Vital Equipment Verification <u>(Post App.)*</u>	13.6.13.2
13.6-3	Site-Specific Security System	13.6.13.3
13.6-4	Nuclear Material Control Requirements	13.6.13.4
14.4-1	Organization and Staffing	14.4.1
14.4-2	Test Specifics and Procedures	14.4.2

*Activities identified as Post App. are provided by the COL holder prior to fuel load.

Table 1.8-2 (Sheet 6 of 7)

**SUMMARY OF AP1000 STANDARD PLANT
COMBINED LICENSE INFORMATION ITEMS**

Item No.	Subject	Subsection
14.4-3	Conduct of Test Program	14.4.3
14.4-4	Review and Evaluation of Test Results	14.4.4
14.4-5	Testing Interface Requirements	14.4.5
14.4-6	First-Plant-Only and Three-Plant-Only Tests <u>(Post App.)*</u>	14.4.6
15.7-1	Consequences of Tank Failure	15.7.6
16.1-1	Technical Specification Preliminary Information	16.1
16.3-1	Procedure to Control Operability of Investment Protection Systems, Structures and Components	16.3.2
17.5-1	Quality Assurance Design Phase	17.5
17.5-2	Quality Assurance for Procurement, Fabrication, Installation, Construction and Testing	17.5
17.5-3	Design Reliability Assurance Program/Site Specific List of Systems, Structures and Components	17.5
17.5-4	Quality Assurance Program for Operations	17.5
17.5-5	Maintaining Reliability of Risk-Significant SSCs	17.5
17.5-6	Maintenance Activities Relevant to Maintenance Rule	17.5
17.5-7	Operational Reliability Assurance Activities	17.5
17.5-8	Operational Reliability Assurance Program Integration with Quality Assurance Program	17.5
18.2-1	Execution of the NRC Approved Human Factors Engineering Program	18.2.6
18.2-2	Design of the Emergency Operations Facility	18.2.6
18.5-1	Task Analysis	18.5.4
18.5-2	Main Control Room	18.5.4
18.6-1	Plant Staffing	18.6.1
18.7-1	Execution and Documentation of the Human Reliability Analysis/Human Factors Engineering Integration	18.7.1
18.8-1	Execution and Documentation of the Human System Interface Design Implementation Plan	18.8.5
18.9-1	Procedure Development	18.9.1
18.10-1	Training Program Development	18.10.1

*Activities identified as Post App. are provided by the COL holder prior to fuel load.

Table 1.8-2 (Sheet 7 of 7)

**SUMMARY OF AP1000 STANDARD PLANT
COMBINED LICENSE INFORMATION ITEMS**

Item No.	Subject	Subsection
18.11-1	Verification and Validation of AP1000 Human Factors Engineering Program	18.11.1
18.14-1	Human Performance Monitoring	18.14
19.59.10-1	As-Built SSC HCLPF Comparison to Seismic Margin Evaluation <u>(Post App.)*</u>	19.59.10.5
19.59.10-2	Evaluation of As-Built Plant Versus Design in AP1000 PRA and Site-Specific PRA External Events <u>(Post App.)*</u>	19.59.10.5
19.59.10-3	Internal Fire and Internal Flood Analyses <u>(Post App.)*</u>	19.59.10.5
19.59.10-4	Develop and Implement Severe Accident Management Guidance	19.59.10.5
19.59.10-5	Equipment Survivability <u>(Post App.)*</u>	19.59.10.5
	Bulletins and Generic Letters (WCAP-15800, Revision 3, July 2004)	1.9.5.5
	Unresolved Safety Issues and Generic Safety Issues	Table 1.9-2

*Activities identified as Post App. are provided by the COL holder prior to fuel load.