RULEMAKING ISSUE
AFFIRMATION

October 18, 2011 SECY-11-0145

FOR: The Commissioners

FROM: R. W. Borchardt
Executive Director for Operations

SUBJECT: FINAL RULE: AP1000 DESIGN CERTIFICATION AMENDMENT

PURPOSE:

To obtain the Commission's approval to publish in the *Federal Register* the enclosed final rule that amends Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, Appendix D, "Design Certification Rule for the AP1000 Design."

SUMMARY:

Westinghouse Electric Company, LLC (Westinghouse) requested changes to the AP1000 certified design, which the U.S. Nuclear Regulatory Commission (NRC or Commission) approved in the AP1000 design certification rule (DCR), 10 CFR Part 52, Appendix D. Westinghouse is seeking to replace combined license (COL) information items and design acceptance criteria with specific design information, address compliance with 10 CFR 50.150 "Aircraft impact assessment" (AIA rule), and incorporate design improvements and correction of errors resulting from detailed design efforts.

The NRC staff reviewed the requested changes in Revision 19 of the design control document (DCD) and documented its safety review in the final safety evaluation report (FSER) related to certification of the AP1000 standard design on August 5, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML112061231). The NRC staff believes that the AP1000 DCR, as amended, will continue to meet all applicable requirements in 10 CFR 52.54, "Issuance of standard design certification," and meets the requirements of the AIA rule. Therefore, the staff seeks Commission approval to publish in the *Federal Register* (FR) a final rule amending the AP1000 DCR.

CONTACT: Serita Sanders, NRO/DNRL
301-415-2956

BACKGROUND:

The AP1000 standard design was initially certified in Appendix D to 10 CFR Part 52, on January 27, 2006 (71 FR 4464). The currently approved AP1000 standard design is described in Revision 15 to the DCD (ADAMS Accession No. ML053460400), which is incorporated by reference in Appendix D.

Westinghouse submitted Revision 16 to the DCD in its application to amend the AP1000 design certification on May 26, 2007 (ADAMS Accession No. ML071580939 (public version)). This application was supplemented by letters dated October 26 (ADAMS Accession No. ML073120415), November 2 (ADAMS Accession No. ML073090471), and December 12, 2007 (ADAMS Accession No. ML073460428), and January 11 (ADAMS Accession No. ML080150513) and January 14, 2008 (ADAMS Accession No. ML080220389). On January 18, 2008, the NRC notified Westinghouse that it accepted the May 26, 2007, application, as supplemented, for docketing (Docket No. 52-006) (73 FR 4926; January 28, 2008) (ADAMS Accession No. ML073600743). On September 22, 2008, Westinghouse submitted Revision 17 to the AP1000 DCD (ADAMS Accession Nos. ML083220482 and ML083230868).

On December 1, 2010, Westinghouse submitted Revision 18 of the DCD (ADAMS Accession Nos. ML103480059 and ML103480572). Revision 18 includes all the DCD changes resulting from staff review of Revision 17, as well as additional design changes submitted during 2010, which have also been reviewed by the staff and documented in the advanced final safety evaluation report (AFSER) (ADAMS Accession No. ML103260072).

The staff completed its review of the AP1000 standard design amendment request and issued the publicly available AFSER related to certification of the AP1000 standard design Revision 18, on December 28, 2010 (ADAMS Accession No. ML103260072).

On June 13, 2011, Westinghouse submitted Revision 19 of the DCD. Revision 19 incorporated editorial (correction of typographic, grammatical, and cross-referencing errors) and conforming changes and some technical corrections (discussed below) (ADAMS Accession Nos. ML11171A315 and ML11171A500).

As of October 2011, the standard design application has been referenced in the following COL applications:

COL Name	Docket Date	Docketing FR Citation
Vogtle 3 and 4	May 30, 2008	73 FR 33118
Bellefonte 3 and 4	January 18, 2008	73 FR 4923
Levy County 1 and 2	October 6, 2008	73 FR 60726
Shearon Harris 2 and 3	April 17, 2008	73 FR 21995
Turkey Point 6 and 7	September 4, 2009	74 FR 51621
Virgil C. Summer 2 and 3	August 1, 2008	73 FR 45793
William States Lee III 1 and 2	February 25, 2008	73 FR 11156

DISCUSSION:

Scope and NRC Review of Westinghouse AP1000 Amendment Application

In the proposed rule published in the *Federal Register* on February 24, 2011 (76 FR 10269), the NRC proposed to certify Revision 18 of the AP1000 DCD in Appendix D to 10 CFR Part 52, and used the AFSER as its technical basis. As discussed in the proposed rule, the AFSER contained confirmatory items, such as commitments in letter responses that the staff needed to verify were appropriately reflected in Revision 18. As a result of its review of Revision 18, the staff identified several areas where the DCD wording should be revised for clarity, to resolve internal inconsistencies, or to provide updated versions of referenced technical reports. Thus, the NRC's review of the confirmatory items in Revision 18 resulted in a need for DCD Revision 19.

In addition, two matters arising from the staff's interactions with the Advisory Committee on Reactor Safeguards (ACRS) are included in DCD Revision 19. These are containment internal cleanliness limits on latent debris, and correction of an error which the ACRS previously identified from Revision 15 concerning the steady-state film coverage in the containment cooling analysis. Finally, in the course of reviewing Revision 18, the NRC identified three matters that required corrections to be included in Revision 19: a load combination for the shield building, the method used to evaluate tank sloshing, and containment peak pressure analysis.

As a result of these activities, Westinghouse submitted Revision 19 of the DCD on June 13, 2011; Revision 19 is the version of the DCD that would be certified. The NRC's bases for accepting Revision 19 are set forth in Supplement 2 to the FSER, NUREG-1793. The staff has determined, in its review of Revision 19, that three matters should be identified as Tier 2* matters in Section VIII of the final rule. The staff has evaluated the changes from DCD Revision 18 both individually and considered together, and has concluded that an additional opportunity for the public to provide comments on Revision 19 of the DCD and the three new Tier 2* designations in Section VIII is not necessary. The bases for the staff's conclusion are set forth in Enclosure 4.

Aircraft Impact Assessment Rule Inspection

The staff has performed additional inspection of AIA information concerning the shield building, as documented in an October 3, 2011, follow-up inspection report (ADAMS Accession No. ML112650748) to the initial inspection report issued on October 28, 2010 (ADAMS Accession No. ML102980583). No findings were identified that required changes to the staff FSER related to aircraft impact compliance, the DCD information, or the rule language.

Public Comments

On February 24, 2011 (76 FR 10269), the NRC published in the *Federal Register* a proposed DCR for the AP1000 standard plant design amendment. The *Federal Register* notice provided the public an opportunity to comment on the proposed amended DCR, the DCD (Revision 18), and the draft environmental assessment (EA). The public comment period for the proposed rule closed on May 10, 2011 (ADAMS Accession No. ML103000394).

On September 9, 2011, the Commission issued a *Memorandum and Order*, CLI-11-05, on a series of petitions (ADAMS Accession No. ML11252B074) seeking suspension of adjudicatory, licensing, and rulemaking activities, including the AP1000 design certification amendment rulemaking (ADAMS Accession No. ML112521039). Among other things, the Commission denied the requests to suspend or postpone the AP1000 rulemaking, and referred the petitions and associated filings to the NRC staff "for consideration" as comments on the AP1000 design certification rulemaking amendment. *Id*. at 38. In accordance with the Commission's direction, these filings are treated as comments in the AP1000 rulemaking in a manner consistent with other comment submissions filed in the AP1000 rulemaking.

The NRC received more than 13,500 similar comment submissions; 66 unique comment submissions including one (1) allegation, which was subsequently treated as a comment submission; one (1) congressional correspondence, which the NRC decided to treat as a comment submission; and four (4) "petitions" to suspend or terminate this rulemaking pending consideration of Fukushima implications on the proposed rule. This tabulation includes those documents that the Commission referred to the NRC staff for treatment as AP1000 amendment rulemaking comments, as set forth in CLI-11-05. A comment submission means a communication or document submitted to the NRC by an individual or entity, with one or more distinct comments addressing a subject or an issue. A comment, on the other hand, refers to statements made in the submission addressing a subject or issue.

Several comment submissions expressed support for the proposed amendment to the AP1000, while other comment submissions opposed the proposed amendment unconditionally. The vast majority of comment submissions opposed the rulemaking until the NRC undertook additional procedural actions, performed additional technical review of the design, or made substantive changes to the design. The NRC identified over 200 comments in these submissions. Due to the large number of comments received and the length of the NRC responses, the enclosed *Federal Register* notice provides a summary of the categories of these comments with a general description of the resolution of these comments. The NRC staff placed similar comments and responses under common categories within the *Federal Register* notice and a brief description was provided for each category. The detailed comments and response document is available under ADAMS Accession No. ML112212319. None of the public comments resulted in changes to the final rule, the DCD (the FSER), or the AP1000 Environmental Assessment (EA).

Access to Safeguards Information (SGI) and Sensitive Unclassified Non-Safeguards Information (SUNSI)

Consistent with the draft final rule for amending the advanced boiling water reactor design certification (ADAMS Accession No. ML111040636), the staff is including in this rule Paragraph E of Section VI, "Issue Resolution," which describes the procedure that an interested member of the public must follow to obtain access to SGI and SUNSI for the AP1000 design to request and participate in proceedings that involve licenses and applications that reference the AP1000 design.

Rulemaking Procedure

The review of the standard design certification amendment is being conducted under the applicable requirements of Subpart B of 10 CFR Part 52, "Standard Design Certifications," and

10 CFR Parts 2 and 51, “Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders” and “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.” The rulemaking package includes the *Federal Register* notice of issuance of the final rulemaking (Enclosure 1), AP1000 EA (Enclosure 2), the Comment Response Document (Enclosure 3), and the staff’s explanation why DCD changes after Revision 18 do not require renoticing (AP1000 DCD Changes Since Revision 18, Enclosure 4).

On March 7, 2011, Dianne Curran, on behalf of the Union of Concerned Scientists (UCS) requested for herself and Dr. Edward Lyman, access to certain SGI and SUNSI information on the AP1000 (ADAMS Accession No. ML110680075). On April 5, 2011, the NRC denied the UCS request (ADAMS Accession No. ML110880203). The UCS did not file an appeal of this denial under the procedure described in the statements of consideration for the proposed rule (76 FR 10269; February 24, 2011).

Near-Term Task Force (NTTF) Evaluation of Fukushima-Daiichi Nuclear Power Plant Event

The proposed changes to the AP1000 certified design and the NRC’s review of those changes were nearly completed before the events at Fukushima. The Commission created an NTTF to conduct an analysis of the lessons that can be learned from the event. The NTTF issued a report (ADAMS Accession No. ML111861807) evaluating currently available technical and operational information from the events, and presented a set of recommendations to the Commission. The NTTF supports completing the AP1000 design certification rulemaking activity without delay (see pages 71-72 of the report).

In an August 19, 2011, Staff Requirements Memoranda (SRM) (ADAMS Accession No. ML112310021), the Commission set forth actions related to the NTTF report together with a schedule for the conduct of those actions. Two of those actions have been completed and are documented in the following reports: “Recommended Actions to Be Taken Without Delay from the Near-Term Task Force Report,” September 9, 2011 (SECY-11-0124) (ADAMS Accession No. ML11245A127) and “Prioritization of Recommended Actions to be Taken In Response to Fukushima Lessons Learned,” October 3, 2011 (SECY-11-0137) (ADAMS Accession No. ML11269A204). Neither the SRM nor the reports cited above set forth specific direction to the staff concerning the NTTF recommendation on the AP1000, or the regulatory approach to be taken on the AP1000 amendment rulemaking in light of the NTTF recommendations. Therefore, the staff is providing its views on those subjects in this Commission paper.

Inasmuch as the NTTF recommendations relevant to the AP1000 design certification are limited to: seismic and flooding protection (Recommendation 2); mitigation of prolonged station blackout (Recommendation 4); and enhanced instrumentation and makeup capability for spent fuel pools (Recommendation 7) and the task force concluded that by the nature of its passive design and inherent 72-hour coping capability, AP1000 designs have many of the design features and attributes necessary to address the Task Force recommendations, the staff concludes that no changes to the AP1000 DCR are required at this time. In addition, because the 10 CFR 52.63(a)(1) criteria for imposing any additional Commission-approved NTTF recommendations do not vary depending on whether the Commission-directed changes are made as part of this AP1000 DCR amendment or in a separate rulemaking, the staff sees no safety or regulatory benefit in the Commission delaying its approval of the AP1000 DCR amendment.

Therefore, the staff believes that the Commission may proceed with the issuance of the AP1000 DCR amendment and does not need to wait until the Commission has acted on the NTTF recommendations.

RESOURCES:

The Office of New Reactors (NRO) budgeted 0.6 full-time equivalent (FTE) in FY 2011 and requested 0.1 FTE in its FY 2012 budget to support this rulemaking. Resources for other offices in FY 2012, if necessary, will be requested through the planning, budget, and performance management process.

RECOMMENDATIONS:

That the Commission:

1. Approve the amendment to 10 CFR Part 52 for publication in the *Federal Register*.

2. Certify that this rule, if promulgated, will not have a negative economic impact on a substantial number of small entities in order to satisfy requirements of the Regulatory Flexibility Act (5 U.S.C. 605(b)).

3. Determine that:

   a. Compliance with the issue finality provision of 10 CFR 52.63 with respect to changes necessary to comply with the AIA rule were addressed in the AIA rulemaking, when the Commission "administratively exempted" the AIA rule from the issue finality provisions in 10 CFR Part 52; and

   b. The Westinghouse-initiated changes to the AP1000 design meet the issue finality provisions of 10 CFR 52.63.

4. Note:

   a. The staff has performed an environmental assessment that resulted in a finding of no significant impact and evaluated severe accident mitigation design alternatives for the proposed amendment (Enclosure 2).

   b. This rule contains AIA information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). The information collection requirements must be submitted to the Office of Management and Budget (OMB) for its review and approval before publication of the final rule in the *Federal Register*.

   c. The staff will inform the Chief Counsel for Advocacy of the Small Business Administration of the certification regarding the economic impact on small entities and the reasons for it as required by the Regulatory Flexibility Act (Section XI of Enclosure 1).

   d. The appropriate congressional committees will be informed.

e. The Office of Public Affairs will issue a press release.

f. The staff will use a communications plan with frequently asked questions on the DCR process and the use of a DCR in referenced COL applications, as well as questions specifically prepared for the AP1000 standard design.

g. The staff is preparing a letter to the Director, Office of the Federal Register (OFR), requesting approval of the AP1000 DCD for incorporation by reference. The letter will be sent to the OFR before requesting publication of the *Federal Register* notice and will address the criteria for approval of documents for incorporation by reference.

h. The staff has determined that this is not a major rule and has received verification from the OMB.

COORDINATION:

The Office of the General Counsel (OGC) has no legal objection to the final AP1000 design certification rulemaking. The Chief Financial Officer has reviewed this paper for resource implications and has no objections. OIS has reviewed this paper for information technology and information management implications and concurs on it. The staff provided a draft copy of the AP1000 final rule to the ACRS on September 2, 2011 (ADAMS Accession No. ML112420188) and requested that the ACRS waive its review of the final rule. The ACRS issued a letter in response dated September 22, 2011 (ADAMS Accession No. ML11266A070) agreeing with the staff to waive its review of the final rule and stating that it has no objection to the staff's proposal to issue the final rule.

/RA by Martin J. Virgilio for/

R. W. Borchardt
Executive Director
for Operations

Enclosures:
1. *Federal Register* Notice
2. Environmental Assessment
3. AP1000 Comment Response Document
4. AP1000 Design Control Document Changes Since Revision 18

[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 52

RIN 3150-AI81

NRC-2010-0131

AP1000 Design Certification Amendment

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC or Commission) is amending its regulations to certify an amendment to the AP1000 standard plant design. The amendment replaces the combined license (COL) information items and design acceptance criteria (DAC) with specific design information, addresses the effects of the impact of a large commercial aircraft, incorporate design improvements, and increases standardization of the design. This action is necessary so that applicants or licensees intending to construct and operate an AP1000 design may do so by referencing this regulation (AP1000 design certification rule (DCR)), and need not demonstrate in their applications the safety of the certified design as amended. The applicant for this amendment to the AP1000 design is Westinghouse Electric Company, LLC (Westinghouse).

DATES: The effective date of this rule is **[insert date 30 days after publication in the *Federal Register*]**. The incorporation by reference of certain material specified in this regulation is approved by the Director of the Office of the Federal Register as of **[insert date 30 days after publication in the *Federal Register*]**.

ADDRESSES: You can access publicly available documents related to this action (see Section VI. Availability of Documents) using the following methods:

- **NRC's Public Document Room (PDR):** The public may examine and have copied, for a fee, publicly available documents at the NRC's PDR, O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.
- **NRC's Agencywide Documents Access and Management System (ADAMS):** Publicly available documents created or received at the NRC are available online in the NRC Library at http://www.nrc.gov/reading-rm/adams.html. From this page, the public can gain entry into ADAMS, which provides text and image files of the NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's PDR reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov.
- **Federal Rulemaking Web site:** Public comments and supporting materials related to this final rule can be found at http://www.regulations.gov by searching on Docket ID NRC-2010-0131. Address questions and concerns regarding NRC dockets to Carol Gallagher; telephone at 301-492-3668; e-mail: Carol.Gallagher@nrc.gov.

FOR FURTHER INFORMATION CONTACT: Ms. Serita Sanders, Office of New Reactors, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; telephone at 301-415-2956; e-mail: serita.sanders@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Background

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Subpart B, presents the process for obtaining standard design certifications. Section 52.63, "Finality of standard design certifications," provides criteria for determining when the Commission may amend the certification information for a previously certified standard design in response to a request for amendment from any person.

The NRC originally approved the AP1000 design certification in a final rule in 2006 (71 FR 4464; January 27, 2006). The final AP1000 DCR incorporates by reference Revision 15 of the design control document (DCD) (ADAMS Accession No. ML053460400), which describes the AP1000 certified design. During its initial certification of the AP1000 design, the NRC issued a final safety evaluation report (FSER) for the AP1000 as NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," in September 2004 (ADAMS Accession No. ML043570339) and Supplement No. 1 to NUREG-1793 (ADAMS Accession No. ML053410203).

From March 2006 through May 2007, NuStart Energy Development, LLC (NuStart)[1] and Westinghouse provided the NRC with a number of technical reports (TRs) for pre-application review of a possible amendment to the approved AP1000 certified design, in order to: 1) close specific, generically applicable COL information items (information to be supplied by COL applicants/holders) in the AP1000 certified standard design; 2) identify standard design changes resulting from the AP1000 detailed design efforts; and 3) provide specific standard design information in areas or for topics where the AP1000 DCD was focused on the design process and acceptance criteria. TRs typically addressed a topical area (e.g., redesign of a component, structure or process) and included the technical details of a proposed change, design standards, analyses and justifications as needed, proposed changes to the DCD, and Westinghouse's assessment of the applicable regulatory criteria (e.g., the assessment of the criteria in 10 CFR Part 52, Appendix D, Section VIII, "Processes for Changes and Departures"). The NRC identified issues associated with the TRs and engaged Westinghouse in requests for additional information and meetings during the pre-application phase to resolve them.

[1] The NuStart member companies are: Constellation Generation Group, LLC, Duke Energy Corporation, EDF-International North America, Inc., Entergy Nuclear, Inc, Exelon Generation Company, LLC, Florida Power and Light Company, Progress Energy, and Southern Company Services, Inc.

On May 26, 2007, Westinghouse submitted, via transmittal letter (ADAMS Accession No. ML071580757), an application to amend the AP1000 DCR. The application included Revision 16 of the DCD (ADAMS Accession No. ML071580939). This application was supplemented by letters dated October 26 (ADAMS Accession No. ML073120415), November 2 (ADAMS Accession No. ML073090471), and December 12, 2007 (ADAMS Accession No. ML073610541), and January 11 (ADAMS Accession No. ML080150513) and January 14, 2008 (ADAMS Accession No. ML080220389). The application noted, in part:

> 1) Generic amendments to the design certification, including additional design information to resolve DAC and design-related COL information items, as well as design information to make corrections and changes, would result in further standardization and improved licensing efficiency for the multiple COL applications referencing the AP1000 DCR that were planned for submittal in late 2007 and early 2008.
>
> 2) Westinghouse, in conjunction with NuStart, has been preparing TRs since late 2005. These TRs were developed with input, review, comment, and other technical oversight provided by NuStart members, including the prospective AP1000 COL applicants. Submittal of these TRs to the NRC was initiated in March 2006. The TRs contain discussion of the technical changes and supplemental information that is used to support the detailed information contained in the DCD.

In Attachment 2 to the May 26, 2007, application, Westinghouse identified the criteria of 10 CFR 52.63(a)(1) that apply to the changes described in each TR and associated COL information items, if applicable.

On January 18, 2008, the NRC notified Westinghouse that it accepted the May 26, 2007, application, as supplemented, for docketing (Docket No. 52-006) and published a notice of acceptance (ADAMS Accession No. ML073600743) in the *Federal Register* (73 FR 4926; January 28, 2008). On September 22, 2008, Westinghouse submitted Revision 17 to the AP1000 DCD. Revision 17 contained changes to the DCD that had been previously accepted

by the NRC in the course of its review of Revision 16 of the DCD. In addition, Revision 17 proposed changes to DAC in the areas of piping design (Chapter 3), instrumentation and control (I&C) systems (Chapter 7) and human factors engineering (HFE) (Chapter 18).

The NRC issued guidance on the finalization of design changes in Interim Staff Guidance (ISG) DC/COL-ISG-011, "Finalizing Licensing-basis Information," (ADAMS Accession No. ML092890623), which describes various categories of design changes that should not be deferred and those that should be included in the DCR.

By letter dated January 20, 2010, Westinghouse submitted a list of design change packages that would be included in Revision 18 of the AP1000 DCD (ADAMS Accession No. ML100250873). A number of subsequent submittals were made by Westinghouse to narrow the focus to those design changes to the categories of changes that should not be deferred, as recommended by DC/COL-ISG-011.

Revision 18 to the AP1000 DCD (ADAMS Accession Nos. ML103480059 and ML103480572) was submitted on December 1, 2010, and contains both proposed changes previously described in the design change packages and changes already accepted by the NRC in the review process of Revision 17 to the AP1000 DCD.

In the course of its ongoing review of the amendment application, the NRC determined that changes from information in Revision 15 to the DCD were needed. In response to NRC questions, Westinghouse proposed such changes. Once the NRC was satisfied with these DCD markups, they were documented in the advance safety evaluation report (SER) as confirmatory items (CIs). The use of CIs is restricted to cases where the NRC has reviewed and approved specific DCD proposals. With the review of Revision 18, the NRC has confirmed that Westinghouse has made those changes to the DCD accepted by the NRC that were not addressed in Revision 17 to the AP1000 DCD. For the final rule, the NRC has completed the review of the CIs and prepared a FSER reflecting that action. The CIs were closed based upon

an acceptable comparison between the revised DCD text and the text required by the CI. As further discussed later, Revision 19 is the version being certified in the final rule.

In order to simplify the NRC's review of the design change documentation, and to simplify subsequent review by the NRC's Advisory Committee on Reactor Safeguards (ACRS), the design changes pursuant to DC/COL-ISG-011 are reviewed in a separate chapter (Chapter 23) of the FSER. This chapter indicates which areas of the DCD are affected by each design change and the letters from Westinghouse that submitted them. In some cases, the NRC's review of the design changes reviewed in Chapter 23 may be incorporated into the chapters of the FSER where this material would normally be addressed because of the relationship between individual design changes and the review of prior DCD changes from Revisions 16 and 17 of the DCD.

The Westinghouse Revision 18 DCD includes an enclosure providing a cross-reference to the DCD changes and the applicable 10 CFR 52.63(a)(1) criteria. Revision 17 provides a similar cross-reference within the September 22, 2008, Westinghouse letter for those changes associated with the revised DCD. Revision 16, on the other hand, uses TRs to identify the DCD changes and lists the corresponding applicable 10 CFR 52.63(a)(1) criteria via Westinghouse letter, dated May 26, 2007 (Table 1). Revision 19 has a cross-reference similar to Revisions 17 and 18.

As of the date of this document, the application for amendment of the AP1000 design certification has been referenced in the following COL applications:

Vogtle, Units 3 and 4	Docket No. 05200025/6	73 FR 33118
Bellefonte Nuclear Station, Units 3 and 4	Docket Nos. 05200014/5	73 FR 4923
Levy County, Units 1 and 2	Docket Nos. 05200029/30	73 FR 60726
Shearon Harris, Units 2 and 3	Docket Nos. 05200022/3	73 FR 21995
Turkey Point, Units 6 and 7	Docket Nos. 05200040/1	74 FR 51621

Virgil C. Summer, Units 2 and 3	Docket Nos. 05200027/8	73 FR 45793
William States Lee III, Units 1 and 2	Docket Nos. 05200018/9	73 FR 11156

II. Summary of Analysis of Public Comments on the Proposed Rule

A. Overview of Public Comments

The NRC published the proposed rule amending the AP1000 DCR in the *Federal Register* on February 24, 2011 (76 FR 10269). The public comment period for the proposed rule closed on May 10, 2011. The NRC received a large number of comment submissions for the proposed rule (AP1000 rulemaking) from members of the public, non-governmental organizations, and the nuclear industry. A comment submission means a communication or document submitted to the NRC by an individual or entity, with one or more distinct comments addressing a subject or an issue. A comment, on the other hand, refers to statements made in the submission addressing a subject or issue.

The NRC received more than 13,500 comment submissions, which appear to be variations of two letters with largely similar content. These comment submissions also contained approximately 100 separate comments. The NRC also received 66 additional comment submissions containing over 100 comments. Finally, the NRC received four "petitions" to suspend or terminate this rulemaking, which are being treated as public comments. The petitions set forth approximately 39 comments. As stated in the proposed rule, "Comments received after May 10, 2011 will be considered if it is practical to do so, but assurance of consideration of comments received after this date cannot be given." The NRC determined that it was practical to consider comment submissions received on or before June 30, 2011. Five of the comment submissions were received after the 75-day comment period closed, and the NRC has addressed these late-filed comment submissions as part of this final rule (the numbers above reflect those late-filed comments, which were deemed practical to consider). These late comment submissions consisted of one petition, two submissions

requesting the NRC to reconsider comments made during the initial AP1000 DC rulemaking, and two submissions with supplemental information to support suspending this rulemaking. The NRC also received several comment submissions after June 30, 2011. Although the NRC deemed that it was not practical to consider, in this rulemaking, comments received after June 30, 2011 and, therefore, does not provide responses to those comments. However, the NRC has briefly reviewed them to ensure that they contain no health and safety matters.

There were several commenters in favor of completing the AP1000 rulemaking, while some were unconditionally opposed to completing the proposed amendment to the AP1000 design. The vast majority of commenters favored delaying (in some fashion) the AP1000 amendment rulemaking until lessons are learned from the Fukushima Daiichi Nuclear Power Plant (Fukushima) accident that occurred on March 11, 2011, and the NRC applies the lessons learned to U.S. nuclear power plants, including the AP1000 design.

Before responding to specific comments based upon the Fukushima Daiichi Nuclear Power Plant Event, the NRC is providing this discussion about the ongoing actions underway in response to this event. The Commission created a Near-Term Task Force (NTTF) to conduct an analysis of the lessons that can be learned from the event. The task force was established to conduct a systematic and methodical review of NRC processes and regulations to determine whether the NRC should make additional improvements to its regulatory system. The NTTF issued a report (ADAMS Accession No. ML111861807) evaluating currently available technical and operational information from the events, and presented a set of recommendations to the Commission. The task force concluded that continued operation and continued licensing activities do not pose an imminent risk to public health and safety. Among other recommendations, the NTTF supports completing the AP1000 design certification rulemaking activity without delay (see pages 71-72 of the report).

In an August 19, 2011, Staff Requirements Memoranda (SRM) (ADAMS Accession No. ML112310021), the Commission set forth actions related to the NTTF report together with a

schedule for the conduct of those actions. Two of those actions have been completed and are documented in the following reports: "Recommended Actions to Be Taken Without Delay from the Near-Term Task Force Report," September 9, 2011 (SECY-11-0124) (ADAMS Accession No. ML11245A127) and "Prioritization of Recommended Actions to be Taken In Response to Fukushima Lessons Learned," October 3, 2011 (SECY-11-0137) (ADAMS Accession No. ML11269A204).

Inasmuch as the NTTF recommendations relevant to the AP1000 design certification are limited to: seismic and flooding protection (Recommendation 2); mitigation of prolonged station blackout (Recommendation 4); and enhanced instrumentation and makeup capability for spent fuel pools (Recommendation 7) and the task force concluded that by the nature of its passive design and inherent 72-hour coping capability, AP1000 designs have many of the design features and attributes necessary to address the Task Force recommendations, the NRC concludes that no changes to the AP1000 DCR are required at this time. Moreover, even if the Commission concludes that at a later time that some additional action is needed for the AP1000, the NRC has ample opportunity and legal authority to modify the AP1000 DCR to implement NRC-required design changes, as well as to take any necessary action to ensure that COLs, which reference the AP1000, also make the necessary design changes.

The NRC organized the comments on the AP1000 amendment into the following subject areas: Fukushima-related, shield building, containment, severe accident mitigation design alternative (SAMDA), spent fuel, environmental, other AP1000 topics and general concerns. Some comments opposed the AP1000 rulemaking until purported shield building flaws are corrected. Many comments opposed completing the AP1000 rulemaking for reasons outside the scope of this rulemaking. For example, many comments opposed the completion of the AP1000 rulemaking until there is resolution of high level radioactive waste storage issues.

Due to the large number of comments received and the length of the NRC responses provided, this section of the statement of considerations (SOC) for the final rule amending the

AP1000 design certification only provides a summary of the categories of comments with a general description of the resolution of those comments. A detailed description of comments and the NRC's response is contained in a comment response document, which is available electronically through ADAMS Accession No. ML112212319.

B. Description of Key Structures of the AP1000 Design

This section is provided to help readers understand the issues and the NRC's responses. The following is a brief description of the three design features and a summary of the design changes that are being approved by the AP1000 amendment.

Containment

The containment vessel is a single steel pressure vessel, inside which is located the reactor vessel with the nuclear fuel, the steam generators, the refueling water storage tank, and various equipment for power generation, refueling, and emergency response, and supporting electric power, control, and communications.

The steel containment building stands independently inside the shield building. The containment's primary purpose is to retain pressure up to the maximum "design pressure" should an accident occur in which the reactor vessel or associated equipment releases reactor coolant into the containment atmosphere. The containment also acts as the passive safety-grade interface to the ultimate heat sink.

The primary containment vessel prevents the uncontrolled release of radioactivity to the environment. The AP1000 primary containment consists of a cylindrical steel shell with ellipsoidal upper and lower heads. The steel thickness is increased in the transition region where the cylindrical shell enters the foundation concrete to provide additional margin in consideration of corrosion.

Safety-related coatings are applied to both the interior and exterior surfaces of the containment vessel. These coatings have several functions. For the exterior surface, the corrosion-resistant paint or coating for the containment vessel is specified to enhance surface

wet-ability and film formation, as well as for corrosion protection. Wet-ability and film formation are important to the passive cooling function. For the inside containment surfaces, the coatings are designed to remain intact within the zone-of-influence of any postulated pipe break (or to result in settling of any resultant debris), to facilitate heat transfer to the containment vessel and for corrosion protection. Periodic inspections are required of the containment internal and external surfaces and of the coatings on those surfaces.

As the interface to the ultimate heat sink (the surrounding atmosphere), the primary containment is an integral component of the passive containment cooling system. The exterior of the containment vessel provides a surface for evaporative film cooling and works in conjunction with the natural draft airflow created by the shield building baffle and chimney arrangement to reduce the pressure and temperature of the containment atmosphere following a design-basis accident (DBA). The source of water for the evaporative cooling is the passive containment cooling water storage tank, located at the top of the shield building.

Design changes within the scope of the amendment with respect to the containment vessel are certain details about coatings with respect to long-term core cooling capability and the calculated peak accident pressure (from correction of errors). Other changes included addition of a vacuum relief system to provide protection for external pressure events.

Shield Building

The shield building performs multiple functions (e.g., to provide a biological shield to high-energy radiation, to support the primary containment cooling water storage tank on the roof, to shield the steel containment from high velocity debris that may be generated by tornadoes or other natural phenomena, to protect the containment from aircraft impact, and to function as a “chimney” to enhance airflow over the primary steel containment to remove heat from the containment and reduce containment pressure in the event that post accident cooling of the containment would be necessary). While other designs have included shield buildings of reinforced concrete, with the exception of the AP600 design, they did not perform cooling

functions. The shield building is not intended to be a pressure retaining structure or to mitigate the effects of a containment failure. The shield building construction is primarily a steel-concrete composite module wall, with a reinforced concrete roof and reinforced concrete where the wall meets the foundation. The wall is appropriately reinforced and sized where the composite wall module joins the reinforced concrete sections and as appropriate to accommodate seismic loads and aircraft loads. This design is new to the amendment; previously the structure was all reinforced concrete.

The shield building and the containment are designed with a gap, or annulus, that ensures that both the shield building and steel containment are physically separate, excluding their foundation, and are considered to be “freestanding.” In the shield building, air flows from the environment through openings in the shield building wall. The air then flows down along an interior baffle, turns toward the steel containment vessel, and then rises alongside the steel containment vessel where it absorbs heat. This heated air naturally rises and is then exhausted through the chimney located in the center of the primary containment cooling storage water tank.

Design changes to the passive containment cooling system and shield building principally involve the redesign of the shield building to a steel-composite design, with related changes to air inlet sizing, height of the building and gratings above the chimney opening. Revised safety analyses were performed to confirm adequate containment pressure control, capability of the shield building to withstand external events (tornado, seismic), as well as aircraft impact assessment. The shield building functions to protect the containment and facilitate passive containment cooling were not changed in the current amendment.

Spent Fuel Pool

The spent fuel pool (SFP) is a safety-related structure, housed in the auxiliary building that provides protection from aircraft impact or other external hazards.

For the first 72 hours, the spent fuel pool including response to a station blackout (SBO) event relies upon the natural heat capacity of the water in the pool to absorb the heat from spent

fuel elements, and boil the water in the pool. Thus, the safety-related means of heat removal for 72 hours is by heat-up of the volume of water in the pool and in safety-related water sources such as the cask washdown pit. The AP1000 design (as initially certified) included safety-related water level indication with readout and alarm in the main control room. A nonsafety-related spent fuel pool cooling system is also installed. Onsite, protected sources of water are available for up to 7 days, controlled from areas away from the pool. In modes with high heat load in the pool, two sources of ac power are specified in the availability controls. Water can be sprayed into the pool from two nozzle headers on opposite sides of the pool. A cross-connection also exists to the residual heat removal system. Those design features needed to provide make-up water after 72 hours and up to 7 days, such as the passive containment cooling water ancillary storage tank, and ancillary diesel generators, are protected from external hazards including the safe-shutdown earthquake (SSE), tornado, and flooding.

Design changes within the scope of the current amendment are the number of fuel assemblies stored, the rack designs for new and spent fuel storage, the criticality analysis for spent fuel in the pool (including use of boron material attached to the storage cells), installation of spray headers, and credit for additional water sources for pool makeup.

C. Significant Public Comments and Overall NRC Responses

Comment: Many comments noted the NRC staff nonconcurrence on the shield building design and requested that the NRC should reconsider the views expressed in the nonconcurrence.

NRC Response: The NRC disagrees with these comments. Professional opinions may vary, and the NRC has in place mechanisms for making differing views known.

NRC employees can choose to exercise the nonconcurrence process as a way of communicating their views and ensuring their opinions are heard by NRC management. The NRC staff individual who authored the nonconcurrence used this open process to express concerns regarding the safety of the AP1000 shield building design. The specific concerns and

staff response to the nonconcurrence are publically available (ADAMS Accession No. ML103370648).

The NRC concluded that the AP1000 shield building design is safe, meets the Commission's regulations, and provides reasonable assurance that the building will remain functional under design-basis loads. The comments did not offer new information on the matters related to the nonconcurrence nor did they include rationale showing the NRC's resolution of the technical matters raised in the nonconcurrence to be incorrect. No change was made to the final rule, DCD, or environmental assessment (EA) as a result of these comments.

Comment: One comment noted that the spent fuel racks' design in Revision 18 increased the density. The higher density fuel pools require boron shields between stored assemblies to reduce the risk of criticality. The comment stated that such re-racking introduces potential partial loss of cooling water, possible fire of spent fuel assemblies, and release of large inventories of cesium-137 and other radionuclides.

NRC Response: The NRC agrees that, under the proposed amendment of the AP1000 DCR, the capacity of the spent fuel pool racks would be increased from 619 to 889 (rather than 884 as asserted by the comment) fuel assemblies, and that the increased density of fuel assemblies being stored in the spent fuel pool requires the use of boron shields as part of the amendment.

However, the NRC disagrees with this comment's assertion that the increased capacity and density would introduce potential lost of cooling water, resulting in a possible fire of spent fuel assemblies and large releases of radionuclides. The comment did not explain how increased fuel capacity and concomitant increase in density of the spent fuel pool would "introduce" potential loss of cooling water as compared with the capacity and density described in DCD Revision 15. The NRC does not believe that the increased capacity and density leads to a new (previously un-described or unconsidered) way of losing spent fuel pool cooling water.

The NRC evaluated the proposed increase in fuel assembly capacity and density, and the effectiveness of the Westinghouse-proposed boron shields to ensure against re-criticality of the spent fuel stored in the spent fuel pool. The AP1000 DCD Revision 18 SFP criticality analysis was reviewed following the guidance found in NUREG-0800 Section 9.1.1, Revision 3, "Criticality Safety of Fresh and Spent Fuel Storage and Handling," to ensure that the applicant is in compliance with the applicable regulations (General Design Criterion 62, "Prevention of Criticality in Fuel Storage and Handling," and 10 CFR 50.68, "Criticality Accident Requirements"). These requirements are generally performance-based with limitations on the reactivity values, and as such, there are no specific physical design requirements such as minimum geometric spacing which must be met. The AP1000 SFP criticality analysis demonstrates that, with the proposed storage arrangement of the SFP, the reactivity requirements are met, and no regulations are violated. Therefore, the NRC determined that that the AP1000 spent fuel pool storage arrangement is acceptable. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Several comments stated that given the recent event at the Fukushima plant in Japan, the 75-day comment period is not adequate and should be extended.

NRC Response: The NRC disagrees with this comment, and believes that the 75-day public comment period, which is consistent with most other NRC technical rulemakings, is adequate. The Commission established a NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The public comment period for the proposed rule on the AP1000 design certification amendment closed on May 10, 2011, and the NTTF issued its report (ML111861807) on July 12, 2011. The NTTF considered the AP1000 design certification amendment in its report and noted that it has passive safety systems. By nature of their passive designs and inherent 72-hour coping capability for core, containment, and spent fuel pool cooling, the AP1000 designs have many of the design features

and attributes necessary to address the NTTF recommendations. The NTTF supports completing the AP1000 design certification rulemaking activities without delay.

The NRC believes that the AP1000 final rulemaking can and should proceed without extending the public comment period because: (i) the NRC has determined that the AP1000 design certification amendment meets current regulations; (ii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iii) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: One comment questioned whether the NRC endorsed NQA-1-1994 for work performed for the AP1000 project, where the NRC documented that NQA-1-1994 adequately meets the NRC requirements in the *Code of Federal Regulations*, and whether the Westinghouse's AP1000 design meets the requirements of 10 CFR Part 50, Appendix B.

NRC Response: The NRC disagrees with this comment. The NRC has, in application-specific requests for NRC approval of quality assurance programs, approved the use of NQA-1-1994 as an acceptable method to meet the requirements of Appendix B to 10 CFR Part 50. The NRC's approvals of NQA-1-1994 have been documented in NRC SERs on those requests.

The NRC believes that the AP1000 design meets the requirements of 10 CFR Part 50, Appendix B. By letter dated February 23, 1996 (available in ADAMS legacy library), the NRC issued a safety evaluation report approving Revision 1 of the Westinghouse Quality Systems Manual (Westinghouse Quality Assurance (QA) Manual). The Westinghouse QA Manual is based upon the guidance in NQA-1-1994. The NRC found that the Westinghouse QA Manual meets all the requirements of Appendix B. In addition, the NRC concluded in its FSER for the amendment that Revision 5 of the Westinghouse Quality Systems Manual, as described in the AP1000 Design Control Document, Revision 17, meets the criteria of Appendix B with respect to

AP1000 quality assurance. No change was made to the final rule, the DCD, or the EA as a result of this comment.

Comment: Several comments claimed the containment design was flawed because the containment cooling method includes convective air flow and because the steel containment could be subject to corrosion. As a result, they state that Westinghouse has not satisfactorily proved that the thin steel containment shell over the reactor would be effective during severe accidents.

NRC Response: The NRC considers these comments to be outside the scope of the rulemaking amending the AP1000 DCR. These features of the AP1000 design that demonstrate that the containment shell would be effective during severe accident conditions, as well as resistant to corrosion have already been certified with Revision 15. The proposed amendment to the AP1000 design does not propose any modification to these features and, therefore, the comment is outside the scope of for this rulemaking.

The NRC considers a single metal containment vessel to be acceptable if it meets the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Subsection NE. This part of the ASME Code contains requirements for the material, design, fabrication, examination, inspection, testing, and overpressure protection of metal containment vessels. Many such vessels are in use at operating nuclear power plants. The AP1000 containment is designed to meet ASME requirements for a pressure of 6.9 kPa (59 psi) and a temperature of 149 degrees C (300 degrees F). Its thickness includes an allowance for corrosion that may occur over the 60-year design life of the plant.

The AP1000 containment building has an additional function – transferring heat from containment to the atmosphere. The staff has reviewed the applicant's analysis, which shows that the containment building and the shield building, working as a system, would transfer heat to the atmosphere during severe accidents as well as design-basis earthquakes. Experiments

were conducted to demonstrate that these predictions are based upon physical phenomena that can be relied upon to work even when there is no ac power. In short, Westinghouse has demonstrated that the containment building is robust and will perform its safety functions effectively if a severe accident occurs at an AP1000 plant.

The commenters did not offer any basis for Westinghouse to revise its design or for the NRC to revise its evaluation. No change was made to the final rule, the DCD, or the EA as a result of these comments.

Comment: Many comments stated that Westinghouse has not proven that the reactor could be properly cooled in conditions similar to those at Fukushima.

NRC Response: The NRC considers these comments to be outside the scope of the rulemaking amending the AP1000 DCR. The Fukushima event involved an extended SBO (loss of offsite and onsite ac power). Westinghouse has shown that the AP1000 includes design features that keep the reactor properly cooled under these conditions. The features of the AP1000 design ensuring that the reactor can be properly cooled in conditions similar to those at Fukushima are already part of the certified design for the AP1000, and are not being changed or modified by this final rule amending the AP1000 design. Therefore, these comments are out of scope for this rulemaking.

In addition, even if these comments are assumed to be within the scope of the rulemaking, the NRC disagrees with the comment. If a severe accident occurs, seriously damaging the core, the AP1000 containment can be adequately cooled for 3 days – even if a loss-of-coolant accident (LOCA) occurred and without any ac power – because the AP1000 containment is cooled by gravity-fed water from a tank located at the top of the containment. After 3 days with no ac power, only a small “ancillary” generator is needed. This generator is used to power a small pump that re-fills the tank that supplies water to the outside surface of the containment. The generator could be brought to the site; however, in an AP1000 design, two such generators are installed in a seismically qualified structure (along with fuel and supporting

equipment). After 1 week, the containment can be cooled indefinitely as long as fuel for at least one ancillary generator is provided and there is water to replenish the water tank above the shield building, as discussed in the DCD.

These comments did not present any basis that would support an NRC determination that the AP1000 design is deficient in this regard. No change was made to the final rule, the DCD, or the EA as a result of these comments.

Comment: Some comments stated that there are significant unresolved technical issues related to Revision 19 changes and that the NRC has not fully disclosed its analysis of these weaknesses, and the existence of such weaknesses is evidenced by the concerns identified by Dr. Susan Sterrett, Mr. Arnie Gundersen of Fairewinds Associates, and Dr. John Ma.

NRC Response: The NRC disagrees with this comment. As discussed in more detail in the comment response document, the NRC concludes these issues were either resolved as part of the initial AP1000 rulemaking, or are resolved as part of this rulemaking. Elsewhere in this notice, NRC discusses the Revision 19 changes and summarizes the response to the other technical issues.

Comment: Many comments expressed views that nuclear power plants are too expensive or too dangerous, or that alternative energy sources should be pursued.

NRC Response: The NRC considers these comments to be outside the scope of the rulemaking amendment the AP1000 DCR. The NRC has concluded that the AP1000 design meets its regulatory requirements, and the comments do not offer any basis that this is not supported. Other issues about expense or alternative energy sources are outside the scope of the rulemaking amending the AP1000 DCR. A design certification rule is not an NRC license or authorization for construction or operation. No change was made to the final rule, the DCD, or the EA as a result of these comments.

Comment: Many comments expressed concerns about nuclear waste.

NRC Response: These comments address matters that are outside the scope of the rulemaking amending the AP1000 DCR. These comments do not address whether the AP1000 design changes, as reflected in the amendment application and evaluated in the NRC's SER and EA, meet the applicable NRC requirements. No change was made to the final rule, the DCD, or the EA as a result of these comments.

III. Discussion

A. Technical Evaluation of Westinghouse Amendment to the AP1000 Design

Westinghouse's request to amend the AP1000 design contained several classes of changes. Each class is discussed below:

Editorial Changes

Westinghouse requested changes to the AP1000 DCD to correct spelling, punctuation, grammar, designations, and references. None of these changes make substantive changes to the certified design, and NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," Supplement 2 (SER) does not address these changes.

Changes to Address Consistency and Uniformity

Westinghouse requested changes to the currently-approved AP1000 DCD (Revision 15) to achieve consistency and uniformity in the description of the certified design throughout the DCD. For example, a change to the type of reactor coolant pump (RCP) motor is evaluated in Chapter 5 of the SER on the application for the AP1000 amendment; Westinghouse requested that wherever this RCP motor is described in the DCD, the new description of the changed motor be used. The NRC reviewed the proposed change (to be used consistently throughout the DCD) to ensure that the proposed changes needed for uniformity and consistency are technically acceptable and do not adversely affect the previously approved design description. The NRC's bases for approval of these changes are set forth in the SER for the AP1000 amendment.

Substantive Technical Changes to the AP1000 Design (other than those needed for compliance with the AIA rule)

Among the many technical changes to the currently-approved DCD Revision 15 that are proposed by Westinghouse for inclusion in Revision 19 of the AP1000 DCD, the NRC selected 15 substantive changes for specific discussion in this final rule document, based on their safety significance:

- Removal of HFE DAC from the DCD
- Change to I&C DAC and Inspection, Test, Analysis, and Acceptance Criteria (ITAAC)
- Minimization of Contamination
- Extension of Seismic Spectra to Soil Sites and Changes to Stability and Uniformity of Subsurface Materials and Foundations
- Long-Term Cooling
- Control Room Emergency Habitability System
- Changes to the Component Cooling Water System (CCWS)
- Changes to I&C Systems
- Changes to the Passive Core Cooling System (PCCS) – Gas Intrusion
- Integrated Head Package (IHP) – Use of the QuickLoc Mechanism
- Reactor Coolant Pump Design
- Reactor Pressure Vessel (RPV) Support System
- SFP Decay Heat Analysis and Associated Design Changes
- Spent Fuel Rack Design and Criticality Analysis
- Vacuum Relief System

The NRC evaluated each of the proposed changes and concluded that they are acceptable. The NRC's bases for approval of these changes are set forth in the FSER for the

AP1000 amendment and are summarized in Section XII, “Backfitting and Issue Finality,,” of this document, as part of the discussion as to how each of the 15 changes satisfy the criteria in e10 CFR 52.63(a).

Changes to Address Compliance with the AIA Rule

Westinghouse requested changes to the AP1000 design in order to comply with the requirements of the AIA rule, 10 CFR 50.150. The NRC confirmed that Westinghouse has adequately described key AIA design features and functional capabilities in accordance with the AIA rule and conducted an assessment reasonably formulated to identify design features and functional capabilities to show, with reduced use of operator action, that the facility can withstand the effects of an aircraft impact. In addition, the NRC determined that there will be no adverse impacts from complying with the requirements for consideration of aircraft impacts on conclusions reached by the NRC in its review of the original AP1000 design certification. The NRC’s bases for approval of these changes are set forth in the FSER for the AP1000 amendment. As a result of these changes, the AP1000 design will achieve the Commission’s objectives of enhanced public health and safety and enhanced common defense and security through improvement of the facility’s inherent robustness to the impact of a large commercial aircraft at the design stage.

AP1000 Design Control Document Changes Since Revision 18

Introduction

The NRC staff’s (staff’s) review of DCD Revision 18 (ADAMS Accession No. ML103260072) identified a few areas where the DCD wording should be revised for clarity, to resolve internal inconsistencies, or to provide updated versions of referenced technical reports. In addition, three technical issues were noted: a load combination for the shield building, the method used to evaluate tank sloshing, and containment peak pressure analysis error correction. As a result of these activities, Westinghouse submitted Revision 19 of the DCD on June 13, 2011 (ADAMS Accession No. ML11171A315), and is the version of the DCD that is

being certified by this final rule. The NRC has determined that none of the changes from Revision 18 to Revision 19 of the DCD require an additional opportunity for public comment. These changes, which are organized into five subject areas, are discussed below.

The NRC has also determined, in its review of Revision 19, that three of the five subject areas must be identified as Tier 2* matters in the Section VIII of the final rule. The NRC has determined that none of the three new Tier 2* designations in Section VIII.B.6 of the rule require an additional opportunity for public comment. The bases for the NRC's determinations are set forth below.

DCD Structural Design Information and Shield Building Tier 2 Information*

Revision 18 of the DCD moved some design details regarding structures, including the shield building, from supporting Westinghouse documents into the DCD itself. Some of the details were marked as Tier 2*, based upon initial NRC staff comments. For example, information about penetrations was brought out of TR-9 into the DCD, and the shield building structural description was added to Section 3.8.4 in Revision 18.

The advanced final safety evaluation report (AFSER) included a confirmatory item to verify that the DCD appropriately reflected all necessary details regarding the structural design and shield building, and clearly showed which design details were to be Tier 2* (see AFSER Section 3.8.4 under ADAMS Accession No. ML103430502). The staff was able to close the confirmatory item after Westinghouse submitted Revision 19 of the DCD, by verifying the appropriate structural details were in the DCD and the design details were identified as Tier 2*. These DCD revisions enhanced the description of the design and were not a result of changes to the design itself. Westinghouse report GLR-603, submitted on March 28, 2011 (ADAMS Accession No. ML110910541), was the nonproprietary version of the report that presented shield building information to be made Tier 2* (those aspects that were also proprietary), in addition to the DCD information added to Section 3.8 and Appendix 3H. The scope of the report was materials, connection details, and tie bar spacing.

Use of steel composite modules was the heart of the revised shield building design, including the NRC's determination that existing consensus standards are not techinically applicable in all respects to the analysis for such modules. This was a key factor in the NRC conclusion that design details about the shield building are Tier 2* so that any future changes to that information by the COL would receive prior staff review and approval. The staff considered the existing rule language as it relates to Tier 2* designation for structural information. For example, the existing rule includes use of ACI-349, definition of critical locations and thicknesses, nuclear island structural dimensions, and design summary of critical sections. Some of the critical sections are within the shield building, and ACI-349 was part of the design criteria. However, the staff concluded, during the course of final rule preparation, that the rule would be more clear if the use of steel composite module details that are designated in the DCD as Tier 2* was explicitly stated in the final rule (at Section VIII.B.6.c) and requested that Westinghouse designate this information at Tier 2* in Revision 19 of the DCD. Westinghouse included this change in Revision 19. As a result of the Tier 2* markings, a conforming change is being made to the final rule language to Section VIII.B.6.c about the categories of Tier 2* information that would expire at fuel load.

The NRC does not believe that the DCD changes or the designation of this information as Tier 2* in the final rule require re-noticing. The material was publicly available in referenced reports, the staff's intention that the composite steel module design be designated Tier 2* was clear at the time of the public comment period, and there were no comments regarding the extent of Tier 2* inclusion in Revision 18.

Implementation of Revision 18 Commitments for the Shield Building

Load Combinations for Shield Building

In the NRC staff's follow-up to an apparent editorial error in a table in the Westinghouse shield building report, the staff determined that Westinghouse had not documented in its calculations the numerical combination of the loads for external temperature conditions (minus

40 degrees F) and a safe-shutdown earthquake (SSE). On April 12, 2011, the staff requested Westinghouse to document in the shield building report the numerical combination of loads for extreme ambient thermal loads and SSE loads, as specified in DCD Table 3.8.4-1 for steel structures and Table 3.8.4-2 for concrete structures. See meeting summary dated May 17, 2011 (ADAMS Accession No. ML111440298). By letter dated June 15, 2011, Westinghouse responded to this request (ADAMS Accession No. ML111950098), and concluded that the current design is acceptable when the load combinations are explicitly analyzed. The analysis results are discussed in detail in Revision 4 of the shield building report. Changes were made to the DCD to reflect the results of this load combination analysis, but the changes did not involve any changes to the methodology or the design of the shield building. The specific DCD changes were the addition of Section 3.8.4.5.5 to discuss the load combination analysis, and updating of tables of results in Appendix 3H. No change to the language of the AP1000 DCR in 10 CFR Part 52, Appendix D was made as a result of the DCD changes.

The NRC does not believe these DCD changes require re-noticing because Revision 18 of the DCD stated that the design would be verified using the required load combinations, and these load combinations had previously been approved by the NRC for use in AP1000 analyses similar to those for the shield building elements requiring reanalysis. There was no change to the methodology or the actual design of the shield building was needed, and there was no change to the language of the AP1000 DCR. The also NRC notes that the June 16, 2011 “petition” (filed by John Runkle) that requested the NRC terminate the rulemaking specifically raised the three technical issues in Revision 19, including the load combination topic.

Passive Containment Cooling Water Storage Tank

During the analysis of the thermal plus earthquake load combination for the passive containment cooling water storage tank (located on top of the shield building), Westinghouse determined that it had not performed an analysis of hydrodynamic loads using an equivalent static analysis as stated in Westinghouse’s response (ADAMS Accession No. ML102650098) to

an action item from the NRC's shield building report review (documented in AFSER Chapter 3, ADAMS Accession No. ML103430502). Instead, the analysis had been done by response spectrum analysis. Both the equivalent static method and the response spectrum method had previously been approved by the NRC for use in the AP1000 design for structural analyses as described in Revision 18 of the DCD. This issue was discussed in a May 17, 2011, public meeting (see meeting summary dated May 26, 2011 (ADAM Accession No. ML111430775)). In response, Westinghouse performed the analysis with this method and presented the results in the revised shield building report and in DCD Revision 19 as follows. The use of the equivalent static method for the tank is discussed in Section 3.7 and Appendix 3G, and a table and figure were added to Appendix 3H. The revised shield building report included the results of the load combination for the containment cooling water storage tank using the equivalent static analytical method, which demonstrated that the design remained adequate when evaluated using the equivalent static analytical method. No change to the language of the AP1000 DCR in 10 CFR Part 52, Appendix D was made as a result of the DCD changes.

The NRC does not believe these DCD changes require renoticing. Revision 18 of the DCD stated that the design would be verified through the use of the equivalent static method, and that method had been previously approved by the NRC for AP1000 analyses equivalent to that peformed for the containment cooling water tank. No change to the actual design of the tank was needed, and there was no change to the language of the AP1000 DCR. The NRC also notes that one of the petitions (dated June 16, 2011) that the NRC is responding to in the comment response document specifically raised this issue and the NRC has provided an answer similar to that described above.

Debris Limits

In its December 20, 2010, letter on long-term core cooling (ADAMS Accession No. ML103410348), the ACRS concluded that the regulatory requirements for long-term core cooling for design-basis accidents have been adequately met, based on cleanliness requirements

specified in the amendment. In particular, the amount of latent debris that might be present in the containment is an important parameter. The ACRS further stated that any future proposed relaxation of the cleanliness requirements will require substantial additional data and analysis. In their January 24, 2011, (ADAMS Accession No. ML110170006) report on the Vogtle COL application, which references the AP1000 design, the ACRS recommended that the containment interior cleanliness limits on latent debris should be included in the Technical Specifications (TSs) for the Vogtle plant.

In a letter dated February 23, 2011 (ADAMS Accession No. ML110590455), Westinghouse proposed DCD markups to designate information in Section 6.3 including debris sources such as latent debris (and the amount of fiber) as Tier 2*. Revision 19 of the DCD includes changes to mark selected information as Tier 2*.

The NRC made a conforming change to the final rule language to provide a new item as Section VIII.B.6.b.(7) screen design criteria for this new type of Tier 2* information. The NRC believes that inclusion of debris limits in the AP1000 DCD as Tier 2* information, rather than including such limits in each plant referencing the AP1000, represents a better regulatory approach for achieving the intent of the ACRS. Inclusion of debris limits in the AP1000 and its designation as Tier 2* would ensure that there is consistency across all referencing plants with repect to debris control, and ensures NRC regulatory control of any future relaxations of the limits, as discussed in the staff's March 3, 2011, response to the ACRS (ADAMS Accession No. ML110350198).

The NRC does not believe that this change to the DCD marking or to the final rule language requires renoticing because the ACRS letter, staff response and Westinghouse letter, were all publicly available during the comment period and the public had a fair opportunity to comment on this matter. In this regard, the staff notes that the April 6, 2011, "petition" (filed by John Runkle) that requested the NRC to suspend the AP1000 amendment rulemaking, included discussion about this topic with specific reference to the ACRS letter (ADAMS Accession No.

ML11108A077). Numerous other comment submissions pointed to this petition as part of their comments. This lends support to the NRC's view that the public had adequate notice and an opportunity to comment on this matter. In addition, the inclusion of debris limits as Tier 2* represents a new limitation, not present in the prior revisions of the AP1000 DCD, which will require a referencing COL holder to use debris limits as specified in the AP1000 DCD. Given that the designation of the debris limits as Tier 2* represents a new restriction agreed to by Westinghouse, a matter on which the NRC received public comment, the staff does not believe that an additional opportunity for public comment need be provided on the inclusion of debris limits in Revision 19 of the DCD and the designation of those limits as Tier 2*.

Heat Sinks and Containment Pressure Analysis

In its December 13, 2010, letter on the AP1000 design certification, the ACRS identified an error in the previously certified Revision 15 of the DCD (ADAMS Accession No. ML103410351) concerning the containment cooling analysis. The error affected the time at which steady-state film coverage is achieved on the exterior of the containment vessel. In a February 5, 2011, letter, the NRC staff agreed with the ACRS, and indicated that Westinghouse agreed that the error existed and should be corrected. The letter also indicated that the NRC staff would monitor Westinghouse's corrective actions and review any needed revisions to the DCD (ADAMS Accession No. ML103560411).

In the course of correcting the steady-state film coverage error, after the proposed rule was published Westinghouse identified other errors and modeling updates in supporting analyses that affected the calculated post-accident peak containment pressure (the highest peak pressure in the event of a large break loss-of-coolant accident). The net impact of correcting the steady-state film error and the subsequent Westinghouse-identified errors and modeling updates was an increase in calculated peak containment pressure from 57.8 psig to 59.2 psig, which would have exceeded the 59 psig post-accident peak containment pressure acceptance criterion in the existing AP1000 DCR.

Therefore, as part of the revised analysis to account for all the identified errors, Westinghouse relied upon a limited number of existing structural elements (gratings) within the containment as heat sinks, in order to remain within the 59 psig post-accident peak containment pressure acceptance criterion. Westinghouse's revised analysis used the NRC-approved methodology in the existing AP1000 DCR containment pressure calculation, and the method for crediting heat sink capacity as described in Westinghouse documents WCAP-15846 (proprietary) and WCAP-15862 (nonproprietary) "WGOTHIC Application to AP600 and AP1000," Revision 1, March 2004, which are incorporated by reference in the previously certified Revision 15 of the DCD. In addition, the Westinghouse-revised analysis used the NRC-approved 59 psig post-accident peak containment pressure acceptance criterion in the existing AP1000 DCD, Revision 15.

The staff safety evaluation of the Westinghouse revised analysis is included in Sections 23.X and 23.Y of the FSER (ADAMS Accession No. ML112061231). Table 6.2.1.1-10 of Revision 19 of the DCD includes the credited elements. The ACRS reviewed the Westinghouse corrections, and agreed that Westinghouse's revised analysis continues to demonstrate that the containment will be able to withstand the post-accident peak containment pressure (ADAMS Accession No. ML11256A180), and that the reevaluated pressure is based on a sufficiently conservative methodology. The final AP1000 rule language designates this "heat sink data for containment analysis" by adding it as a new Tier 2* item in Section VIII.B.6.b(8). The NRC decided to control any future changes to the credited elements by designating the material as Tier 2* because the geometry and location of the heat sinks could impact their effectiveness.

The NRC does not believe that the revisions to Table 6.2.1.1-10 of Revision 19 of the DCD require renoticing for several reasons. The gratings to be credited as heat sinks were already part of the approved AP1000 design and were not part of the proposed amendment to the AP1000 DCR described design. Thus, the actual DCD did not involve any new design

elements being added. The use of heat sinks as part of the containment pressure calculation, and the method for crediting heat sink capacity were described in the DCD Revision 15. The criterion for evaluating the acceptability of the change continues to be the calculated post-accident peak containment pressure of 59 psig. Therefore, the revised Westinghouse analysis did not involve the use of any previously unapproved design methodologies or acceptance criteria; the methodology used and the acceptance criterion (59 psig post-accident peak containment pressure) is in the already-approved AP1000 DCR. Finally, crediting of the gratings as heat sinks in the revised analysis did not introduce any new safety issues not previously addressed. Therefore, the NRC does not believe that opportunity for public comment need be provided on the rule language change.

The NRC does not believe that the designation of the heat sink as Tier 2* requires renoticing. As discussed above, the Tier 2* change is a direct result of the Westinghouse revised analysis that does not warrant an additional opportunity for public comment. The designation of this information as Tier 2* adds a new limitation, not present in the prior revisions of the AP1000 DCD, which limits a referencing combined license applicant/holder to alter the heat sink information for the grating and all other heat sinks credited in the containment peak pressure analysis. Given that the designation of the heat sink information as Tier 2* represents a new restriction agreed to by Westinghouse, the staff does not believe that opportunity for public comment need be provided on the Westinghouse revised analysis and the designation of the heat sink information as Tier 2*.

B. Changes to Appendix D

1. Scope and Contents (Section III).

The purpose of Section III is to describe and define the scope and contents of this design certification and to set forth how documentation discrepancies or inconsistencies are to be resolved. Paragraph A is the required statement of the Office of the Federal Register (OFR) for approval of the incorporation by reference of Tier 1, Tier 2, and the generic TSs into this

appendix. The NRC is updating the revision number of the DCD that is incorporated by reference to the revision Westinghouse provided to the NRC in its application for amendment to this DCR. In this final rule, the revision of the DCD that is incorporated by reference is Revision 19.

The effect of this incorporation by reference is that the incorporated material has the same legal status as if it were published in the *Federal Register* and in NRC's regulations at 10 CFR Part 52. This material, like any other properly issued regulation, has the force and effect of law. The AP1000 DCD was prepared to meet the technical information contents of application requirements for design certifications under 10 CFR 52.47(a) and the requirements of the OFR for incorporation by reference under 1 CFR Part 51. One requirement of the OFR for incorporation by reference is that the applicant for the design certification (or amendment to the design certification) makes the generic DCD available upon request after the final rule becomes effective. Therefore, paragraph A identifies a Westinghouse representative to be contacted to obtain a copy of the AP1000 DCD.

The AP1000 DCD is electronically accessible under ADAMS Accession No. ML11171A500, at the OFR, and at www.regulations.gov by searching under Docket ID NRC-2010-0131. Copies of the generic DCD are also available at the NRC's PDR. Questions concerning the accuracy of information in an application that references Appendix D will be resolved by checking the master copy of the generic DCD in ADAMS. If a generic change (rulemaking) is made to the DCD by the revision process provided in Section VIII of Appendix D, then at the completion of the rulemaking process the NRC would request approval of the Director, OFR, for the revised incorporation by reference and revise its copies of the generic DCD, provide a revised copy to the OFR, and notify the design certification applicant to change its copy. The Commission requires that the design certification applicant maintain an up-to-date copy of the master DCD under Section X.A.1 of Appendix D because it is likely that most applicants intending to reference the standard design will obtain the generic DCD from the

design certification applicant. Plant-specific changes to and departures from the generic DCD will be maintained by the applicant or licensee that references Appendix D in a plant-specific DCD under Section X.A.2 of Appendix D.

The NRC is also making a change to paragraph D. Paragraph D establishes the generic DCD as the controlling document in the event of an inconsistency between the DCD and the design certification application or the FSER for the certified standard design. The revision renumbers paragraph D as paragraph D.1, clarifies this requirement as applying to the initial design certification, and adds a similar paragraph D.2 to indicate that this is also the case for an inconsistency between the generic DCD and the amendment application and the NRC's associated FSER for the amendment.

2. Additional Requirements and Restrictions (Section IV).

Section IV of this appendix sets forth additional requirements and restrictions imposed upon an applicant who references this appendix. Paragraph A sets forth the information requirements for these applicants. Paragraph A.3 requires the applicant to physically include, not simply reference, the proprietary information (PI) and safeguards information (SGI) referenced in the AP1000 DCD, or its equivalent, to ensure that the applicant has actual notice of these requirements. The NRC revised paragraph A.3 to indicate that a COL applicant must include, in the plant-specific DCD, the sensitive unclassified non-safeguards information (SUNSI) (including PI) and SGI referenced in AP1000 DCD. This revision addresses a wider class of information (SUNSI) to be included in the plant-specific DCD, rather than limiting the required information to PI. The requirement to include SGI in the plant-specific DCD would not change.

The NRC also added a new paragraph A.4 to indicate requirements that must be met in cases where the COL applicant is not using the entity that was the original applicant for the design certification (or amendment) to supply the design for the applicant's use. Paragraph A.4 requires that a COL applicant referencing Appendix D to 10 CFR Part 52 include, as part of its

application, a demonstration that an entity other than Westinghouse is qualified to supply the AP1000 certified design unless Westinghouse supplies the design for the applicant's use. In cases where a COL applicant is not using Westinghouse to supply the AP1000 certified design, this information is necessary to support any NRC finding under 10 CFR 52.73(a) that the entity is qualified to supply the certified design.

3. Applicable Regulations (Section V).

The purpose of Section V is to specify the regulations applicable and in effect when the design certification is approved (i.e., as of the date specified in paragraph A, which is 30 days after the publication of this rule in the *Federal Register*). The NRC is redesignating paragraph A as paragraph A.1 to indicate that this paragraph applies to that portion of the design that was certified under the initial design certification. The NRC is further adding a new paragraph A.2, similar to paragraph A.1, to indicate the regulations that would apply to that portion of the design within the scope of this amendment, as approved by the Commission and signed by the Secretary of the Commission.

4. Issue Resolution (Section VI).

The purpose of Section VI is to identify the scope of issues that were resolved by the Commission in the original certification rulemaking and, therefore, are "matters resolved" within the meaning and intent of 10 CFR 52.63(a)(5).

Paragraph B presents the scope of issues that may not be challenged as a matter of right in subsequent proceedings and describes the categories of information for which there is issue resolution. Paragraph B.1 provides that all nuclear safety issues arising from the Atomic Energy Act of 1954 (the Act), as amended, that are associated with the information in the NRC's AFSER related to certification of the AP1000 standard design (ADAMS Accession No. ML103260072) and the Tier 1 and Tier 2 information and the rulemaking record for Appendix D to 10 CFR Part 52, are resolved within the meaning of 10 CFR 52.63(a)(5). These issues include the information referenced in the DCD that are requirements (i.e., "secondary

references"), as well as all issues arising from PI and SGI, which are intended to be requirements. Paragraph B.2 provides for issue preclusion of PI and SGI.

The NRC revised paragraph B.1 to extend issue resolution to the information contained in the NRC's FSER, Appendix 1B of Revision 19 (Supplement No. 2) and the rulemaking record for this amendment. In addition, the NRC revised paragraph B.2 to extend issue resolution to the broader category of SUNSI, including PI, referenced in the generic DCD.

The NRC also revised paragraph B.7, which identifies as resolved all environmental issues concerning severe accident mitigation design alternative (SAMDA) arising under the National Environmental Policy Act of 1969 (NEPA) associated with the information in the NRC's final EA for the AP1000 design and Appendix 1B of the generic DCD (Revision 15) for plants referencing Appendix D to 10 CFR Part 52 whose site parameters are within those specified in the SAMDA evaluation. The NRC revised this paragraph to identify all resolved environmental issues concerning SAMDA associated with the information in the NRC's final EA for this amendment and Appendix 1B of Revision 19 of the generic DCD for plants referencing Appendix D to 10 CFR Part 52 whose site parameters are within those specified in the SAMDA evaluation.

Finally, the NRC is revising paragraph E, which provides the procedure for an interested member of the public to obtain access to SUNSI (including PI) and SGI for the AP1000 design in order to request and participate in proceedings, as identified in paragraph B, involving licenses and applications that reference Appendix D to 10 CFR Part 52. The NRC is replacing the current information in this paragraph with a statement that the NRC will specify at an appropriate time the procedure for interested persons to review SGI or SUNSI (including PI) for the purpose of participating in the hearing required by 10 CFR 52.85, the hearing provided under 10 CFR 52.103, or in any other proceeding relating to Appendix D to 10 CFR Part 52 in which interested persons have a right to request an adjudicatory hearing. The NRC will follow its current practice of establishing the procedures by order when the notice of hearing is published in the *Federal Register* (e.g., Florida Power and Light Co, Combined License Application for the Turkey Point

Units 6 and 7, Notice of Hearing, Opportunity To Petition for Leave To Intervene and Associated Order Imposing Procedures for Access to Sensitive Unclassified Non-Safeguards Information and Safeguards Information for Contention Preparation (75 FR 34777; June 18, 2010); Notice of Receipt of Application for License; Notice of Consideration of Issuance of License; Notice of Hearing and Commission Order and Order Imposing Procedures for Access to Sensitive Unclassified Non-Safeguards Information and Safeguards Information for Contention Preparation; In the Matter of AREVA Enrichment Services, LLC (Eagle Rock Enrichment Facility) (74 FR 38052; July 30, 2009)).

In the four currently approved design certifications (10 CFR Part 52, Appendices A through D), paragraph E presents specific directions on how to obtain access to PI and SGI on the design certification in connection with a license application proceeding referencing that DCR. The NRC is changing this because these provisions were developed before the terrorist events of September 11, 2001. After September 11, 2001, Congress changed the statutory requirements governing access to SGI, and the NRC revised its rules, procedures, and practices governing control and access to SUNSI and SGI. The NRC now believes that generic direction on obtaining access to SUNSI and SGI is no longer appropriate for newly approved DCRs. Accordingly, the specific requirements governing access to SUNSI and SGI contained in paragraph E of the four currently approved DCRs will not be included in the DCR for the AP1000. Instead, the NRC will specify the procedures to be used for obtaining access at an appropriate time in the COL proceeding referencing the AP1000 DCR. The NRC will include the new rule language in any future amendments or renewals of the currently existing DCRs, as well as in new (i.e., initial) DCRs. However, the NRC will not initiate rulemaking to change paragraph E of the existing DCRs, in an effort to minimize unnecessary resource expenditures by both the original DCR applicant and the NRC.

5. Processes for Changes and Departures (Section VIII).

The purpose of Section VIII of this appendix is to set forth the processes for generic changes to, or plant-specific departures (including exemptions) from, the DCD. The Commission adopted this restrictive change process in order to achieve a more stable licensing process for applicants and licensees that reference this DCR. The change processes for the three different categories of Tier 2 information, namely, Tier 2, Tier 2*, and Tier 2* with a time of expiration, are presented in paragraph B.

Departures from Tier 2 that a licensee may make without prior NRC approval are addressed under paragraph B.5 (similar to the process in 10 CFR 50.59). The NRC is modifying Section VIII to address the change control process specific to departures from the information required by 10 CFR 52.47(a)(28) to address the NRC's AIA requirements in 10 CFR 50.150. Specifically, the NRC revised paragraph B.5.b to indicate that the criteria in this paragraph for determining if a proposed departure from Tier 2 requires a license amendment do not apply to a proposed departure affecting information required by 10 CFR 52.47(a)(28) to address 10 CFR 50.150. In addition, the NRC redesignated paragraphs B.5.d, B.5.e, and B.5.f as paragraphs B.5.e, B.5.f, and B.5.g, respectively, and added a new paragraph B.5.d. Paragraph B.5.d requires an applicant or licensee who proposed to depart from the information required by 10 CFR 52.47(a)(28) included in the final safety analysis report (FSAR) for the standard design certification to consider the effect of the changed feature or capability on the original assessment required by 10 CFR 50.150(a). The FSAR information required by the AIA rule, which is subject to this change control requirement, includes the descriptions of the design features and functional capabilities incorporated into the final design of the nuclear power facility and the description of how the identified design features and functional capabilities meet the assessment requirements in 10 CFR 50.150(a)(1). The objective of the change controls is to determine whether the design of the facility, as changed or modified, is shown to withstand the effects of the aircraft impact with reduced use of operator actions. In other words, the applicant

or licensee must continue to show, with the modified design, that the acceptance criteria in 10 CFR 50.150(a)(1) are met with reduced use of operator actions. The AIA rule does not require an applicant or a licensee implementing a design change to redo the complete AIA to evaluate the effects of the change. The NRC believes it may be possible to demonstrate that a design change is bounded by the original design or that the change provides an equivalent level of protection, without redoing the original assessment.

Consistent with the NRC's intent when it issued the AIA rule, under this section, plant-specific departures from the AIA information in the FSAR would not require a license amendment, but may be made by the licensee upon compliance with the substantive requirements of the AIA rule (i.e., the AIA rule acceptance criteria). The applicant or licensee is required to document, in the plant-specific departure, how the modified design features and functional capabilities continue to meet the assessment requirements in 10 CFR 50.150(a)(1), in accordance with Section X of Appendix D to 10 CFR Part 52. Applicants and licensees making changes to design features or capabilities included in the certified design may also need to develop alternate means to cope with the loss of large areas of the plant from explosions or fires to comply with the requirements in 10 CFR 50.54(hh). The addition of these provisions to Appendix D to 10 CFR Part 52 is consistent with the NRC's intent when it issued the AIA rule in 2009, as noted in the SOC for that rule (74 FR 28112; June 12, 2009).

Paragraph B.6 of Appendix D to 10 CFR Part 52 provides a process for departing from Tier 2* information. The creation of, and restrictions on changing Tier 2* information resulted from the development of the Tier 1 information for the ABWR design certification (Appendix A to 10 CFR Part 52) and the ABB–CE [ASEA Brown Boveri – Combustion Engineering] System 80+ design certification (Appendix B to 10 CFR Part 52). During this development process, these applicants requested that the amount of information in Tier 1 be minimized to provide additional flexibility for an applicant or licensee who references these appendices. Also, many codes, standards, and design processes that would not be specified in Tier 1, but were acceptable for

meeting ITAAC, were specified in Tier 2. The result of these actions was that certain significant information only exists in Tier 2 and the Commission did not want this significant information to be changed without prior NRC approval. This Tier 2* information was identified in the generic DCD with italicized text and brackets (see Table 1-1 of the AP1000 DCD Introduction for a list of the Tier 2* items). Although the Tier 2* designation was originally intended to last for the lifetime of the facility, like Tier 1 information, the NRC determined that some of the Tier 2* information could expire when the plant first achieves full-power (100 percent), after the finding required by 10 CFR 52.103(g), while other Tier 2* information must remain in effect throughout the life of the facility. The factors determining whether Tier 2* information could expire after the first full-power was achieved were whether the Tier 1 information would govern these areas after first full-power and the NRC's determination that prior approval was required before implementation of the change due to the significance of the information. Therefore, certain Tier 2* information listed in paragraph B.6.c would cease to retain its Tier 2* designation after full-power operation is first achieved following the NRC finding under 10 CFR 52.103(g). Thereafter, that information would be deemed to be Tier 2 information that would be subject to the departure requirements in paragraph B.5. By contrast, the Tier 2* information identified in paragraph B.6.b would retain its Tier 2* designation throughout the duration of the license, including any period of license renewal.

The NRC is revising certain items designated as Tier 2*. As discussed in the proposed rule, the Commission is adding an item to Section VIII.B.6.b for reactor coolant pump type. In addition, a new item was added to paragraph B.5.b for RCP type. The NRC determined that certain specific characteristics of the RCP were significant to the safety review and that prior approval of changes affecting those characteristics would be required. This Tier 2* designation does not expire.

In the final rule, two additional items are being added to Section VIII.B.6.b. First, in its December 20, 2010, letter on long-term core cooling, the ACRS concluded that the regulatory

requirements for long-term core cooling for designbasis accidents have been adequately met, based on cleanliness requirements specified in the amendment. In particular, the amount of latent debris that might be present in the containment is an important parameter. The ACRS further stated that any future proposed relaxation of the cleanliness requirements will require substantial additional data and analysis. In their January 24, 2011, report on the Vogtle COL application, which references the AP1000 design, the ACRS recommended that the containment interior cleanliness limits on latent debris should be included in the TSs. In a letter dated February 23, 2011, Westinghouse proposed DCD markups to designate information in Section 6.3 including debris sources such as latent debris (and the amount of fiber) as Tier 2*. The NRC believes this is a better approach to achieving the intent of the ACRS for regulatory control of any future relaxations of the limits and would thus require prior NRC approval, as discussed in the staff's March 3, 2011, response to the ACRS. Revision 19 includes DCD changes to mark selected information as Tier 2*. No changes to the content itself were made. The NRC made a conforming change to the final rule language to provide a new item as Section VIII.B.6.b(7) entitled general screen design criteria for this new type of Tier 2* information.

The second change, which was also discussed in the December 13, 2010, ACRS letter report on the DC amendment, concerned an error ACRS identified in the previously certified Revision 15, concerning the containment cooling analysis. The error affected the time at which steady-state film coverage is achieved on the exterior of the containment vessel. In the corrected analysis, the calculated peak containment pressure for a LOCA increases somewhat, but remains below the design pressure. In the course of reviewing the correction of the error for the peak containment pressure, after the proposed rule was published, Westinghouse identified other errors in supporting analyses that affect the calculated post-accident peak containment pressure. The net impact is an increase in calculated peak containment pressure in the event of a large break LOCA (the highest peak pressure) of about 0.3 psi. As part of the revised analysis for all of the changes, Westinghouse relied upon a limited number of structural

elements within the containment as heat sinks for the peak pressure analysis in order to maintain margin to the design limit. The NRC's safety evaluation is included in the FSER. Table 6.2.1.1-10 of Revision 19 of the DCD includes the credited elements. The final rule language designates this "heat sink data for containment analysis" by adding it as new Tier 2* in Section VIII.B.6.b(8). Because the geometry and location of the heat sinks could impact their effectiveness, the staff decided to control any future changes to the credited elements by designating the material as Tier 2*.

As discussed in the proposed rule, the NRC is clarifying some of the Tier 2* designations for structural requirements, with respect to Tier 2* information that expires at first full-power operation. The item on human factors engineering (HFE) moved from paragraph B.5.b to paragraph B.5.c, with the effect that the Tier 2* designation on that information expires after full-power operation is achieved rather than never expiring. In the final rule, an additional item (paragraph B.6.c(16)) is added to provide Tier 2* designation for certain details about the steel composite modules (as identified within the DCD); the designation expires at first full-power operation. The NRC concludes that the details are the key elements of this unique design, and therefore warrant Tier 2* regulatory control.

The NRC also concluded that the Tier 2* designation is not necessary for the specific Code edition and addenda for the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), as listed in item VIII.B.6.c(2). At the time of the initial certification, the NRC determined that this information should be Tier 2*. Subsequently, 10 CFR Part 50 was modified to include provisions in 10 CFR 50.55a(b)(1)(iii) to provide restrictions in the use of certain editions/addenda to the ASME Code, Section III, that the NRC found unacceptable. In addition, 10 CFR 50.55a(c)(3), (d)(2) and (e)(2), for reactor coolant pressure boundary, Quality Group B Components, and Quality Group C Components, respectively, provide regulatory controls on the use of later edition/addenda to the ASME Code, Section III, through the conditions NRC established on use of paragraph NCA-1140 of the Code.

As a result, these rule requirements adequately control the ability of a licensee to use a later edition of the ASME Code and addenda such that Tier 2* designation is not necessary. Thus, the Tier 2* item in paragraph B.6.c(2) for ASME Code was modified to be limited to ASME Code piping design restrictions as identified in Section 5.2.1.1 of the AP1000 DCD and to include certain Code cases, including Code Case N-284-1, as discussed in Section 3.8.2.2 and other Code cases as designated in Table 5.2-3 of the DCD (Code Case N-284-1 is the only case currently specified in Appendix D to 10 CFR Part 52). The NRC retained the Tier 2* designation for applying ASME Code, Section III, Subsection NE to containment design, by moving this provision to the end of Section VIII.B.6.c(14). Section 3.8.2.2 of the DCD identifies the specific edition and addenda for containment design (2001 Edition of ASME Code, Section III, including 2002 Addenda) with the Tier 2* markings.

6. Records and Reporting (Section X).

The purpose of Section X is to set forth the requirements that apply to maintaining records of changes to and departures from the generic DCD, which would be reflected in the plant-specific DCD. Section X also sets forth the requirements for submitting reports (including updates to the plant-specific DCD) to the NRC. Paragraph A.1 requires that a generic DCD and the PI and SGI referenced in the generic DCD be maintained by the applicant for this rule. The NRC revised paragraph A.1 to replace the term “proprietary information,” or PI, with the broader term “sensitive unclassified non-safeguards information,” or SUNSI. Information categorized as SUNSI is information that is generally not publicly available and encompasses a wide variety of categories. These categories include information about a licensee's or applicant's physical protection or material control and accounting program for special nuclear material not otherwise designated as SGI or classified as National Security Information or Restricted Data (security-related information), which is required by 10 CFR 2.390 to be protected in the same manner as commercial or financial information (i.e., they are exempt from public disclosure). This change is necessary because the NRC is approving PI and security-related information.

This change also ensures that Westinghouse (as well as any future applicants for amendments to the AP1000 DCR who intend to supply the certified design) are required to maintain a copy of the applicable generic DCD, and maintain the applicable SUNSI (including PI) and SGI – developed by that applicant – that were approved as part of the relevant design certification rulemakings.

The NRC notes that the generic DCD concept was developed, in part, to meet OFR requirements for incorporation by reference, including public availability of documents incorporated by reference. However, the PI and SGI were not included in the public version of the DCD. Only the public version of the generic DCD are identified and incorporated by reference into this rule. Nonetheless, the SUNSI for this amendment was reviewed by the NRC and, as stated in paragraph B.2, the NRC considers the information to be resolved within the meaning of 10 CFR 52.63(a)(5). Because this information is in the nonpublic version of the DCD, this SUNSI (including PI) and SGI, or its equivalent, is required to be provided by an applicant for a license referencing this DCR.

In addition, the NRC is adding a new paragraph A.4.a that requires the applicant for the AP1000 design to maintain a copy of the AIA performed to comply with the requirements of 10 CFR 50.150(a) for the term of the certification (including any period of renewal). The NRC added a new paragraph A.4.b that requires an applicant or licensee who references this appendix to maintain a copy of the AIA performed to comply with the requirements of 10 CFR 50.150(a) throughout the pendency of the application and for the term of the license (including any period of renewal). The addition of paragraphs A.4.a and A.4.b is consistent with the NRC's intent when it issued the AIA rule in 2009 (74 FR 28112; June 12, 2009).

IV. Section-by-Section Analysis

The following discussion sets forth each amendment to the AP1000 DCR being made in this final rule. All section and paragraph references are to the provisions in the amendment to Appendix D to 10 CFR Part 52, unless otherwise noted.

A. Scope and Contents (Section III).

The NRC is amending Section III, Scope and Contents, to revise paragraph A to update the revision number of the DCD, from Revision 15 to Revision 19, approved for incorporation by reference by the Office of the Federal Register; update the contact information of the Westinghouse representative to be contacted should a member of the public request a copy of the generic DCD; and update other locations (e.g., the NRC's PDR) where a member of the public could request a copy of or otherwise view the generic DCD.

The NRC is revising paragraph D to establish the generic DCD as the controlling document in the event of an inconsistency between the DCD and either the application or the FSER for the certified standard design. This clarification further distinguishes between the conflict scenarios presented in paragraphs D.1 (for the initial certification of the design) and D.2 (for Amendment 1 to the design).

B. Additional Requirements and Restrictions (Section IV).

The NRC is amending Section IV, Additional Requirements and Restrictions, to set forth additional requirements and restrictions imposed upon an applicant who references Appendix D to 10 CFR Part 52. Paragraph A sets forth the information requirements for these applicants. The NRC is revising paragraph A.3 to replace the term "proprietary information" with the broader term "sensitive unclassified non-safeguards information."

The NRC is also adding a new paragraph A.4 to indicate requirements that must be met in cases where the COL applicant is not using the entity that was the original applicant for the design certification (or amendment) to supply the design for the applicant's use.

C. Applicable Regulations (Section V).

The NRC is revising paragraph A to distinguish between the regulations that were applicable and in effect at the time the initial design certification was approved (paragraph A.1) and the regulations that are applicable and in effect as of the effective date of the final rule (paragraph A.2).

D. Issue Resolution (Section VI).

The NRC is amending Section VI, Issue Resolution, by revising paragraph B.1 to provide that all nuclear safety issues arising from the Act that are associated with the information in the NRC's FSER (NUREG-1793), the Tier 1 and Tier 2 information (including the availability controls in Section 16.3 of the generic DCD), and the rulemaking record for Appendix D to 10 CFR Part 52 are resolved within the meaning of 10 CFR 52.63(a)(5). These issues include the information referenced in the DCD that are requirements (i.e., secondary references), as well as all issues arising from SUNSI (including PI) and SGI, which are intended to be requirements. This paragraph is revised to extend issue resolution beyond that of the previously certified design to also include the information in Supplement No. 2 of the 2011 FSER (Supplement 1 supported the initial certification) and the rulemaking record associated with Amendment 1 to the AP1000 design.

The NRC is revising paragraph B.2 to replace the term "proprietary information" with the broader term "sensitive unclassified non-safeguards information."

Paragraph B.7 is revised to extend environmental issue resolution beyond that of the previously certified design to also include the information in Amendment 1 to the AP1000 design and Appendix 1B of Revision 19 of the generic DCD.

A new paragraph E is added to allow the NRC to specify at the appropriate time the procedures for interested persons to obtain access to PI, SUNSI, and SGI for the AP1000 DCR. Access to such information is for the sole purpose of requesting or participating in certain specified hearings, such as 1) the hearing required by 10 CFR 52.85 where the underlying application references Appendix D to 10 CFR Part 52; 2) any hearing provided under 10 CFR 52.103 where the underlying COL references Appendix D to 10 CFR Part 52; and 3) any other hearing relating to Appendix D to 10 CFR Part 52 in which interested persons have the right to request an adjudicatory hearing.

E. Processes for Changes and Departures (Section VIII).

The NRC is revising Section VIII to address the change control process specific to departures from the information required by 10 CFR 52.47(a)(28) to address the NRC's AIA requirements in 10 CFR 50.150. Specifically, the NRC is revising the introductory text of paragraph B.5.b to indicate that the criteria in this paragraph for determining if a proposed departure from Tier 2 requires a license amendment do not apply to a proposed departure affecting information required by 10 CFR 52.47(a)(28) to address aircraft impacts.

In addition, the NRC is redesignating paragraphs B.5.d, B.5.e, and B.5.f as paragraphs B.5.e, B.5.f, and B.5.g, respectively, and adding a new paragraph B.5.d. Paragraph B.5.d requires an applicant referencing the AP1000 DCR, who proposes to depart from the information required by 10 CFR 52.47(a)(28) to be included in the FSAR for the standard design certification, to consider the effect of the changed feature or capability on the original 10 CFR 50.150(a) assessment.

The NRC is revising certain items designated as Tier 2*. As discussed in the proposed rule, the NRC is adding an item to Section VIII.B.6.b for RCP type. In addition, a new item is added to paragraph B.5.b for RCP type. The NRC determined that certain specific characteristics of the RCP were significant to the safety review and that prior approval of changes affecting those characteristics would be required. This Tier 2* designation does not expire.

In the final rule, two additional items are added to Section VIII.B.6.b. Section VIII.B.6.b(7) provides Tier 2* designation for certain analysis assumptions related to latent debris and the effects on screens and fuel assemblies in post-LOCA conditions where debris is transported to the recirculation sump and into the in-containment refueling water storage tank. Finally, new paragraph VIII.B.6.b(8) is added to include the containment heat sinks credited in the peak pressure analysis. The Tier 2* designation for the requirements in this section of the rule does not expire.

As discussed in the proposed rule, the NRC is clarifying some of the Tier 2* designations for structural requirements, with respect to Tier 2* information that expires at first full-power operation. The item on HFE moved from paragraph B.5.b to paragraph B.5.c, with the effect that the Tier 2* designation on that information expires after full-power operation is achieved rather than never expiring. In the final rule, an additional item (paragraph B.6.c(16)) is added to provide Tier 2* designation for certain details about the steel composite modules (as identified within the DCD); the designation expires at first full-power operation.

Finally, the NRC also concluded that the Tier 2* designation was not necessary for the specific Code edition and addenda for the ASME Code as listed in paragraph VIII.B.6.c(2). Thus, the item in paragraph VIII.B.6.c(2) for ASME Code was modified to be limited to piping and welding restrictions identified in Section 5.2.1.1, and to include certain Code cases, N-284-1 is discussed in Section 3.8.2.2 and other code cases designated as Tier 2* are listed in Table 5.2-3. The NRC retained the Tier 2* designation for applying ASME Code Section III to containment design, by moving this provision to the end of Section VIII.B.6.c(14). Section 3.8.2.2 identifies the specific edition and addenda for containment design (2001 Edition of ASME Code, Section III, including 2002 Addenda).

F. Records and Reporting (Section X).

The NRC is amending Section X, Records and Reporting, to revise paragraph A.1 to replace the term “proprietary information” with the broader term “sensitive unclassified non-safeguards information.” Paragraph A.1 is revised to require the design certification amendment applicant to maintain the SUNSI, which it developed and used to support its design certification amendment application. This would ensure that the referencing applicant has direct access to this information from the design certification amendment applicant, if it has contracted with the applicant to provide the SUNSI to support its license application. The AP1000 generic DCD and the NRC-approved version of the SUNSI would be required to be maintained for the period that Appendix D to 10 CFR Part 52 may be referenced.

The NRC is also adding a new paragraph A.4.a, which requires Westinghouse to maintain a copy of the AIA performed to comply with the requirements of 10 CFR 50.150(a) for the term of the certification (including any period of renewal). This provision, which is consistent with 10 CFR 50.150(c)(3), would facilitate any NRC inspections of the assessment that the NRC decides to conduct.

Similarly, the NRC is adding a new paragraph A.4.b, which requires an applicant or licensee who references Appendix D to 10 CFR Part 52 to maintain a copy of the AIA performed to comply with the requirements of 10 CFR 50.150(a) throughout the pendency of the application and for the term of the license (including any period of renewal).

V. Agreement State Compatibility

Under the "Policy Statement on Adequacy and Compatibility of Agreement States Programs," approved by the Commission on June 20, 1997, and published in the *Federal Register* (62 FR 46517; September 3, 1997), this rule is classified as compatibility "NRC." Compatibility is not required for Category "NRC" regulations. The NRC program elements in this category are those that relate directly to areas of regulation reserved to the NRC by the Act or the provisions of this section. Although an Agreement State may not adopt program elements reserved to the NRC, it may wish to inform its licensees of certain requirements by a mechanism that is consistent with the particular State's administrative procedure laws. Category "NRC" regulations do not confer regulatory authority on the State.

VI. Availability of Documents

The NRC is making the documents identified below available to interested persons through one or more of the following methods, as indicated. To access documents related to this action, see the ADDRESSES section of this document.

Document	PDR	Web	ADAMS
SECY-11-XXXX, "Final Rule – AP1000 Design Certification Amendment"	x	x	ML112380823

Document	PDR	Web	ADAMS
AP1000 Final Rule Environmental Assessment	x	x	ML112380827
AP1000 Final Rule Public Comment Response Document	x	x	ML112212319
SECY-11-0002, "Proposed Rule – AP1000 Design Certification Amendment"	x	x	ML103000397
AP1000 Proposed Rule *Federal Register* Notice	x	x	ML103000412
AP1000 Proposed Rule Environmental Assessment	x	x	ML103000415
NUREG-1793, Supplement 2 to Final Safety Evaluation Report for Revision 19 to the AP1000 Standard Design Certification (publicly available)	x	x	ML112061231
NUREG-1793, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design, September 2004	x	x	ML043570339
NUREG-1793, Supplement 1 to Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design	x	x	ML053410203
Emergency Petition to Suspend All Pending Reactor Licensing Decisions And Related Rulemaking Decisions Pending Investigation Of Lessons Learned From Fukushima Daiichi Nuclear Power Station Accident, April 14 - 18, 2011	x	x	ML111040355 ML111110862
AP1000 Design Control Document (DCD), Revision 19, Transmittal Letter	x	x	ML11171A315
AP1000 DCD, Revision 19 (Public Version)	x	x	ML11171A500
Redacted Version of Dissenting View on AP1000 Shield Building Safety Evaluation Report With Respect to the Acceptance of Brittle Structural Model to be Used for the Cylindrical Shield Building Wall, December 3, 2010	x	x	ML103370648
AP1000 Containment Cleanliness – DCD Markup for Revision 19, February 23, 2011	x	x	ML110590455
Interim Staff Guidance DC/COL-ISG-011, "Finalizing Licensing-basis Information"	x	x	ML092890623
Design Changes Submitted by Westinghouse, Revision 18	x	x	ML100250873
AP1000 Technical Reports (Appendix)	x	x	ML103350501
TR-3, AP1000 Standard COL Technical Report Submittal of APP-GW-S2R-010, "Extension of Nuclear Island Seismic Analysis to Soil Sites," Revision 5, February 28, 2011	x	x	ML110691050
TR-26, "AP1000 Verification of Water Sources for Long-Term Recirculation Cooling Following a LOCA," Revision 8	x	x	ML102170123
TR-34, APP-GW-GLN-016, "AP1000 Licensing	x	x	ML063250306

Document	PDR	Web	ADAMS
Design Change Document for Generic Reactor Coolant Pump," Revision 0, November 17, 2006			
TR-54, "Spent Fuel Storage Racks Structure and Seismic Analysis," Revision 4	x	x	ML101580475
TR-65, "Spent Fuel Storage Racks Criticality Analysis," Revision 2	x	x	ML100082093
TR-97, "Evaluation of the Effect of the AP1000 Enhanced Shield Building Design on the Containment Response and Safety Analysis," Revision 3	x	x	ML11168A041
TR-98, AP1000 COL Standard Technical Report Submittal of APP-GW-GLN-098, "Compliance with 10CFR20.1406," (Technical Report Number 98), Revision 0, April 10, 2007	x	x	ML071010536
TR-103, "Fluid System Changes," Revision 2	x	x	ML072830060
TR-108, AP1000 Standard COL Technical Report Submittal of APP-GW-GLN-108, "AP1000 Site Interface Temperature Limits," Revision 2, September 28, 2007	x	x	ML072750137
TR-111, AP1000 Standard COL Technical Report Submittal of APP-GW-GLN-111, "Component Cooling System and Service Water System Changes Required for Increased Heat Loads," Revision 0, May 25, 2007	x	x	ML071500563
TR-134, AP1000 Standard COL Technical Report Submittal of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," Revision 0, October 26, 2007	x	x	ML073120415
AP1000 Standard COL Technical Report Submittal of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," Revision 1, December 12, 2007	x	x	ML073610541
AP1000 Standard COL Technical Report, APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," Revision 3, January 14, 2008	x	x	ML080220389
NRC Acceptance Review of AP1000 Design Certification Amendment Application, November 2, 2007	x	x	ML073090471
AP1000 Piping DAC/Component COL Information Item 3.9-2 Acceptance Issue, Revision 16, January 11, 2008	x	x	ML080150513
AP1000 License Report APP-GW-GLR-603, Revision 0, "AP1000 Shield Building Design Details for Select Wall and RC/SC Connections"	x	x	ML110910541

Document	PDR	Web	ADAMS
AP1000 Design Control Document (DCD), Revision 18, Transmittal Letter	x	x	ML103480059
Westinghouse AP1000 DCD, Revision 18 (public version)	x	.x	ML103480572
Advanced Final Safety Evaluation Report for Revision 18 to the AP1000 Standard Design Certification (publicly available)	x	x	ML103260072
AP1000 DCD Transmittal Letter, Revision 17	x	x	ML083220482
AP1000 DCD, Revision 17	x	x	ML083230868
AP1000 DCD Transmittal Letter, Revision 16	x	x	ML071580757
AP1000 DCD, Revision 16	x	x	ML071580939
NRC Notice of Acceptance, Revision 16	x	x	ML073600743
AP1000 DCD, Revision 15	x	x	ML053460400
December 13, 2010, ACRS Letter to Chairman (Report on FSER to AP1000 DCD)	x	x	ML103410351
December 20, 2010, ACRS Letter to Chairman (Long-Term Core Cooling)	x	x	ML103410348
January 19, 2011, ACRS Letter to EDO (Aircraft Impact)	x	x	ML110210462

Document	PDR	Web	ADAMS
January 24, 2011, ACRS Letter to EDO (Containment interior cleanliness limits on latent debris in Technical Specifications)	x	x	ML110350282
EDO response to January 24, 2011 ACRS Letter	x	x	ML110480429
May 17, 2011, ACRS Letter to EDO	x	x	ML11144A188
Regulatory History of Design Certification	x	x	ML003761550
Commission Memorandum and Order , , CLI-11-05, September 9, 2011	x	x	ML11252B074
Commission Memo and Order on Petitions to Suspend adjudicatory, licensing, and rulemaking activities	x	x	ML112521039
ABWR Final Rule	x	x	ML111040636
ABWR Proposed Rule	x	x	ML102100129
Request for ACRS to Waive review of the AP1000 DCR final rule	x	x	ML112420188
ACRS Waiver of review of AP1000 DCR final rule	x	x	ML11266A070
Design Report for the AP1000 Enhanced Shield Building	x	x	ML111950098
SER Approving Rev. 1 of the Westinghouse Quality Systems Manual	x	x	ML11280A309
ACRS Letter on AP1000 Long-Term Cooling	x	x	ML103410348
ACRS Letter on Staff's review of Vogtle, including discussion of containment interior cleanliness	x	x	ML110170006
Staff's response to ACRS' January 24, 2011, Letter	x	x	ML110350198
Petition to Suspend AP1000 DCR Rulemaking	x	x	ML110970673
Green Ticket for Runkle Petition	x	x	ML11108A077
ACRS letter on AP1000 DCD Revision 19 and Staff's Review	x	x	ML11256A180
Petition to Suspend AP1000 DCR Rulemaking	x	x	ML111110851
Emergency Petition	x	x	ML111110862
Petition to Terminate the Rulemaking on Design Certification of the AP1000	x	x	ML11171A014
AP1000 Proposed Rule Package (Rule, FRN, and EA	x	x	ML103000394
ISG-01, "Seismic Issues Associated with High Frequency Ground Motion	x	x	ML081400293
Green Ticket Containing Letter from Congressman Markey	x	x	ML110680273
Cover letter for Response to Congressman Markey, August 15, 2011	x	x	ML11080A015
Near-Term Task Force Review of Fukushima	x	x	ML111861807
SRM responding to Near-Term Task Force Report and Recommendations	x	x	ML112310021
Crystal River Unit 3 Special Inspection report	x	x	ML102861026

Document	PDR	Web	ADAMS
Crystal River Unit 3 Steam Generator Replacement Inspection	x	x	ML111330350
Response to Congressman Markey Letter	x	x	ML112450407
Revision 19 to the AP1000 Design Control Document and the AP1000 Final Safety Evaluation Report	x	x	ML11256A180
Advanced Final Safety Evaluation Report, Section 3.8.4	x	x	ML103430502
Presentation Slides "AP1000 Shield Building Design," Meeting with NRC Staff, May 17, 2011 (Proprietary and Non-Proprietary)	x	x	ML111440298
Summary of a Category 1 Meeting With Westinghouse Electric Company Regarding AP1000 Shield Building Design Methodology, May 17, 2011	x	x	ML111430775
G20100734/LTR-10-0528/EDATS: SECY-2010-0595 - Ltr. Said Abdel-Khalik re: Report on the Final Safety Evaluation Report Associated with the Amendment to the AP1000 Design Control Document	x	x	ML103560411
Transmittal of WEC Shield Building Action Item 21	x	x	ML102650098

VII. Voluntary Consensus Standards

The National Technology and Transfer Act of 1995, Public Law 104-113, requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless using such a standard is inconsistent with applicable law or is otherwise impractical. In this final rule, the NRC is approving an amendment to the AP1000 standard plant design for use in nuclear power plant licensing under 10 CFR Parts 50 or 52. Design certifications (and amendments thereto) are not generic rulemakings establishing a generally applicable standard with which all Parts 50 and 52 nuclear power plant licensees must comply. Design certifications (and amendments thereto) are NRC approvals of specific nuclear power plant designs by rulemaking. Furthermore, design certifications (and amendments thereto) are initiated by an applicant for rulemaking, rather than by the NRC. For these reasons, the NRC concludes that the National Technology and Transfer Act of 1995 do not apply to this final rule.

VIII. Finding of No Significant Environmental Impact: Availability

The Commission has determined under NEPA, and the Commission's regulations in subpart A, "National Environmental Policy Act; Regulations Implementing Section 102(2)," of 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," that this DCR, is not a major Federal action significantly affecting the quality of the human environment and, therefore, an environmental impact statement (EIS) is not required. The basis for this determination, as documented in the final EA, is that the Commission has made a generic determination under 10 CFR 51.32(b)(2) that there is no significant environmental impact associated with the issuance of an amendment to a design certification. This amendment to 10 CFR Part 52 does not authorize the siting, construction, or operation of a facility using the amended AP1000 design; it only codifies the amended AP1000 design in a rule. The NRC will evaluate the environmental impacts and issue an EIS as appropriate under NEPA as part of the application for the construction and operation of a facility referencing this amendment to the AP1000 DCR. In addition, as part of the final EA for the amendment to the AP1000 design, the NRC reviewed Westinghouse's evaluation of various design alternatives to prevent and mitigate severe accidents in Appendix 1B of the AP1000 DCD Tier 2. According to 10 CFR 51.30(d), an EA for a design certification amendment is limited to the consideration of whether the design change, which is the subject of the proposed amendment renders a SAMDA previously rejected in the earlier EA to become cost beneficial, or results in the identification of new SAMDAs, in which case the costs and benefits of new SAMDAs and the bases for not incorporating new SAMDAs in the design certification must be addressed. Based upon review of Westinghouse's evaluation, the NRC concludes that the proposed design changes: 1) do not cause a SAMDA previously rejected in the EA for the initial AP1000 design certification to become cost-beneficial; and 2) do not result in the identification of any new SAMDAs that could become cost beneficial.

The NRC prepared a final EA following the close of the comment period for the proposed standard design certification. With the issuance of this final rule, all environmental issues concerning SAMDAs associated with the information in the final EA and Appendix 1B of the AP1000 DCD Tier 2 will be considered resolved for plants referencing Amendment 1 to the AP1000 design whose site parameters are within those specified in SAMDA evaluation. The existing site parameters specified in the SAMDA evaluation are not affected by this design certification amendment.

The final EA, upon which the NRC's finding of no significant impact is based, and Revision 19 of the AP1000 DCD are available as discussed in Section IV. Availability of Documents. The NRC sent a copy of the EA and final rule to every State Liaison Officer and no comments were received.

IX. Paperwork Reduction Act Statement

This final rule contains new or amended information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These requirements were approved by the Office of Management and Budget, approval number 3150-0151.

The burden to the public for these information collections is estimated to average 3 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments on any aspect of these information collections, including suggestions for reducing the burden, to the Information Services Branch (T-5F53), U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or by Internet electronic mail to INFOCOLLECTS.RESOURCE@NRC.gov; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0151), Office of Management and Budget, Washington, D.C. 20503.

X. Regulatory Analysis

The NRC has not prepared a regulatory analysis for this final rule. The NRC prepares regulatory analyses for rulemakings that establish generic regulatory requirements applicable to all licensees. Design certifications are not generic rulemakings in the sense that design certifications do not establish standards or requirements with which all licensees must comply. Rather, design certifications are Commission approvals of specific nuclear power plant designs by rulemaking, which then may be voluntarily referenced by applicants for COLs. Furthermore, design certification rulemakings are initiated by an applicant for a design certification, rather than the NRC. Preparation of a regulatory analysis in this circumstance would not be useful because the design to be certified is proposed by the applicant rather than the NRC. For these reasons, the Commission concludes that preparation of a regulatory analysis is neither required nor appropriate.

XI. Regulatory Flexibility Act Certification

Under the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this final rule will not have a significant economic impact upon a substantial number of small entities. The final rule provides for certification of an amendment to a nuclear power plant design. Neither the design certification amendment applicant, nor prospective nuclear power plant licensees who reference this DCR, fall within the scope of the definition of “small entities” set forth in the Regulatory Flexibility Act, or the size standards established by the NRC (10 CFR 2.810). Thus, this rule does not fall within the purview of the Regulatory Flexibility Act.

XII. Backfitting and Issue Finality

The NRC has determined that this final rule meets the requirements of the backfit rule, 10 CFR 50.109, and the requirements governing changes to DCRs in 10 CFR 52.63(a)(1).

The final rule does not constitute backfitting as defined in the backfit rule (10 CFR 50.109) with respect to operating licenses under 10 CFR Part 50 because there are no operating licenses referencing this DCR.

Westinghouse requested many changes to the currently approved AP1000 DCD Revision 15 to correct spelling, punctuation, or similar errors, which result in text that has the same essential meaning. The NRC concludes that these Westinghouse-requested changes, which are editorial in nature, neither constitute backfitting as defined in 10 CFR 50.109(a)(1), nor are these changes inconsistent with the issue finality provisions of 10 CFR 52.63 or 10 CFR 52.83. The backfitting and issue finality provisions were not meant to apply to such editorial changes in as much as such changes would have insubstantial impact on licensees with respect to their design and operation, and are not the kind of changes falling within the policy considerations that underlie the backfit rule and the issue finality provisions of 10 CFR 52.63 and 10 CFR 52.83.

Westinghouse also made proposed changes to Revision 15 of the AP1000 DCD, which the NRC understands were the result of requests to Westinghouse from COL applicants referencing the AP1000 design, to achieve consistency in description and approach in different portions of the DCD. In the absence of a generic change to the AP1000, the referencing COL applicants stated to Westinghouse and the NRC that each would likely take plant-specific departures to address the inconsistency. While this could result in more consistency within any given COL application, it would result in inconsistencies among the different referencing COLs, which is inconsistent with the overall standardization goal of 10 CFR Part 52. Accordingly, the NRC concludes that the Westinghouse-requested changes to the AP1000 to address consistency do not constitute backfitting under the backfit rule (in as much as they are voluntary) and are not otherwise inconsistent with the issue finality provisions of 10 CFR 52.63 and 52.83.

Westinghouse also proposed numerous substantive changes to the AP1000 design described in Revision 15 of the DCD, including, but not limited to, minor component design details, replacement of a design feature with another having similar performance (e.g., turbine manufacturer, power for the auxiliary boiler), and changes allowing additional capability for operational flexibility (e.g., liquid waste holdup tanks, unit reserve transformer). Westinghouse

included within its application a detailed list of each DCD content change and the basis for concluding that one or more of the criteria in 10 CFR 52.63(a)(1) are satisfied for each change.

In the course of the NRC review of the technical changes proposed by Westinghouse, the NRC considered the basis offered by Westinghouse and made conclusions about whether the criteria of 10 CFR 52.63(a) were satisfied. These conclusions are included in the chapters of the FSER under ADAMS Accession No. ML112061231. The NRC concluded that all of these changes met at least one of the criteria in 10 CFR 52.63(a) and are not otherwise inconsistent with the issue finality provisions of 10 CFR 52.63 and 52.83. Fifteen of the most significant changes are discussed below, to show that each of the 15 substantive changes to the AP1000 certified design meet at least one of the criteria in 10 CFR 52.63(a)(1)(i) through (a)(1)(vii) and, therefore, do not constitute a violation of the finality provisions in that section.

I. 10 CFR 52.63 Criterion (a)(1)(iv): Provides the Detailed Design Information to be Verified under those ITAAC, which are Directed at Certification Information (i.e., DAC).

Title: **Removal of Human Factors Engineering Design Acceptance Criteria from the Design Control Document**

Item: 1 of 15

Significant Description of Change: The ITAAC Design Commitments for HFE is in Tier 1, Table 3.2-1. In Revision 17 of the AP1000 DCD, Westinghouse proposed deletion of the Human Factors DAC (Design Commitments 1 through 4) and provided sufficient supporting documentation to meet the requirements of these ITAAC. Design Commitment 1 pertains to the integration of human reliability analysis with HFE design. Design Commitment 2 pertains to the HFE task analysis. Design Commitment 3 pertains to the human-system interface. Design Commitment 4 pertains to the HFE program verification and validation implementation. The information developed by Westinghouse to satisfy these ITAAC is included in Chapter 19 of the DCD.

Location within the Safety Evaluation (SER) where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the HFE DAC are in Sections 18.7.6 (Design Commitment 1), 18.5.9 (Design Commitment 2), 18.2.8 (Design Commitment 3), and 18.11 (Design Commitment 4) of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

The additional information included in Tier 2 provides detailed design information on human factors design that would otherwise have to be addressed through verification of implementation of the human factors DAC. Therefore, the changes to the DCD eliminate the need for DAC on human factors and meet the finality criteria in 10 CFR 52.63(a)(1)(iv).

Title: Change to Instrumentation and Control DAC and Associated ITAAC

Item: 2 of 15

Description of Change: In the proposed revision to DCD Chapter 7, Westinghouse chose the Common Q platform to implement the Protection and Safety Monitoring System (PMS) and removed all references to the Eagle 21 platform. This design change, coupled with the development of other information about the PMS system definition design phase, was the basis for Westinghouse's proposed removal of its Tier 1, Chapter 2, Section 2.5.2, Design Commitment 11(a) Design Requirements phase from Table 2.5.2-8, "Inspections, Tests, Analyses, and Acceptance Criteria," for the PMS.

In its proposed revision to the DCD in Chapter 7, Westinghouse altered its design for the Diverse Actuation System (DAS) by implementing it with Field Programmable Gate Array (FPGA) technology instead of microprocessor-based technology. Additional information about the design process for the DAS was added as the basis for Westinghouse's proposed completion of its Tier 1, Chapter 2, Section 2.5.1, Design Commitments 4(a) and 4(b) Design Requirements and System Definition phases from Table 2.5.1-4 "Inspections, Tests, Analyses, and Acceptance Criteria" for the DAS.

Location within the Safety Evaluation (SER) where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with I&C DAC and ITAAC are in Sections 7.2.2.3.14, 7.2.5, 7.8.2, 7.9.2, and 7.9.3 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Westinghouse provided additional information that incorporates the results of the design process implementation for the PMS and DAS (which both support completion of Design Commitment 11(a) from Table 2.5.2-8 and 4a and 4b from Table 2.5.1-4, respectively) into the DCD. The additional information included in Tier 2 provides detailed design information on I&C design that would otherwise have to be addressed through verification of implementation of the I&C DAC. Therefore, the changes to the DCD eliminate the need for DAC on I&Cs and meet the finality criteria in 10 CFR 52.63(a)(1)(iv).

II. 10 CFR 52.63 Criterion (a)(1)(vii): Contributes to Increased Standardization of the Certification Information

The changes in the AP1000 amendment generally fall into one of two categories: (1) changes that provide additional information or a greater level of detail not previously available in the currently-approved version of the AP1000 DCD (Revision 15); or (2) changes requested by COL applicants referencing the AP1000 who would plan to include these changes in their application as departures if they were not approved in the AP1000 DCR amendment. The Commission concludes that both categories of changes meet the 10 CFR 52.63 criterion of "contributes to increased standardization." The bases for the Commission's conclusions, including each category of change, are discussed below.

Additional and more detailed information

Westinghouse proposes that the DCD be changed by adding new, more detailed design information that expands upon the design information already included in the DCD. This information would be used by every COL referencing the AP1000 DCR. Incorporating these

proposed changes into the AP1000 DCR as part of this amendment contributes to the increased standardization of the certification information by eliminating the possibility of multiple departures. Therefore, these changes enhance standardization, and meet the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Changes for which COL applicants would otherwise request departures

Westinghouse proposes several changes to its DCD with the stated purpose of contributing to increased standardization. Westinghouse represents that these changes were requested by the lead COL applicants currently referencing the AP1000. The NRC, in meetings with these applicants as part of the "Design-Centered Working Group" process for jointly resolving licensing issues, confirmed that these applicants requested these changes and committed to pursue of plant-specific departures from the AP1000 if Westinghouse did not initiate such changes to the AP1000 DCR. Such departures may be pursued by individual COL applicants (and licensees) as described in Part VIII, "Processes for Changes and Departures" of the AP1000 DCR (Appendix D to 10 CFR Part 52). Incorporating these proposed changes into the AP1000 DCR as part of this amendment contributes to the increased standardization of the certification information by eliminating the possibility of multiple departures. Therefore, all Westinghouse-initiated changes for the purpose of eliminating plant-specific departures enhance standardization, and meet the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: Minimization of Contamination (10 CFR 20.1406 (b))

Item: 3 of 15

Description of Change: In DCD Section 12.1.2.4, Westinghouse discussed features incorporated into the amended design certification to demonstrate compliance with 10 CFR 52.47(a)(6), which requires that a design certification application include the information required by 10 CFR 20.1406 (b), which was adopted in 2007 as part of the general revisions to 10 CFR Part 52. This regulation requires design certification applicants whose applications are submitted after August 20, 1997, to describe how the design will minimize, to the extent

practicable, contamination of the facility and the environment, facilitate decommissioning and minimize the generation of radioactive waste. The DCD changes are documented in Westinghouse Technical Report 98, "Compliance with 10 CFR 20.1406" (APP-GW-GLN-098), Revision 0 (ADAMS Accession No. ML071010536). Westinghouse evaluated contaminated piping, the SFP air handling systems, and the radioactive waste drain system to show that piping and components utilize design features that will prevent or mitigate the spread of contamination within the facility or the environment. Westinghouse has incorporated modifications and features such as elimination of underground radioactive tanks, RCPs without mechanical seals, fewer embedded pipes, less radioactive piping in the auxiliary building and containment vessel, and monitoring the radwaste discharge pipeline to demonstrate that the AP1000 design certification, as amended, will be in compliance with the subject regulation and Regulatory Guidance (RG) 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning" (June 2008).

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features are in Section 12.2 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1)(vii):

Inclusion in the DCD of the more detailed information about the features for minimization of contamination provides additional information to be included in the DCD for the AP1000 that increases standardization of the AP1000 design. Thus, the changes meet the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Extension of Seismic Spectra to Soil Sites and Changes to Stability and Uniformity of Subsurface Materials and Foundations**

Item: 4 of 15

Description of Change: In AP1000 DCD Tier 2, Sections 2.5.2 and 3.7, Westinghouse extended the AP1000 design to sites with five soil profiles, ranging from hard rock to soft soil, for

Category I structures, systems, and components. The certified design included only hard rock conditions. To support the technical basis for the extension, Westinghouse provided: seismic analysis methods, procedures for analytical modeling, soil-structure interaction analysis with three components of earthquake motion, and interaction of non-seismic Category I structures with seismic Category I structures. Also, in DCD Section 2.5.4, Westinghouse extended the AP1000 design with "Stability and Uniformity of Subsurface Materials and Foundations," where the DCD presents the requirements related to subsurface materials and foundations for COL applicants referencing AP1000 standard design. The site-specific information includes excavation, bearing capacity, settlement, and liquefaction potential. On February 28, 2011, Westinghouse submitted Revision 5 to TR-03, "Extension of Nuclear Island Seismic Analysis to Soil Sites," and summarized the report in DCD Appendix 3G, to provide more detail about its analyses.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with extension of seismic spectra to soil sites are in Section 3.7 of the FSER. The details of the NRC's evaluation of Westinghouse's design features associated with stability and uniformity of subsurface materials and foundations are in Sections 2.5.2 and 2.5.4 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Westinghouse submitted a change to the DCD that provides the seismic design and supporting analysis for a range of soil conditions representative of expected applicants for a COL referencing the AP1000 design. As a result, the certified design can be used at more sites without the need for departures to provide site-specific analyses or design changes, thus leading to a more uniform analysis and seismic design for all the AP1000 plants. Including in the DCD the information demonstrating adequacy of the design for seismic events for a wider range of soil conditions is a change that provides additional information leading to increased standardization of this aspect of the design. In addition, the change reduces the need for COL

applicants to seek departures from the current AP1000 design in as much as most sites do not conform to the currently approved hard rock sites. Therefore, the change increases standardization and meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Long-Term Cooling**

Item: 5 of 15

Description of Change: DCD Tier 2, Section 6.3.8, describes the changes to COL information items related to containment cleanliness and verification of water sources for long-term recirculation cooling following a LOCA. The COL information item related to verification of water sources for long-term recirculation cooling following a LOCA was closed based on Westinghouse TR-26, "AP1000 Verification of Water Sources for Long-Term Recirculation Cooling Following a LOCA," APP-GW-GLR-079 (ADAMS Accession No. ML102170123) and other information contained in DCD Chapter 6. Section 6.3.2.2.7 describes the evaluation of the water sources for long-term recirculation cooling following a LOCA, including the design and operation of the AP1000 PCCS debris screens. DCD Tier 1, Section 2.2.3, includes the associated design descriptions and ITAAC.

The COL information item requires a cleanliness program to limit the amount of latent debris in containment consistent with the analysis and testing assumptions.

Location within the SE where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with long-term cooling in the presence of LOCA-generated and latent debris and General Design Criteria 35 and 38 are in Subsection 6.2.1.8 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the design and analysis information that demonstrates adequacy of long-term core cooling provides additional information leading to increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Control Room Emergency Habitability System**

Item: 6 of 15

Description of Change: DCD Tier 2, Section 6.4, has undergone significant revision. Westinghouse redesigned its main control room emergency habitability system to meet control room radiation dose requirements using the standard assumed in-leakage of 5 cubic feet per minute in the event of a release of radiation. The changes include the addition of a single-failure proof passive filter train. The flow through the filter train is provided by an eductor downstream of a bottled air supply. These changes were prompted by Westinghouse's proposal to revise the atmospheric dispersion factors from those certified in Revision 15 to larger values to better accommodate COL sites. As a result, other design changes were needed to maintain doses in the control room within acceptable limits.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with radiation dose to personnel under accident conditions are in Section 6.4 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Incorporation of design changes to the main control room ventilation systems would contribute to increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Changes to the Component Cooling Water System**

Item: 7 of 15

Description of Change: In Revision 18 to AP1000 DCD Tier 2, Westinghouse proposed changes to the design of the component cooling water system (CCWS) to modify the closure logic for system motor-operated containment isolation valves and install safety-class relief valves on system supply and return lines. The closure logic would close the isolation valves upon a high RCP bearing water temperature signal, which might be indicative of a RCP heat exchanger tube rupture. This change would automatically isolate this potential leak to

eliminate the possibility of reactor coolant from a faulted heat exchanger discharging to portions of the CCWS outside containment.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the CCWS are in Chapter 23, Section V, of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Westinghouse included changes to the component cooling water in the DCD. These changes will contribute to increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: Changes to Instrumentation and Control Systems

Item: 8 of 15

Description of Change: In AP1000 DCD Tier 2, Sections 7.1 through 7.3, Westinghouse completed planning activities related to the architecture of its safety related I&C protection system, referred to as the PMS. Westinghouse also proposed changes to the DCD to reflect resolution of PMS interdivisional data communications protocols and methods utilized to ensure a secure development and operational environment. A secure development and operational environment in this context refers to a set of protective actions taken against a predictable set of non-malicious acts (e.g., inadvertent operator actions, undesirable behavior of connected systems) that could challenge the integrity, reliability, or functionality of a digital safety system. The establishment of a secure development and operational environment for digital safety systems involves: (i) measures and controls taken to establish a secure environment for development of the digital safety system against undocumented, unneeded and unwanted modifications and (ii) protective actions taken against a predictable set of undesirable acts (e.g., inadvertent operator actions or the undesirable behavior of connected systems) that could challenge the integrity, reliability, or functionality of a digital safety system during operations.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with I&C systems are in Sections 7.1 through 7.3, and 7.9 of NRC's Chapter 7 FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the more detailed information about the I&C architecture and communications provides additional information leading to increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: Changes to the Passive Core Cooling System – Gas Intrusion

Item: 9 of 15

Description of Change: In AP1000 DCD Tier 1 and Tier 2, Westinghouse proposed changes to the design of the PCCS to add manual maintenance vent valves and manual maintenance drain valves, and to reroute accumulator discharge line connections in order to address concerns related to gas intrusion. In addition, Westinghouse provided descriptions of surveillance and venting procedures to verify gas void elimination during plant startup and operations. These proposed changes are responsive to the actions requested by Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems."

The passive core cooling system (PCCS) provides rapid injection of borated water, which provides negative reactivity to reduce reactor power to residual levels and ensures sufficient core cooling flow. Noncondensible gas accumulation in the PCCS has the potential to delay injection of borated water, which would impact the moderating and heat removal capabilities, thus providing a challenge to the primary fission product barrier and maintenance of a coolable core geometry. As part of its review, the NRC determined that the proposed changes in the design of the PCCS were acceptable for providing protection for DBEs, such as LOCAs.

Location within the SER where the changes are principally described:

The NRC's evaluation of proposed changes to the DCD associated with changes to the PCCS is in Chapter 23, Section L, of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the design and analysis information that provides for venting of non-condensible gases provides additional information leading to increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Integrated Head Package – Use of the QuickLoc Mechanism**

Item: 10 of 15

Description of Change: In DCD Tier 2, Section 5.3.1.2, Westinghouse describes a revised integrated head package (IHP) design. The inclusion of eight QuickLoc penetrations in lieu of the forty-two individual in-core instrument thimble-tube-assembly penetrations on the reactor vessel head is a significant decrease in the number of reactor pressure vessel (RPV) closure head penetrations for access to in-core and core exit instrumentation. The QuickLoc mechanism allows the removal of the RPV closure head without removal of in-core and core exit instrumentation and, thus, decreases refueling outage time and overall occupational exposure. This head package design has been installed on a number of operating plants and, as noted, has several operational and safety advantages.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the (1) IHP and QuickLoc mechanism are in Section 5.2.3 of the FSER and (2) radiation protection pertaining to the addition of the integrated reactor head package and QuickLoc connectors are in Subsection 12.4.2.3 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the changes to the IHP would contribute to the increased

standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Reactor Coolant Pump Design**

Item: 11 of 15

Description of Change: In AP1000 DCD Tier 2, Subsection 5.4.1, Westinghouse proposed changes related to the RCP design. These changes include: change to a single-stage, hermetically sealed, high inertia, centrifugal sealless RCP of canned motor design; use of an externally mounted heat exchanger; and change of the RCP flywheel to bimetallic construction. These DCD changes are documented in: TR-34, "AP1000 Licensing Design Change Document for Generic Reactor Coolant Pump," APP-GW-GLN-016, November 2006 and in other documentation in response to NRC inquiries. The supporting documentation includes an analysis demonstrating that failure of the flywheel would not generate a missile capable of penetrating the surrounding casing, and, therefore, that such failure would not damage the reactor coolant pressure boundary.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the RCP design are in Section 5.4.1 of the NRC's Chapter 5 FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the changes to the RCP would reduce the possibility of plant-specific departure requests by COL applicants referencing the AP1000 DCR. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: Reactor Pressure Vessel Support System

Item: 12 of 15

Description of Change: The RPV structural support system of the AP1000 standard design is designed to provide the necessary support for the heavy RPV in the AP1000 standard design. The original anchorage design was bolting into embedded plates of the CA04 structural

module. Subsection 3.8.3.1.1 of the AP1000 DCD Tier 2 would be changed to reflect modifications to the RPV support design. In the revised design, there are four support "boxes" or "legs" located at the bottom of RPV's cold leg nozzles. The support boxes are anchored directly to the primary shield wall concrete base via steel embedment plates. This CA04 structural module is no longer used in the new design. The four RV support boxes are safety-related and the design of the RPV associated support structures is consistent with the safe shutdown earthquake design of Seismic Category I equipment. Subsections 3.8.3.5.1 and 5.4.10.2.1 of the DCD are modified.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with RPV supports are in Chapter 23, Section R, of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the changes to the RPV supports contributes to the increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii)

Title: Spent Fuel Pool Decay Heat Analysis and Associated Design Changes

Item: 13 of 15

Description of Change: In AP1000 DCD Tier 2, Section 9.1.3, Westinghouse proposed changes to the SFP cooling system. Westinghouse proposed to increase the number of spent fuel storage locations from 619 to 889 fuel assemblies and implement the following associated design changes: (1) increase in component cooling system (CCS) pump design capacity, (2) increase in the CCS supply temperature to plant components, and (3) changes in the CCS parameters related to the RCPs. The increase in the number of assemblies affects the decay heat removal/SFP heatup analyses. The supporting bases for these DCD changes are documented in: TR-111, "Component Cooling System and Service Water System Changes Required for Increased Heat Loads," APP-GW-GLN-111, Revision 2, dated May 2007 (ADAMS

Accession No. ML071500563); TR-103, "Fluid System Changes," APP-GW-GLN-019, Revision 2, dated October 2007 (ADAMS Accession No. ML072830060); TR-108, "AP1000 Site Interface Temperature Limits," APP-GW-GLN-108, Revision 2, dated September 2007 (ADAMS Accession No. ML072750137), and TR-APP-GW-GLR-097, "Evaluation of the Effect of the AP1000 Enhanced Shield Building on the Containment Response and Safety Analysis," Revision 3, dated June 2011 (ADAMS Accession No. ML11168A041).

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the SFP decay heat analysis are in Section 9.2.2 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the changes to the SFP decay heat analysis would contribute to the increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: Spent Fuel Rack Design and Criticality Analysis

Item: 14 of 15

Description of Change: In DCD Tier 2, Section 9.1.2, Westinghouse proposed changes to the spent fuel racks: (1) to increase the storage capacity by 270 additional fuel assemblies, and (2) to integrate a new neutron poison into the rack design. These changes included a different rack design and associated structural analysis and a revised criticality analysis. These DCD changes are documented in TR-54, "Spent Fuel Storage Racks Structure and Seismic Analysis," APP-GW-GLR-033, Revision 4, dated June 2, 2010 (ADAMS Accession No. ML101580475); and TR-65, "Spent Fuel Storage Racks Criticality Analysis," APP-GW-GLR-029, Revision 2, dated January 5, 2010 (ADAMS Accession No. ML100082093).

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the spent fuel rack design and criticality analysis are in Section 9.1.2 of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the changes to the spent fuel rack design and criticality analysis would contribute to the increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Title: **Vacuum Relief System**

Item: 15 of 15

Description of Change: In Revision 18 to AP1000 DCD Tier 2, Chapters 3, 6, 7, 9, and 16, Westinghouse proposed a change to the design of the containment, which adds a vacuum relief system to the existing containment air filtration system vent line penetration. The proposed vacuum relief system consists of redundant vacuum relief devices inside and outside containment sized to prevent differential pressure between containment and the shield building from exceeding the design value of 1.7 psig, which could occur under extreme temperature conditions.

Each relief flow path consists of a check valve inside containment and a motor operated butterfly valve outside of containment. The redundant relief devices outside containment share a common inlet line with redundant outside air flow entry points. The outlet lines downstream of the outside containment relief devices are routed to a common header connected to the vent line penetration. The redundant relief devices inside containment share a common inlet line from the vent line penetration and have independent discharge lines into containment.

Location within the SER where the changes are principally described:

The details of the NRC's evaluation of Westinghouse's design features associated with the addition of the vacuum relief system are in Chapter 23, Section W, of the FSER.

Evaluation of the Criteria in 10 CFR 52.63(a)(1):

Inclusion in the DCD of the introduction of a containment vacuum relief system would contribute to the increased standardization of this aspect of the design. Therefore, the change meets the finality criterion for changes in 10 CFR 52.63(a)(1)(vii).

Other Technical Changes

The above discussion on selected technical changes is illustrative of the NRC's consideration of applicability of the finality provisions to other technical changes proposed from Revision 15 of the DCD, which are reflected in Revision 19. As noted earlier, Westinghouse provided its proposed basis for each change as part of the application. The NRCconcludes that the other technical changes meet one or more of the finality criteria and thus do not constitute a violation of the finality provisions of 10 CFR 52.63.

Changes Addressing Compliance with Aircraft Impact Assessment Rule (10 CFR 50.150)

The final rule amends the existing AP1000 DCR, in part, to address the requirements of the AIA rule. The AIA rule itself mandated that a DCR be revised, if not during the DCR's current term, then no later than its renewal to address the requirements of the AIA rule. In addition, the AIA rule provided that any COL issued after the effective date of the final AIA rule must reference a DCR complying with the AIA rule, or itself demonstrate compliance with the AIA rule. The AIA rule may therefore be regarded as inconsistent with the finality provisions in 10 CFR 52.63(a) and Section VI of the AP1000 DCR. However, the NRC provided an administrative exemption from these finality requirements when the final AIA rule was issued (74 FR 28112; June 12, 2009). Accordingly, the NRC has already addressed the backfitting implications of applying the AIA rule to the AP1000 with respect to the AP1000 and referencing COL applicants.

Conclusion

The amended AP1000 DCR does not constitute backfitting and is consistent with the finality provisions in 10 CFR Part 52. Accordingly, the NRC has not prepared a backfit analysis or documented evaluation for this rule.

XIII. Congressional Review Act.

In accordance with the Congressional Review Act of 1996, the NRC has determined that this action is not a major rule and has verified this determination with the Office of Information and Regulatory Affairs of the Office of Management and Budget.

List of Subjects in 10 CFR Part 52

Administrative practice and procedure, Antitrust, Backfitting, Combined license, Early site permit, Emergency planning, Fees, Inspection, Limited work authorization, Nuclear power plants and reactors, Probabilistic risk assessment, Prototype, Reactor siting criteria, Redress of site, Reporting and recordkeeping requirements, Standard design, Standard design certification, Incorporation by reference.

For the reasons set out in this standard operating procedure and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 552 and 553, the NRC is adopting the following amendments to 10 CFR Part 52.

PART 52 – LICENSES, CERTIFICATIONS, AND APPROVALS FOR NUCLEAR POWER PLANTS

1. The authority citation for 10 CFR Part 52 continues to read as follows:

AUTHORITY: Secs. 103, 104, 161, 182, 183, 186, 189, 68 Stat. 936, 948, 953, 954, 955, 956, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2133, 2201, 2232, 2233, 2236, 2239, 2282); secs. 201, 202, 206, 88 Stat. 1242, 1244, 1246, as amended (42 U.S.C. 5841, 5842, 5846); sec. 1704, 112 Stat. 2750 (44 U.S.C. 3504 note); Energy Policy Act of 2005, Pub. L. No. 109–58, 119 Stat. 594 (2005), secs. 147 and 149 of the Atomic Energy Act.

2. In Appendix D to 10 CFR Part 52:

a. In Section III, revise paragraphs A and D;

b. In Section IV, revise paragraph A.3 and add paragraph A.4;

c. In Section V, redesignate paragraph A as paragraph A.1 and add a new paragraph A.2;

d. In Section VI, revise paragraphs B.1, B.2, B.7, and E;

e. In Section VIII, revise the introductory text of paragraph B.5.b, redesignate paragraphs B.5.d, B.5.e, and B.5.f as paragraphs B.5.e, B.5.f, and B.5.g, respectively, and add a new paragraph B.5.d, and revise paragraphs B.6.b and B.6.c; and

f. In Section X, revise paragraph A.1 and add a new paragraph A.4.

The revisions and additions read as follows:

Appendix D to Part 52—Design Certification Rule for the AP1000 Design

* * * * *

III. Scope and Contents

A. Tier 1, Tier 2 (including the investment protection short-term availability controls in Section 16.3), and the generic TSs in the AP1000 Design Control Document, Revision 19, (Public Version) (AP1000 DCD), dated June 13, 2011, are approved for incorporation by reference by the Director of the Office of the Federal Register under 5 U.S.C. 552(a) and 10 CFR Part 51. Copies of the generic DCD may be obtained from Stanley E. Ritterbusch, Manager, AP1000 Design Certification, Westinghouse Electric Company, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066, telephone 412-374-3037. A copy of the generic DCD is also available for examination and copied for a fee, publicly available documents at the NRC's PDR, Room O-1F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. Copies are available for examination at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, Maryland 20852, telephone 301-415-5610, e-mail LIBRARY.RESOURCE@NRC.GOV. The DCD can also be viewed online in the NRC Library at http://www.nrc.gov/reading-rm/adams.html by searching under ADAMS Accession No. ML11171A500. All approved material is available for inspection at the National Archives and

Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to http://www.archives.gov/federal-register/cfr/ibr-locations.html.

* * * * *

D. 1. If there is a conflict between the generic DCD and either the application for the initial design certification of the AP1000 design or NUREG-1793, "Final Safety Evaluation Report Related to Certification of the Westinghouse Standard Design," and Supplement No. 1, then the generic DCD controls.

2. If there is a conflict between the generic DCD and either the application for Amendment 1 to the design certification of the AP1000 design or NUREG-1793, "Final Safety Evaluation Report Related to Certification of the Westinghouse Standard Design," Supplement No. 2, then the generic DCD controls.

* * * * *

IV. Additional Requirements and Restrictions

A.* * *

3. Include, in the plant-specific DCD, the SUNSI (including PI) and SGI referenced in the AP1000 DCD.

4. Include, as part of its application, a demonstration that an entity other than Westinghouse is qualified to supply the AP1000 design, unless Westinghouse supplies the design for the applicant's use.

* * * * *

V. Applicable Regulations

A.* * *

2. The regulations that apply to those portions of the AP1000 design approved by Amendment 1 are in 10 CFR Parts 20, 50, 73, and 100, codified as of [INSERT DATE THAT IS 30 DAYS AFTER THE DATE OF PUBLICATION IN THE *FEDERAL REGISTER*], that are

applicable and technically relevant, as described in the Supplement No. 2 of the FSER (NUREG-1793).

* * * * *

VI. Issue Resolution

* * * * *

B.* * *

1. All nuclear safety issues, except for the generic TS and other operational requirements, associated with the information in the FSER and Supplement Nos. 1 and 2, Tier 1, Tier 2 (including referenced information, which the context indicates is intended as requirements, and the investment protection short-term availability controls in Section 16.3 of the DCD), and the rulemaking records for initial certification and Amendment 1 of the AP1000 design;

2. All nuclear safety and safeguards issues associated with the referenced SUNSI (including PI) and SGI which, in context, are intended as requirements in the generic DCD for the AP1000 design;

* * * * *

7. All environmental issues concerning severe accident mitigation design alternatives associated with the information in the NRC's EA for the AP1000 design, Appendix 1B of Revision 15 of the generic DCD, the NRC's final EA for Amendment 1 to the AP1000 design, and Appendix 1B of Revision 19 of the generic DCD, for plants referencing this appendix whose site parameters are within those specified in the severe accident mitigation design alternatives evaluation.

* * * * *

E. The NRC will specify at an appropriate time the procedures to be used by an interested person who wishes to review SUNSI (including PI, such as trade secrets or financial information obtained from a person that are privileged or confidential (10 CFR 2.390 and 10

CFR Part 9)) or SGI for the AP1000 certified design, for the purpose of participating in the hearing required by 10 CFR 52.85, the hearing provided under 10 CFR 52.103, or in any other proceeding relating to this appendix in which interested persons have a right to request an adjudicatory hearing.

* * * * *

VIII. Processes for Changes and Departures

* * * * *

B.* * *

5.* * *

b. A proposed departure from Tier 2, other than one affecting resolution of a severe accident issue identified in the plant-specific DCD or one affecting information required by 10 CFR52.47(a)(28) to address 10 CFR 50.150, requires a license amendment if it would:

* * * * *

d. If an applicant or licensee proposes to depart from the information required by 10 CFR 52.47(a)(28) to be included in the FSAR for the standard design certification, then the applicant or licensee shall consider the effect of the changed feature or capability on the original assessment required by 10 CFR 50.150(a). The applicant or licensee must also document how the modified design features and functional capabilities continue to meet the assessment requirements in 10 CFR 50.150(a)(1) in accordance with Section X of this appendix.

* * * * *

6.* * *

b. A licensee who references this appendix may not depart from the following Tier 2* matters without prior NRC approval. A request for a departure will be treated as a request for a license amendment under 10 CFR 50.90.

(1) Maximum fuel rod average burn-up.

(2) Fuel principal design requirements.

(3) Fuel criteria evaluation process.

(4) Fire areas.

(5) Reactor coolant pump type.

(6) Small-break loss-of-coolant accident (LOCA) analysis methodology.

(7) Screen design criteria.

(8) Heat sink data for containment pressure analysis.

c. A licensee who references this appendix may not, before the plant first achieves full-power following the finding required by 10 CFR 52.103(g), depart from the following Tier 2* matters except under paragraph B.6.b of this section. After the plant first achieves full-power, the following Tier 2* matters revert to Tier 2 status and are subject to the departure provisions in paragraph B.5 of this section.

(1) Nuclear Island structural dimensions.

(2) American Society of Mechanical Engineers Boiler & Pressure Vessel Code (ASME Code) piping design and welding restrictions, and ASME Code Cases.

(3) Design Summary of Critical Sections.

(4) American Concrete Institute (ACI) 318, ACI 349, American National Standards Institute/American Institute of Steel Construction (ANSI/AISC)–690, and American Iron and Steel Institute (AISI), "Specification for the Design of Cold Formed Steel Structural Members, Part 1 and 2," 1996 Edition and 2000 Supplement.

(5) Definition of critical locations and thicknesses.

(6) Seismic qualification methods and standards.

(7) Nuclear design of fuel and reactivity control system, except burn-up limit.

(8) Motor-operated and power-operated valves.

(9) Instrumentation and control system design processes, methods, and standards.

(10) Passive residual heat removal (PRHR) natural circulation test (first plant only).

(11) Automatic depressurization system (ADS) and core make-up tank (CMT) verification tests (first three plants only).

(12) Polar crane parked orientation.

(13) Piping design acceptance criteria.

(14) Containment vessel design parameters, including ASME Code, Section III, Subsection NE.

(15) Human factors engineering.

(16) Steel composite structural module details.

* * * * *

X. Records and Reporting

A. * * *

1. The applicant for this appendix shall maintain a copy of the generic DCD that includes all generic changes it makes to Tier 1 and Tier 2, and the generic TS and other operational requirements. The applicant shall maintain SUNSI (including PI) and SGI referenced in the generic DCD for the period that this appendix may be referenced, as specified in Section VII of this appendix.

* * * * *

4.a. The applicant for the AP1000 design shall maintain a copy of the AIA performed to comply with the requirements of 10 CFR 50.150(a) for the term of the certification (including any period of renewal).

b. An applicant or licensee who references this appendix shall maintain a copy of the AIA performed to comply with the requirements of 10 CFR 50.150(a) throughout the pendency of the application and for the term of the license (including any period of renewal).

* * * * *

Dated at Rockville, Maryland, this day of 2011.

For the Nuclear Regulatory Commission.

Annette L. Vietti-Cook,
Secretary of the Commission.

ENVIRONMENTAL ASSESSMENT BY THE

U.S. NUCLEAR REGULATORY COMMISSION

RELATING TO THE CERTIFICATION OF THE

AMENDMENT TO THE AP1000 STANDARD PLANT DESIGN

DOCKET NO. 52-006

Table of Contents

UNITED STATES NUCLEAR REGULATORY COMMISSION

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

RELATING TO THE CERTIFICATION OF THE

AMENDMENT TO THE AP1000 STANDARD PLANT DESIGN

DOCKET NO. 52-006

The U.S. Nuclear Regulatory Commission (NRC or the Commission) is proposing to amend the design certification for the AP1000 standard plant design in response to an application submitted on May 26, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML071580939 (public version)), by Westinghouse Electric Company, LLC (Westinghouse). The purpose of the amendment is to replace combined license (COL) information items and design acceptance criteria (DAC) with specific design information, address the effects of the impact of a large commercial aircraft, incorporate design improvements, and increase standardization of the design. A design certification is a rulemaking; the NRC has decided to adopt design certification rules (DCRs) as appendices to Part 52 of Title 10 of the *Code of Federal Regulations* (10 CFR).

The NRC has performed the following environmental assessment (EA) of the environmental impacts of the proposed amendment and has documented a finding of no significant impact in accordance with the requirements of 10 CFR 51.21 and the National Environmental Policy Act of 1969, as amended. This EA also addresses the severe accident mitigation design alternatives (SAMDAs) that the NRC has considered for the Westinghouse amendment to the AP1000 design. This EA does not address the site-specific environmental impacts of constructing and operating any facility that references the AP1000 design

certification amendment at a particular site. Those impacts would be evaluated as part of any application or applications for the siting, construction, or operation of such a facility.

As discussed in Section 3.0 of this EA, the NRC has determined that issuing the subject design certification amendment does not constitute a major Federal action significantly affecting the quality of the human environment. This determination is based on the generic finding made in 10 CFR 51.32(b)(2) that there is no significant environmental impact associated with an amendment to a design certification. Issuing the subject design certification amendment would not authorize the siting, construction, or operation of a facility using the AP1000 design. Rather, it would merely codify the amendment to the AP1000 design in a rule that could be referenced in a COL application. Furthermore, because certification of the amendment constitutes only a rule rather than a physical action, it would not involve the commitment of any resources that have alternative uses. As explained in the statements of consideration for "Licenses, Certifications, and Approvals for Nuclear Power Plants; Final Rule" (72 FR 49352, 49,427; August 28, 2007), the 10 CFR 51.32(b)(2) generic finding of no significant impact is legally equivalent to a categorical exclusion. Therefore, the NRC has not prepared an environmental impact statement (EIS) for the action.

In accordance with 10 CFR 51.30(d), an EA for an amendment to a design certification is limited to consideration of the following two matters: 1) whether any design change that is the subject of the proposed amendment renders a SAMDA previously rejected in the earlier EA cost beneficial; and 2) whether such a design change results in the identification of new SAMDAs, in which case the costs and benefits of new SAMDAs and the bases for not incorporating new SAMDAs in the design certification must be addressed. As discussed in Section 4.0 of this EA, the proposed amendment would not cause a SAMDA that was previously rejected in the

environmental review for the AP1000 design to become cost beneficial or lead to the identification of any new SAMDAs.

ENVIRONMENTAL ASSESSMENT

1.0 Identification of the Proposed Action

The proposed action is to issue a rule amending the certified AP1000 design in Appendix D to 10 CFR Part 52. The revised rule would allow applicants to reference the revised design control document (DCD) as part of a COL application under 10 CFR Part 52.

2.0 The Need for the Proposed Action

The NRC has long sought the safety benefits of commercial nuclear power plant standardization and early final resolution of design issues. The NRC achieves these benefits by certifying nuclear plant designs. Subpart B of 10 CFR Part 52 allows for certification of nuclear plant designs in the form of rulemaking.

The proposed action is to issue a rule amending 10 CFR Part 52 to revise the certified AP1000 design to replace COL information items and DAC with specific design information, address the effects of the impact of a large commercial aircraft, incorporate design improvements, and increase standardization of the design. The amendment would allow COL applicants to reference the revised AP1000 DCD as part of a COL application under 10 CFR Part 52. Those portions of the AP1000 design included in the scope of the certification amendment rulemaking would not be subject to further safety review or approval in a COL proceeding. In addition, the DCR could eliminate the need to consider SAMDAs individually for any facilities that reference the certified AP1000 design.

3.0 The Environmental Impact of the Proposed Action

The proposedaction constitutes issuance of an amendment to the AP1000 design certification. According to 10 CFR 51.32(b)(2), the NRC has generically determined that there is

no significant environmental impact associated with the issuance of an amendment to a design certification. The amendment would merely codify the NRC's approval of the amendment to the AP1000 design through its final safety evaluation report (FSER) on the design and any FSER supplement issued during rulemaking (refer to NUREG-1793, Supplement 2). Furthermore, because certification of the amendment constitutes a rule rather than a physical action, it would not involve the commitment of any resources that have alternative uses.

The amendment to the DCR by itself would not authorize the siting, construction, or operation of a nuclear power plant. An applicant for a COL that references the AP1000 design will be required to address the environmental impacts of construction and operation at a specific site. The NRC would then evaluate the environmental impacts and issue an EIS in accordance with 10 CFR Part 51. However, the SAMDA analysis that has been completed as part of this EA can be incorporated by reference into an EIS related to an application for siting, construction, or operation of a nuclear plant that references the AP1000 design.

4.0 Severe Accident Mitigation Design Alternatives

4.1 Westinghouse's Assessment of Severe Accident Mitigation Design Alternatives

Consistent with the objectives of standardization and early resolution of design issues, the Commission decided to evaluate SAMDAs as part of the original design certification for the AP1000 design. In the 1985, "Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants" (50 FR 32138; August 8, 1985), the Commission defined the term, "severe accident," as an event that is "beyond the substantial coverage of design-basis events (DBEs)," including events where there is substantial damage to the reactor core (whether or not there are serious offsite consequences). DBEs are events analyzed in accordance with the NRC's Standard Review Plan (NUREG-0800) and documented in several chapters of the AP1000 DCD, such as Chapters 2, 3, and 15.

The SAMDA analysis in Appendix 1B to the AP1000 DCD, Revision 15, as originally certified, concluded that there were no cost-beneficial SAMDAs for the AP1000 design. In Westinghouse's technical report APP-PRA-GER-001, "AP1000 Design Change Proposal Review for PRA and Severe Accident Input," Westinghouse assessed the impacts of the proposed design changes on the probabilistic risk assessment (PRA) and the SAMDA analysis for the certified AP1000 design.

Westinghouse concluded that if design changes did not significantly affect the applicability of the previous PRA, it could be inferred that the "AP1000 PRA revision will not impact the AP1000 SAMDA." Westinghouse further noted that it did not identify any new SAMDAs to incorporate that had not previously been considered. Therefore, Westinghouse concluded the design changes will not result in a change to the applicability of the certified AP1000 PRA, and the AP1000 SAMDA assessment in the original design remains valid.

As a result, Westinghouse concluded that the SAMDAs that were considered and rejected as not being cost beneficial in the original SAMDA assessment did not become cost beneficial due to the proposed design changes.

4.2 NRC Evaluation

NRC staff reviewed the information in the technical report, and in the EA issued for the original AP1000 DCR. NRC staff reviewed the applicant's evaluation of the proposed design changes and concluded that those changes would not result in a significant change in the core damage frequency, as compared with the existing AP1000 design. Therefore, NRC staff concluded that the proposed design changes would not alter the original SAMDA evaluation and would not change the conclusions reached in the EA issued for the original AP1000 DCR. The staff did not identify any new SAMDAs for further evaluation in accordance with 10 CFR 51.30(d).

5.0 Public Comments and NRC Responses

On February 24, 2011 (76 FR10269), the NRC issued the draft EA for public comment (ADAMS Accession No. ML103000415). The comment period expired May 10, 2011. While the NRC did not receive any comments specifically directed to the EA, the NRC received several comments regarding technical issues related to the AP1000 amendment SAMDA analysis. These comments and the NRC responses to the comments, as well as other comments and associated NRC responses regarding this AP1000 amendment rulemaking can be found under ADAMS Accession No. ML112212319. See NRC responses to comments under the SAMDA heading.

6.0 Finding of No Significant Impact

On the basis of the EA, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has decided not to prepare an EIS for the proposed action.

For further details with respect to the proposed action, see the proposed design certification amendment and the documents referenced in the statements of consideration for the proposed amendment (ADAMS Accession No. ML103000397). Documents may be examined, and/or copied for a fee, at the NRC's Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike, Room O-1F21, Rockville, Maryland 20852. Publicly available records are accessible electronically from the ADAMS Public Electronic Reading Room on the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. Persons who do not have access to ADAMS or who encounter problems in accessing the documents in ADAMS should contact the NRC PDR reference staff at 1-800-397-4209 or 301-415-4737 or via e-mail to pdr.resource@nrc.gov. Documents are also available electronically by accessing the Federal Rulemaking Web site at http://www.regulations.gov and search on Docket ID NRC-2010-0131.

NRC Responses to Public Comments

Final Rule:
Amendment to AP1000 Design Certification Rule, 10 CFR Part 52, Appendix D

(RIN 3150-AI81)

ADAMS Accession No. ML112212319
October 2011

NRC Responses to Public Comments
Amendment to AP1000 Design Certification Rule, 10 CFR Part 52, Appendix D
(RIN 3150-AI81)

Table of Contents

Acronyms and Abbreviations

ACRONYM	DEFINITION
(RT_{NDT})	reference temperature nil-ductility transition
ABAQUS	(name of a computer code)
ac	alternating current
ACI	American Concrete Institute
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
ADS	automatic depressurization system
AEA	Atomic Energy Act of 1954
AFSER	advanced final safety evaluation report
AIA	aircraft impact assessment
AISC	American Institute of Steel Construction
ALARA	as low as is reasonably achievable
ANSYS	(name of a computer code)
APA	Administrative Procedure Act
ARB	allegation review board
ASME	American Society of Mechanical Engineers
B&PV	Boiler and Pressure Vessel
BREDL	Blue Ridge Environmental Defense League, Inc.
BWR	boiling-water reactor
CEUS	Central and Eastern U.S.
CFR	*Code of Federal Regulations*
COL	combined license
CRD	comment response document
DBA	design-basis accident
DBE	design-basis event
DBT	design-basis threat
DC	design certification
Dc	direct current
DCA	design certification amendment
DCD	design control document
DCR	design certification rule
DG	diesel generator
DOE	Department of Energy
EA	environmental assessment
ECCS	emergency core cooling system
EDO	Office of the Executive Director
EIS	environmental impact statement
EP	emergency preparedness

EPA	Environmental Protection Agency
ESBWR	Economic Simplified Boiling Water Reactor
ETE	evacuation time estimate
FR	*Federal Register*
FSER	final safety evaluation report
GDC	general design criterion
I&C	instrumentation and control
IN	information notice
INES	International Nuclear Event Scale
IRS	International Incident Reporting System
IRWST	in-containment refueling water storage tank
ISG	Interim staff guidance
ISI	in-service inspection
IST	in-service test in-service testing
Km	kilometer(s)
LOCA	loss-of-coolant accident
LS-DYNA	(name of a computer code
m	meters
NC WARN	North Carolina Waste Awareness and Reduction Network
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NTTF	Near-Term Task Force
NOAA	National Oceanic and Atmospheric Administration
NPP	nuclear power plant
NRC	U.S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
OEP	operating experience program
ORNL/TM	Oak Ridge National Laboratory
PCCS	passive containment cooling system
PCCWST	passive containment cooling water storage tank
PRA	probabilistic risk assessment
REMP	Radiological Environmental Monitoring Program
RG	regulatory guide
SAMDA	severe accident mitigation design alternative
SBO	station blackout
SC	steel-concrete
SER	safety evaluation report
SONGS	San Onofre Nuclear Generating Station
SFP	spent fuel pool
SNOC	Southern Nuclear Operating Company
SRM	staff requirements memoranda
SRP	Standard Review Plan

SSC	structure, system, and component
SSE	safe-shutdown earthquake
SUNSI	sensitive unclassified non-safeguards information
TMI	Three Mile Island
TS	technical specifications
U.S.	United States
USGS	United States Geological Survey
WQSM	Westinghouse Quality Systems Manual

References

The table below provides the Agencywide Documents Access and Management System (ADAMS) Accession Numbers for many key documents referenced in this Comment Response Document (CRD).

Description	ADAMS Accession Number
NUREG-1793: FSER for AP1000 Design, September 30, 2004	ML043570339
Information Notice 2006-01: "Torus Cracking in a BWR Mark I Containment," January 12, 2006	ML053060311
Federal Register Notice for AP1000 Design Certification, December 14, 2005	ML053130350
NUREG-1793, Supplement 1: Final Safety Evaluation Report for the AP1000 Design Certification Amendment, December 13, 2005	ML053410203
Interim Staff Guidance DC/COL-ISG-01, "Seismic Issues Associated with High Frequency Ground Motion," May 19, 2008	ML081400293
Information Notice 85-99: "Cracking in Boiling Water Reactor Mark I and Mark II Containments Caused by Failure of the Inerting System," December 31, 1985	ML082840475
Bulletin 84-01: "Cracks in Boiling Water Reactor Mark I Containment Vent Headers," February 3, 1984	ML082970346
Information Notice 84-17: "Problems with Liquid Nitrogen Cooling Components Below the Nil Ductility Temperature," March 5, 1984	ML083181180
Federal Register Notice for Interim Staff Guidance DC/COL-ISG-011 on Freeze Point for Design Basis Information, November 2, 2009	ML092890577
Interim Staff Guidance DC/COL-ISG-011 on Freeze Point for Design Basis Information, November 2, 2009	ML092890623
Final Report Inspection of Aged/Degraded Containments Program, September 2005	ML093490992
Information Notice 2010-12: "Containment Liner Corrosion," June 18, 2010	ML100640449
SECY-11-0002: AP1000 Proposed Rule, January 3, 2011	ML103000397
Advanced Final Safety Evaluation Report for AP1000, November 22, 2010	ML103260072
Redacted Version of Dissenting View of AP1000 Shield Building, December 3, 2010	ML103370648

Petition to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident, April 6, 2011	ML110970673
Charter for the Near-Term Task Force on Fukushima, March 30, 2011	ML11089A030
Petition to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident, April 19, 2011	ML111110851
Emergency Petition to Suspend All Pending Reactor Licensing Decisions and Related Rulemaking Decisions Pending Investigation of Fukushima Lessons Learned, April 20, 2011	ML111110862
Near-Term Task Force Report on Fukushima, SECY-11-0093, July 12, 2011	ML111861807
Petition to Terminate the Rulemaking on Design Certification of the AP1000 Reactor and to Declare it Null and Void, June 16, 2011	ML11171A014
Containment Liner Corrosion Operating Experience Summary, August 2, 2011	ML112070867
Comment Response Document	ML112212319
SRM to SECY-11-0093: Near-Term Task Force Report on Fukushima, August 19, 2011	ML112310021
Letter from Congressman Markey with Questions on AP1000, March 7, 2011	ML112450398
Response to Letter from Congressman Markey with Questions on AP1000, August 15, 2011	ML112450407
Commission Memorandum and Order, CLI-11-05, September 9, 2011	ML11252B074
ACRS Letter on Revision 19 to the AP1000 Design Control Document and the AP1000 Final Safety Evaluation Report, September 19, 2011	ML11256A180
Unique Comment Submittals (annotated)	ML11265A035 and ML11265A034
Form Letter and Additional Form Letter Submittals (annotated)	ML11265A050
Petitions (annotated)	ML11265A051

I. Introduction

This document presents the U. S. Nuclear Regulatory Commission's (NRC) responses to comments received on the proposed rule to amend the AP1000 design certification rule (DCR), Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, Appendix D. The proposed rule was published on February 24, 2011 (76 FR 10269). The public comment period closed on May 10, 2011.

Comment submissions on this proposed rule are available electronically at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this page, the public can gain entry into ADAMS, which provides text and image files of NRC's public documents.

This CRD is also available electronically at the NRC's Electronic Reading Room under ADAMS Accession No. ML112212319.

II. Description of Types of Comment Submissions

The NRC received three (3) different types of *comment submissions* on the proposed amendment to the AP1000 DCR. Throughout this document, a *comment submission* means a communication or document submitted to the NRC by an individual or entity, with one or more

individual *comments* addressing a subject or issue. The three types of comment submissions received on the proposed AP1000 amendment[1] were:

1. Comment submissions that were not identical or similar in content (*Unique comment submissions*)
2. Comment submissions with identical or similar content (*Form comment submissions*)
3. Comment submissions self-characterized as "Petitions" (*Petitions*)

The discussion below describes each type of comment su*bmission* in greater detail, provides additional information on electronic availability of the comment submissions, and explains how the comments from each type of comment submission are identified.

[1] Ten (10) documents were referred by the Commission to the NRC staff for consideration as comments in the AP1000 design certification amendment. *Memorandum and Order*, CLI-11-05 (September 9, 2011) (slip op.), pages 37-38, and footnotes 125, 128. The 10 documents are:

ADAMS Accession No. ML110970673, "2011/04/06-Petition to Suspend PR 52 AP1000 Design Certification Amendment from John D. Runkle, Counsel for Petitioners"

ADAMS Accession No. ML11122A081, "2011/04/29-Comment (39) of John D. Runkle on Behalf of AP1000 Oversight Group et. al., on Proposed Rule PR-52, Regarding Containment Flaws in the AP1000 Design Certification Amendment"

ADAMS Accession No. ML11131A062, "2011/05/10-Comment (54) of Russell J. Bell, on Behalf of the Nuclear Energy Institute, regarding Proposed Rule PR 52, AP1000 Design Certification Amendment"

ADAMS Accession No. ML11131A064, "2011/05/10-Comment (56) of R.F. Ziesing, on Behalf of Westinghouse Electric Company, on Proposed Rule PR-52, AP1000 Design Certification Amendment Rulemaking in Response to Petitions to Suspend Rulemaking"

ADAMS Accession No. ML111320596, "Petitioners' Motion for Modification of the Commission's April 19, 2011, Order to Permit a Consolidated Reply"

ADAMS Accession No. ML111320634, "Petitioners' Reply to Responses to Emergency Petition to Suspend All Pending Reactor Licensing Decisions and Related Rulemaking Decisions Pending Investigation of Lessons Learned From Fukushima Daiichi Nuclear Power Station Accident"

ADAMS Accession No. ML11139A149, "2011/05/10-Comment (57) of John D. Runkle, on Behalf of AP1000 Oversight Group, on Proposed Rule PR 52 AP1000 Design Certification Amendment"

ADAMS Accession No. ML11146A048, "2011/05/24-Comment (63) of John D. Runkle on Behalf of the AP1000 Oversight Group on Proposed Rules PR-52 to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident Implications on Design"

ADAMS Accession No. ML11171A014, "2011/06/16-Petition To Terminate The Rulemaking On Design Certification of The AP1000 Reactor And Declare It Null And Void from John Runkle"

ADAMS Accession No. ML11234A058, "Letter of R. F. Ziesing on Behalf of Westinghouse Opposing Proposed Rulemaking PR-52 Regarding Petition to Terminate the Rulemaking on Design Certification of the AP1000 Reactor and Declare it Null and Void."

This CRD includes the NRC's disposition of those documents as comment submissions. All of the documents are treated as Unique Comment Submissions with the exception of those documents self-characterized as "Petitions."

Treatment of Late-Filed Comments

The NRC determined that it was practical to consider comment submissions received on or before June 30, 2011. The NRC received five comment submissions after the May 10, 2011 end of the public comment period, but before June 30, 2011. This comment summary document provides the NRC's responses to these late-filed comment submissions. The NRC also received several comment submissions after June 30, 2011, but this CRD does not provide responses to those comments. However, the NRC has briefly reviewed them to ensure that there are no radiological health and safety matters within the regulatory purview of the NRC.

Unique Comment Submissions

The NRC received 66 *unique comment submissions*[2]. The NRC-designated identifier for each unique comment submission, the name of the submitter, the submitter's affiliation (if any), and the ADAMS accession number for each unique comment submission, are provided in Appendix 1 of this document.

One of the unique comment submissions deserves some additional explanation. Comment Submission S62 was originally submitted to the NRC as an allegation. The communication was submitted via e-mail to the NRC's allegation e-mail mailbox. The communication focused on the physical location of the safety-related battery bank for the AP1000 design, and the ability of the design to withstand a beyond-design-basis earthquake and flood such as that experienced at Fukushima Daiichi. The NRC's allegation review board (ARB) reviewed the communication and determined that it should not be characterized as an allegation, but rather as a public comment against the proposed rule. The concerned individual did not timely respond to the NRC's question as to whether the NRC should docket it anonymously or under the individual's name. Hence, Comment Submission S62 was docketed as an anonymous submission. The NRC staff then contacted the individual, informing the individual of the ARB's determination, and indicated that the NRC would treat the communication as an anonymous public comment submission.

Representative Markey Letter

On March 7, 2011, Representative Edward J. Markey sent a letter to Chairman Jaczko (ADAMS Accession No. ML110680273), which raised issues about the design of the AP1000, and requested answers to eight questions. The majority of the questions concerned the adequacy AP1000 shield building design. In an August 15, 2011, letter response from Chairman Jaczko (ADAMS Accession Nos. ML11080A015 and ML11083A077), the NRC provided answers to the questions, and indicated that the issues on the AP1000 raised in Representative Markey's letter would be treated as comments in the rulemaking. Representative Markey's letter is docketed in this rulemaking as Comment Submission S66.

[2] NOTE: The letter from Representative Markey to the NRC, and an allegation re-characterized as a public comment submission, are included in the tally of 66 unique comment submissions. However, Representative Markey's letter is described separately in this section.

Form Comment Submissions

The NRC received more than 13,500 form letter comment submissions that appear to be variations of two (2) "forms." The two forms set forth the same eight (8) comments, though each form presented those comments differently. The form letter comment submissions were submitted to the NRC as e-mail messages. The NRC entered each e-mail message into ADAMS and assigned an ADAMS accession number to each form comment submission. The NRC also created a document (table), which lists each form letter comment submission, the name of the submitter, and the ADAMS accession number assigned to that form comment. To view any form comment submission, go to the NRC's reading room at http://www.nrc.gov/reading-rm/adams.html. Enter ADAMS Accession No. ML11273A070 into the search box and then search that table for the form letter comment submission of interest and note the ADAMS accession number associated with that submission. To view the comment submission, enter the ADAMS accession number from the table into the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html.

The eight form letter comments and their responses are identified in Section IV, "NRC Responses to Comments on Proposed Rule," and organized under the subsection "Form Letter Comments and NRC Responses" and subheading "Form Letter Comments."

Approximately 112 of the form comment submissions also included one or more *additional comments* (*i.e.*, comments which were *in addition to* the eight comments). The ADAMS accession numbers for these 112 form comment submissions containing additional comments are listed in Appendix 2 of this document. The additional form letter comments and their responses are included in Section IV., "NRC Responses to Comments on Proposed Rule," and organized under the subsection "Form Letter Comments and NRC Responses" and subheading "Additional Form Letter Comments." While these additional form letter comments are unique, and could have been included in the Unique Comment Submissions section, the NRC instead decided to organize these comments by their comment submission source (form letters), as described in Section IV of this document.

Petitions

The NRC received three (3) submissions self-characterized as "petitions" during the public comment period, and one (1) "petition" after the comment period closed. All four (4) petitions were signed in whole or part by a single individual, John D. Runkle. However, three of the four petitions were signed on behalf of different entities and, in the case of one petition, 14 individuals. Each of the petitions is described in more detail below. The ADAMS accession numbers for these petitions are listed in Appendix 3 of this document.

1. "Petition to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident Implications on Design and Operational Procedures and Request for Expedited Consideration" (*April 6, 2011 Petition)* (Notated as "P1-X")

The April 6, 2011, Petition was submitted to the NRC as an attachment to an April 6, 2011, e-mail from John D. Runkle to the NRC (the five NRC Commissioners and the Secretary were addressees of the e-mail). The April 6, 2011, Petition was filed on behalf of the AP1000 Oversight Group, Bellefonte Efficiency and Sustainability Team, Blue Ridge Environmental Defense League, Inc. (BREDL), Citizens Allied for Safe Energy, Friends of the Earth, Georgia

Women's Action for New Directions, Green Party of Florida, Mothers Against Tennessee River Radiation, North Carolina Waste Awareness and Reduction Network (NC WARN), Nuclear Information and Resource Service, Nuclear Watch South, South Carolina Chapter - Sierra Club, and the Southern Alliance for Clean Energy.

2. "Petition to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident Implications on Design and Operational Procedures and Request for Expedited Consideration" (*Resubmitted Petition*) (Notated as "P2-X")

The Resubmitted Petition was submitted to the NRC as an attachment to an April 19, 2011, e-mail from John D. Runkle to the NRC (the e-mail was sent to the NRC's general e-mail mailbox for rulemakings). The Resubmitted Petition appears to be identical to the April 6, 2011, Petition (including an unchanged date of submission, *see* page 23 of the Resubmitted Petition), but includes the eight (8) attachments that were listed, but not actually included in the April 6, 2011, Petition.

3. "Emergency Petition To Suspend All Pending Reactor Licensing Decisions And Related Rulemaking Decisions Pending Investigation Of Lessons Learned From Fukushima Daiichi Nuclear Power Station Accident" (*Emergency Petition*) (Notated as "P3-X")

The Emergency Petition was submitted to the NRC and directed at the AP1000 design certification amendment (DCA) rulemaking, the (initial) economic simplified boiling water reactor (ESBWR) design certification rulemaking, and twenty-two (22) listed nuclear power plant (NPP) proceedings involving applications for construction permits, license renewals and combined licenses (COLs). The Emergency Petition was filed on behalf of a large number of organizations and individuals.[3]

The NRC is only considering those portions of the Emergency Petition addressing the AP1000 design certification in this CRD. The portions of the Emergency Petition addressing the ESBWR will be addressed in the ESBWR design certification rulemaking as a comment, consistent with the Commission's direction under *Memorandum and Order*, CLI-11-05, September 9, 2011.

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[3] The named organizations and individuals are the AP1000 Group, Beyond Nuclear, Inc., Blue Ridge Environmental Defense League, Inc. ("BREDL"), BREDL Chapter Bellefonte Efficiency and Sustainability Team ("BREDL"), Center for a Sustainable Coast, Inc., Citizens Allied for Safe Energy, Inc., Citizens Environmental Alliance of Southwestern Ontario, Inc., Don't Waste Michigan, Inc., Friends of the Earth, Inc., Friends of the Coast, Inc., Georgia Women's Action for New Directions, Inc., Green Party of Florida, Green Party of Ohio, Hudson River Sloop Clearwater, Inc., Keith Gunter, Michael J. Keegan, Dan Kipnis, Leonard Mandeville, Frank Mantei, Marcee Meyers, Edward McArdle, National Parks Conservation Association, Inc., Henry Newnan, Mark Oncavage, Missouri Coalition for the Environment, Inc., Missourians for Safe Energy, Mothers Against Tennessee River Radiation, New England Coalition, Inc., North Carolina Waste Reduction and Awareness Network, Inc., Northwest Environmental Advocates, Inc., Nuclear Information and Resource Service, Inc., Nuclear Watch South, Inc., Public Citizen, Inc., San Luis Obispo Mothers for Peace, Inc., Savannah Riverkeeper, Inc., Seacoast Anti-Pollution League, Inc., Sierra Club, Inc. (Michigan Chapter), Sierra Club (South Carolina Chapter), George Steinman, Shirley Steinman, Southern Alliance for Clean Energy, Inc., Gene Stilp, Harold L. Stokes, Southern Maryland CARES, Inc. (Citizens Alliance for Renewable Energy Solutions), Sustainable Energy and Economic Development Coalition, Inc., Marilyn R. Timmer, and the Village of Pinecrest, Florida.

The Commission is considering separately in an adjudicatory context those portions of the Emergency Petition addressing the 22 listed NPP proceedings.

4. "Petition to Terminate the Rulemaking on Design Certification of the AP1000 Reactor and to Declare it Null and Void (Docket ID NRC-2010-0131)" (*June 16, 2011, Petition to Terminate*) (Notated as "P4-X")

The June 16, 2011, Petition to Terminate was submitted to the NRC as an attachment to a June 16, 2011, e-mail from John D. Runkle to the NRC (the five NRC Commissioners and the Secretary were addressees of the e-mail). The June 16, 2011, Petition to Terminate was filed on behalf of the Friends of the Earth, NC WARN, and the AP1000 Oversight Group.

III. Overview of Public Comments

The NRC received over 13,500 comment submissions. Commenters included Westinghouse, the AP1000 applicant; nuclear utility and generation companies; industry organizations including Nuclear Energy Institute (NEI); non-governmental organizations; private citizens; and governmental bodies. Several comment submissions expressed support for the proposed amendment to the AP1000, while other comment submissions opposed the proposed amendment unconditionally. The vast majority of comment submissions favored delaying (in some fashion) the AP1000 amendment rulemaking until lessons are learned from the Fukushima Daiichi NPP (Fukushima) accident that occurred on March 11, 2011, and the NRC applies the lessons learned to United States (U.S.) nuclear power plants (NPPs), including the AP1000 design.

Many comments were considered to be out-of-scope of this rulemaking because the comment did not address the merits of the proposed amendment of the AP1000 DCR. Nonetheless, the NRC has prepared a response for each comment as described in Section IV of this document.

IV. NRC Responses to Comments on Proposed Rule

<u>Explanation of how comments and comment responses are organized</u>

The comments and NRC responses to the comments are first divided into three sections based on the comment submission source:

Unique comments
Form letter comments
Petitions

Within each section, comments are organized by subject area into the following eight sub-sections:

Fukushima-Related
Shield Building
Containment
Severe Accident Mitigation Design Alternative (SAMDA)
Spent Fuel
Environmental
Other AP1000 Topics
General Concerns

Each subject area (in some cases referred to as "category") appears in each section regardless of whether a comment was submitted in that subject area. For example, if there were no spent fuel comments in the petitions subject area, then the *Spent Fuel* subject area would appear under the petitions section with the word "None" underneath it. For some subject areas, comments are further organized under a group heading, e.g., Fukushima – 75-Day Public Comment Period. In the *Form Letter Comments* section only, comments are further divided under two different subheadings: "Form Letter Comments" and "Additional Form Letter Comments," reflecting whether the comment is a comment or an additional (i.e., "unique") comment, which was included in the form letter comment submission.

Comment identification format

All of the comment submittals are listed in Appendices 1 through 3. All comments are identified uniquely by using the format [W][X]-[Y], where:

[W] represents the comment submission type:

S = unique comment submission
F = form letter
P = petition

[X] represents the comment submission identification number:

For unique comment submissions use the comment submission ID from the first column of Appendix 1 in this document.
For form letter comments use the character "L."
For additional form letter comments use the comment submission ID in Appendix 2 in this document.
For petitions use the petition numbers in Appendix 3.

[Y] represents the comment number, which the NRC assigned to the comment. In some instances, lower-case alphabetic characters [Ya, Yb, Yc * * *] were added to a comment number after the initial designation of comments.

The comment numbers for each comment submission are provided in the following documents:

Unique comment submittals 1 through 57 (partial): ADAMS Accession No. ML11265A035
Unique comment submittals 57 (continued) through 66: ADAMS Accession No. ML11265A034
Form letter and additional form letter submittals: ADAMS Accession No. ML11265A050
Petitions: ADAMS Accession No. ML11265A051

Unique Comments and NRC Responses

Fukushima-related

This subject area includes comments requesting specific action (hold, suspend, terminate, or extend comment period) based upon the Fukushima Daiichi NPP accident. This subject area includes AP1000-specific comments, as well as more general comments (e.g., close all plants), as a result of Fukushima. Other Fukushima-related topics covered under this subject area include tsunami/earthquake, core cooling, station blackout (SBO), and the need for a second control room. This subject area excludes comments relating to another AP1000-specific subject area (e.g., shield building).

Before responding to specific comments based upon the Fukushima Daiichi Nuclear Power Plant Event, the NRC is providing this discussion about its ongoing actions underway in response to this event. The Commission created a Near-Term Task Force (NTTF) to conduct an analysis of the lessons that can be learned from the event. The task force was established to conduct a systematic and methodical review of NRC processes and regulations to determine whether the NRC should make additional improvements to its regulatory system. The NTTF issued a report (ADAMS Accession No. ML111861807) evaluating currently available technical and operational information from the events, and presented a set of recommendations to the Commission. The NTTF concluded that continued operation and continued licensing activities do not pose an imminent risk to public health and safety. Among other recommendations, the NTTF supports completing the AP1000 design certification rulemaking activity without delay (see NTTF Report pages 71-72).

In an August 19, 2011, Staff Requirements Memoranda (SRM) (ADAMS Accession No. ML112310021), the Commission set forth actions related to the NTTF report together with a schedule for the conduct of those actions. Two of those actions have been completed and are documented in the following reports: "Recommended Actions to Be Taken Without Delay from the Near-Term Task Force Report," September 9, 2011 (SECY-11-0124) (ADAMS Accession No. ML11245A127) and "Prioritization of Recommended Actions to be Taken In Response to Fukushima Lessons Learned," October 3, 2011 (SECY-11-0137) (ADAMS Accession No. ML11269A204).

Inasmuch as the NTTF recommendations relevant to the AP1000 design certification are limited to: seismic and flooding protection (Recommendation 2); mitigation of prolonged SBO (Recommendation 4); and enhanced instrumentation and makeup capability for spent fuel pools (SFPs) (Recommendation 7) and the task force concluded that the AP1000 design by the nature of its passive design and inherent 72-hour coping capability, AP1000 designs have many of the design features and attributes necessary to address the Task Force recommendations, the NRC concludes that no changes to the AP1000 DCR are required at this time. Moreover, even if the Commission concludes that at a later time that some additional action is needed for

the AP1000, the NRC has ample opportunity and legal authority to modify the AP1000 DCR to implement NRC-required design changes, as well as to take any necessary action to ensure that COLs, which reference the AP1000, also make the necessary design changes.

Fukushima – Do Not Build Any More Reactors

Comment: Because of the recent events at the Fukushima NPP in Japan, and other historical nuclear events such as Chernobyl and Three Mile Island (TMI), nuclear reactors should no longer be built. (S4-1, S7-1, S17-1, S21-1, S28-1, S38-1)

NRC Response: Several comments expressed concern about the use of nuclear power in light of the events at the Fukushima facility in Japan, as well as other historical events, such as Chernobyl (Russia) and TMI (U.S.). These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a licensing decision on whether to build new reactors. The NRC regulates the safe and secure use of nuclear materials, including NPPs. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements and guidelines. No change was made to the rule, the design control document (DCD), or the environmental assessment (EA) as a result of this comment.

Fukushima – Nuclear Power is Dangerous, Unsafe, and Unclean

Comment: The recent events at the Fukushima NPP in Japan have shown that nuclear power is dangerous, unsafe, and unclean. (S12-1, S13-1, S21-6, S21-7, S29-1, S36-2)

NRC Response: Several comments expressed general concern about the safety of nuclear power in light of the events at the Fukushima facility in Japan. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC's regulations provide reasonable assurance of adequate protection of public health and safety. The NRC reviewed the AP1000 design, as amended, and determined in its final safety evaluation report (FSER) that the design complies with all of the applicable regulations. Further, all U.S. NPPs are designed with multiple layers of protection, or "defense-in-depth," with structure, systems, and components (SSCs) that are designed to prevent an accident or, should an accident occur, minimize the consequences of an accident. The NRC continues to believe that the current regulations that apply to the AP1000 design, as amended, are adequate and that the AP1000 design is acceptable as described in the FSER.

The NRC interprets the comments regarding nuclear power being unclean to mean there are concerns with the long-term impact of spent fuel on the environment. The AP1000 design includes an SFP where spent fuel rods will be stored. In the Commission's Waste Confidence Decision and Rule (10 CFR 51.23(a)) (75 FR 81032), the Commission has made the generic determination that "if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations."

The transfer of spent fuel to a permanent repository or other facility is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101, et seq.) mandates that high-level wastes (such as spent fuel) are to be buried at a deep geologic repository.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Put Application on Hold to Consider Fukushima Lessons Learned

Comment: The approval of the AP1000 DCA should be put on hold until the lessons learned from the Fukushima event in Japan have been taken into consideration. (S6-1, S6-2, S8-2, S18-1, S20-1, S20-2, S29-10, S29-12, S33-2, S40-5, S48-1, S49-7, S51-1, S52-2, S57-2, S65-1)

NRC Response: The Commission declines to suspend or postpone the AP10000 rulemaking. See *Memorandum and Order*, CLI-11-05 (September 9, 2011, ADAMS Accession No. ML112521039). The reasons for the Commission action are set forth in CLI-11-05.

The Commission has taken and is continuing to take a series of actions to evaluate the Fukushima Daiichi Plant accident, identify possible regulatory actions, obtain stakeholder input, determine what actions should be adopted, and implement the Commission's determinations. In brief, the Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The Commission held a public meeting on July 28, 2011, to discuss the results of the NTTF Report with members of the public and other interested stakeholders. Thereafter, the Commission issued an SRM on the NTTF recommendations (reference SRM-SECY-11-0093, dated August 19, 2011, and SRM-COMWDM-11-0001/ COMWCO-11-0001, dated August 22, 2011). These SRMs directed the NRC staff to take several actions, notably to engage with stakeholders to review and assess the NTTF recommendations, provide the Commission with a draft charter for the NRC's longer term review of the NTTF recommendations, and to provide the Commission with papers recommending prioritization of the recommendations and which recommendations should be implemented, in part or in whole, without unnecessary delay.

The pendency of these NRC actions; however, does not support any delay in the AP1000 rulemaking. The NRC noted that the NTTF did not recommend any changes to the AP1000 design certification (see NTTF Report, pages 71-72). Therefore, delay in the AP1000 rulemaking process is not needed to ensure that the AP1000 reflects the recommendations of the Fukushima NTTF. Moreover, even if the Commission concludes that some additional action is needed for the AP1000, the NRC has ample opportunity and legal authority to modify the AP1000 DCR to implement NRC-required design changes, as well as to take any necessary action to ensure that COLs, which reference the AP1000 also make the necessary design changes. Such actions would follow rulemaking processes allowing for public comment. For these reasons, a delay in the AP1000 rulemaking is not necessary.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – AP1000 Design Features & Design-Basis Accidents Should Be Re-evaluated

Comment: In light of the Fukushima accident in Japan, the maximum credible design-basis accident (DBA) and design features for the AP1000 design must be re-evaluated. (S55-24, S55-26)

NRC Response: General concern was expressed about the validity of the maximum credible DBA and the AP1000 design features in light of the events at the Fukushima facility in Japan. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, as noted above, NRC requirements for all NPPs are being re-evaluated in light of the Fukushima accident. Further, all U.S. NPPs, including the AP1000, are designed with multiple layers of protection, or "defense-in-depth," with SSCs that are designed to prevent an accident or, should an accident occur, minimize the consequences of an accident. Maximum credible DBAs are analyzed in accordance with Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 2, which requires the design bases for SSCs that are important to safety, including the safety-related batteries, to reflect the most severe natural phenomena (including earthquakes, tornadoes, floods, hurricanes, and tsunamis) that have historically been reported for the site and surrounding area, with margin to account for uncertainty in the historical data, such that these SSCs will withstand the effects of natural phenomena without the loss of the capability to perform their safety functions. The AP1000 safety-related SSCs (including the Auxiliary Building, which houses the safety-related batteries) are designed to withstand the effects of seismic events and external floods. The AP1000 design, as described in the DCD, meets the requirements of GDC 2 with respect to such seismic events and floods. Under 10 CFR Part 52.79(d), an applicant for a COL referencing the AP1000 standard design will be required to demonstrate that the site characteristics, including seismic events and floods, fall within the site parameters specified in the AP1000 DCD, which were used to establish the design bases for the standard design. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Review Safety Issues of Use of Nuclear Power and Materials

Comment: As a result of the event at Fukushima, all U.S. reactors should be re-evaluated and reviewed for safety issues and to demonstrate their ability to withstand natural disasters or DBAs. (S24-2, S48-2, S49-1, S49-6, S52-1, S55-15, S58-1)

NRC Response: Several comments expressed concern about the safety of all currently operating U.S. nuclear plants in light of the events at the Fukushima facility in Japan. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, as noted above, NRC requirements for all NPPs are being re-evaluated in light of the Fukushima accident. Further, all U.S. NPPs are designed with multiple layers of protection, or "defense-in-depth," with SSCs that are designed to prevent an accident or, should an accident occur, minimize the consequences of an accident. The SSCs that are important to safety are designed to withstand the effects of the most severe natural phenomena (including earthquakes, tornadoes, floods, hurricanes, and tsunamis) that have historically been reported for the site and surrounding area, with margin to account for uncertainty in the historical data, such that these SSCs will be available to perform their safety functions. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Fast-Tracking Concerns

Comment: The NRC should not "fast-track" the approval of any reactors without pausing to learn from Fukushima. (S17-2)

NRC Response: The NRC agrees with the comment. Protection of public health and safety is the foremost regulatory objective of the NRC, and the review of the AP1000 design has been conducted with that in mind. The NRC also recognizes that it must perform its regulatory responsibilities in an efficient and effective manner. The NRC has not ignored any safety issues in order to speed up the regulatory review process or for any other reason. The NRC has followed all applicable procedures and processes in its safety review and has found that the AP1000 DCA meets all NRC requirements.

In addition, the Commission established an NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to regulatory framework that should be conducted by the NRC. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011, recommending that the AP1000 rulemaking process proceed without delay (see NTTF Report, pages 71-72). Consistent with this recommendation, the NRC believes that the AP1000 final rulemaking can and should proceed without delay because: (i) the NRC has determined that the AP1000 DCA meet current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iv) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so under 10 CFR 52.63.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – 75-Day Public Comment Period

Comment: Given the recent event at the Fukushima plant in Japan, the 75-day comment period is not adequate and should be extended. (S8-4, S24-3, S29-11, S49-2)

NRC Response: The NRC disagrees with this comment, and believes that the 75-day public comment period, which is consistent with most other NRC technical rulemakings, is adequate. The Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The public comment period for the proposed rule on the AP1000 DCA closed on May 10, 2011, and the NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The NTTF considered the AP1000 DCA in its report. The NTTF Report noted that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing the AP1000 design certification rulemaking without delay (see NTTF Report, pages 71-72).

The Commission directed the NRC staff, via SRM, to request public input on the NTTF recommendations for the purpose of providing the Commission with fully-informed options and recommendations (SRM-SECY-11-0093, dated August 19, 2011 (ADAMS Accession No. ML112310021), and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011).

To the extent that the Commission might approve any NRC staff recommendations to impose additional requirements on the AP1000 design, the NRC can amend the AP1000 DCR to reflect those requirements. Any Commission-imposed changes would be subject to the issue finality provisions of 10 CFR 52.63(a)(1) and would have to meet one or more of the change criteria of that paragraph.

The NRC believes that the AP1000 final rulemaking can and should proceed without extending the public comment period because: (i) the NRC has determined that the AP1000 DCA meets current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iii) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so under 10 CFR 52.63.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Cooling Capabilities

Comment: Several comments raised concerns about the AP1000's capability to maintain reactor core cooling following a major natural disaster, given the recent events at the Fukushima plant in Japan. (S49-4, S53-6)

NRC Response: The NRC interprets these comments to refer to the severe external environmental conditions experienced at Fukushima and the resultant accident. The AP1000 design can withstand severe external environmental hazards such as fires, flooding, tsunamis, high winds, hurricanes, tornadoes, snow and ice, impacts, and seismic events that are considered credible in the U.S. The AP1000 design was previously analyzed for these severe environmental conditions as part of the initial design certification; therefore, these comments are out of scope. Moreover, the AP1000 design, as amended, continues to meet NRC requirements. Westinghouse has shown and the NRC has concluded in its review as documented in the FSER (NUREG-1793, Supplement 2) that the AP1000 design can keep the reactor properly cooled under these severe environmental conditions, thus providing reasonable assurance that the public is protected.

The Fukushima accident occurred, in part, because of the loss of ac power (also known as SBO), which was necessary to maintain core cooling. The AP1000 design has a passive safety system (natural circulation) and inherent 72-hour coping capability for core, containment, and SFP cooling – even if a loss-of-coolant accident (LOCA) has occurred.

After 3 days with no alternating current (ac) power, only a small "ancillary" generator is needed. This generator is used to power a small pump that re-fills the tank that supplies water to the outside surface of the containment. The AP1000 design provides two such generators that are installed in a seismically qualified structure (along with their fuel and supporting equipment). The AP1000 design includes provisions to support emergency operating protocols such that

after 1 week without ac power, the containment can be cooled indefinitely by replenishing fuel supplies for at least one ancillary generator and replenishing water in the water tank above the shield building. The NRC has reviewed these AP1000 design features and operational provisions and concluded that they meet NRC requirements. These features of the AP1000 design demonstrate that the reactor can be properly cooled during accident conditions.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Other Comments

Comment: *Given the recent events in Japan, is it possible to have* a *SBO during full-power operation lead to the containment being filled with steam by the activation of the automatic depressurization system (ADS). (S2-1)*

NRC Response: SBO is not expected to lead to the actuation of the ADS. The passive residual heat removal heat exchanger within the in-containment refueling water storage tank (IRWST) provides the necessary core cooling. The AP1000 plant is designed to protect the core during and after disasters. The NRC evaluates all appropriate disasters for each chosen site. Adequate cooling of the reactor during and after all DBEs is provided by the safety-related cooling system of the AP1000, which does not require external power of any kind to perform its function. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should re-examine the entire AP1000 reactor in light of the lesson learned from the Fukushima Daiichi Plant accident concerning SFPs, backup power, containment integrity and redundant cooling systems. (S63-4)

NRC Response: The NRC disagrees with this comment. The Fukushima NTTF has completed its analysis of the Fukushima Daiichi accident. The NTTF Report indicates that no change to the AP1000 design certification rulemaking is necessary, because of, among other things, the passive design features of the AP1000. The comment did not present any independent information showing any particular safety problem with the AP1000 design, and the Markey Report attached to the comment does not mention the AP1000 design, as it is focused on currently operating reactors. For these reasons, the NRC declines to adopt the comment's suggestion. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: After an initial look at lessons learned from Fukushima, there is a definite need for a backup offsite shielded reactor plant control center with full reactor plant status can be managed. (S52-1c, S55-16)

NRC Response: The NRC interprets this comment to mean that the habitability of the control room as proposed in the AP1000 design is not adequate in light of the Fukushima accident. The AP1000 control room is designed to protect reactor operators and the associated plant monitoring and control functions during normal operation, DBEs, and severe accidents. The AP1000 main control room emergency habitability system (VES) is a passive system design that consists of safety-related canisters of air that supply the control room with fresh, uncontaminated breathing air. The system does not require ac power to function and is required to function for 72 hours. The design also has a separate (nonsafety-related) ac-powered control room ventilation system. Control room instrumentation can be powered with battery-supplied direct current (dc) power. Specific details of the NRC's review of the control

room design may be found in the FSER Section 6.4, “Control Room Habitability Systems” (NUREG-1793, Supplement 2).

The Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The NTTF’s recommendations considered improving the safety of both operating reactors and new reactor designs. The Commission directed the NRC staff, via SRM, to request public input on the NTTF recommendations for the purpose of providing the Commission with fully-informed options and recommendations (SRM-SECY-11-0093, dated August 19, 2011 (ADAMS Accession No. ML112310021), and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011). The NRC believes that current operating reactors are safe and continue to meet NRC requirements. Further, a backup, offsite, shielded reactor plant control center with full reactor plant status would constitute a new requirement. If the NRC imposes additional requirements on new or currently operating reactors, existing regulations already exist defining the process for doing so. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: After an initial look at lessons learned from Fukushima, we cannot expect structural volumes and 'channels' to maintain structural integrity. We should also expect the immediate ground underneath these structures to be porous (earth). Thus, design of these volumes and channels should be such that they minimize connections to other (adjacent) volumes from which contaminated (liquid) effluents can flow. (S52-1j)

NRC Response: The NRC disagrees with this comment. Applicants for a license must demonstrate that the plant can shutdown safely after specified ground motion based upon consideration of the most severe earthquake that has been historically reported for the site and surrounding area, with margin sufficient to account for the limited period of time, quantity and accuracy of the historical data. The applicant must show that there is a large margin in the seismic capacity of all of the safety-related SSCs necessary for safe-shutdown. The applicant also performs a severe accident analysis (a “seismic margins” analysis) to show that there is still a high confidence of low probability of failure – even if an earthquake occurs that is much larger than predicted. The containment vessel of the AP1000 and the piping systems penetrating the containment are designed to isolate potentially contaminated fluids from the environment during all DBEs and severe accidents.

In addition, Appendix A to 10 CFR Part 50, “General Design Criteria for Nuclear Power Plants,” Criterion 2, requires that SSCs important to safety (e.g., the liquid waste management system), be designed to withstand the effects of natural phenomena (including earthquakes, tornadoes, floods, hurricanes, and tsunamis) that have historically been reported for the site and surrounding area, with margin to account for uncertainty in the historical data, such that these SSCs will withstand the effects of natural phenomena without the loss of the capability to perform their safety functions. These SSCs are designed to withstand accident conditions in combination with the effects of natural phenomena. Technical Specifications include the design feature specifications for the liquid waste management system that limit the volume and type of tank contents to reduce the potential for a release. The NRC has concluded in its evaluation (NUREG-1793, Supplement 2) that the AP1000 design, as amended, meets NRC regulations.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Shield Building

This subject area includes comments relating to the AP1000 shield building design.

To help readers understand the NRC's responses to public comments on the shield building, a brief description of the shield building is presented below, together with a summary of the changes to the shield building that are being approved by the amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

The shield building performs multiple functions, e.g., to provide a biological shield to high-energy radiation, to support the primary containment cooling water storage tank on the roof, to shield the steel containment from high velocity debris that may be generated by tornadoes or other natural phenomena, and to function as a "chimney" to enhance airflow over the primary steel containment to remove heat from the containment and reduce containment pressure in the event that post accident cooling of the containment would be necessary. While other designs have included shield buildings of reinforced concrete, with the exception of the AP600 design, they did not perform cooling functions. The shield building is not intended to be a pressure retaining structure or to mitigate the effects of a containment failure. The shield building construction is primarily a steel-concrete (SC) composite module wall, with a reinforced concrete roof and reinforced concrete where the wall meets the foundation. The wall is appropriately reinforced and sized where the composite wall module joins the reinforced concrete sections and as appropriate to accommodate seismic loads and aircraft loads. This design is new to the amendment; previously the structure was all reinforced concrete.

The shield building and the containment are designed with a gap, or annulus, that ensures that both the shield building and steel containment are physically separate, excluding their foundation, and are considered to be "freestanding." In the shield building, air flows from the environment through openings in the shield building wall. The air then flows down along an interior baffle, turns toward the steel containment vessel, and then rises alongside the steel containment vessel where it absorbs heat. This heated air naturally rises and is then exhausted through the chimney located in the center of the primary containment cooling storage water tank.

Design changes to the passive containment cooling system and shield building principally involve the redesign of the shield building to a steel-composite design, with related changes to air inlet sizing, height of the building and gratings above the chimney opening. Revised safety analyses were performed to confirm adequate containment pressure control, capability of the shield building to withstand external events (tornado, seismic), as well as aircraft impact assessment (AIA). The shield building functions to protect the containment and facilitate passive containment cooling were not changed in the current amendment.

Shield Building – Ductility

Comment: Many comments indicated that the shield building could shatter because structural modules were too brittle. Further, the comments indicated that the nonconcurrence of Dr. John Ma raised this issue and should be addressed before completing the rule. (S24-4, S29-7, S29-8, S40-3, S48-3, S49-8, S49-9, S53-4, S55-19, S66-3)

NRC Response: The NRC disagrees that the shield building is too brittle, and that the NRC has not addressed Dr. Ma's concern before moving forward with the rule. Professional opinions may vary, and the NRC has in place mechanisms for making differing views known and resolving any issue a differing view may raise. NRC employees can choose to exercise the nonconcurrence process as a way of communicating their views and ensuring their opinions are heard by NRC management. Dr. John S. Ma, who is an NRC engineer, used this open process to express concerns regarding the design of the AP1000 shield building. The specific concerns and the NRC staff response to the nonconcurrence are publically available at ADAMS Accession No. ML103370648. The technical issues are explained below.

The AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never before reviewed by the NRC. The NRC staff conducted a careful review of the unique and complex design of the shield building to ensure that under design-basis loads (also called "demands"), including the safe-shutdown earthquake (SSE), the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC relied on the applicable regulatory requirements, such as Appendix S to 10 CFR Part 50, "Earthquake Engineering Criteria" and Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plant Structures." The NRC staff utilized the implementation guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)" and independent reviews by seismic design experts to ensure that the shield building met the applicable regulatory requirements. The bases for the NRC's acceptance of the design are documented in its Safety Evaluation Report (SER) and include the following:

(a) The calculation of design-basis seismic demands was consistent with NUREG-0800 and followed industry standard analysis methods.

(b) Testing of composite SC elements validated the applicability of American Concrete Institute (ACI)-349 code design equations to the SC shield building structure.

(c) Under design-basis loading, the analyses results showed that the shield building stresses, strains, and displacements would be small and that there are sufficient margins with respect to ACI-349 code provisions.

(d) Seismic loads induce small out-of-plane shear forces, which are substantially less than the provided capacity.

(e) The structural response under the Review Level Earthquake (1.67 SSE) shows that although yield would start in a few locations, the strains would still be small.

(f) Under design-basis impulse loads such as tornado-generated missiles, the calculated out-of-plane shear stresses are well below those necessary to induce inelastic deformation.

(g) The AIA performed by the applicant in accordance with 10 CFR 50.150 showed that there would be no perforation of the shield building due to impacts in the non-ductile (more brittle) region.

(h) Collectively, the design-basis and beyond-design-basis analyses conducted by the applicant demonstrated that the out-of-plane shear is not a concern for design-basis loads in the non-ductile region of the shield building, and there is substantial margin in the design above design-basis loads.

The NRC, therefore, concluded from its evaluation that the AP1000 shield building design is adequate, because it meets the Commission's regulations and provides reasonable assurance that the shield building will remain functional under design-basis loads. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comments urge the Commission not to finalize its pending approval of the AP1000 reactor design until serious safety concerns about its shield building have been addressed. These concerns include that there is a risk that an earthquake at, or aircraft impact on, the AP1000 could result in a catastrophic core meltdown. (S40-1, S40-2, S48-4, S66-1)

NRC Response: The NRC disagrees that NRC has not addressed the concerns relating to the shield building. The AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never before reviewed by the NRC. The NRC staff conducted a careful review of the unique and complex design of the shield building to ensure that under design-basis loads, including the SSE, the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC relied on the applicable regulatory requirements, such as Appendix S to 10 CFR Part 50, "Earthquake Engineering Criteria" and Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plant Structures." The NRC staff utilized the implementation guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)" and independent reviews by seismic design experts to ensure that the shield building met the applicable regulatory requirements. The bases for the NRC's acceptance of the design are documented in its FSER.

The NRC, therefore, concluded from its evaluation that the AP1000 shield building design is adequate, because it meets the Commission's regulations and provides reasonable assurance that the shield building will remain functional under design-basis loads. Because the shield building concerns have been resolved, the NRC concludes that there is no reason to delay the amendment to the rule certifying the AP1000 design. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The Commission has apparently accepted Westinghouse's argument that the brittle module design would only be used in regions of the building that are unlikely to encounter high loads. Thus the failing tests were ignored. Instead of relying on the results from the test intended to prove the shield building's design, Westinghouse substituted results from computer simulations that may be a poor approximation of reality. The AP1000 design should not be approved when the material making up 60 percent of the shield building, an essential structural component that is meant to withstand earthquakes, storms, and airplane strikes, has failed a critical physical test showing it to be brittle. (S66-3)

NRC Response: Through the detailed review of the application, the NRC staff reached a conclusion that there is reasonable assurance that the design of the shield building, including the region of the building with modules with the wider spacing (Module 2), meets regulatory requirements and will remain functional under design-basis loads with substantial margin. The bases for accepting the design of the AP1000 shield building and associated modeling assumptions are described in the responses to Comments S24-1 and S40-1, and more fully in the FSER. The specific issues regarding ductility arose around SC Module #2 and the out-of-plane shear test that resulted in a non-ductile failure mode under specific testing

conditions. These testing conditions were intended to represent a limiting condition for out-of-plane shear loading, which is not expected to be realized in the actual structure. While both the nonlinear seismic and AIA analyses performed by the applicant were capable of modeling this non-ductile behavior if similar conditions existed, no such response was predicted by the analyses.

In fact, the AIA analysis predicted that the shield building, including Module #2, would behave in a ductile manner by exhibiting large deformations under aircraft impact loading with significant margin before failure, including out-of-plane shear failure. In addition, NRC conducted inspections of Westinghouse's AIA for the shield building and concluded it would withstand the impact.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comment states that the AP1000 shield building design has evidently failed to meet the standards of the ACI, despite these being endorsed by NRC. Westinghouse has not complied with the ACI "Code Requirements for Nuclear Safety-Related Concrete Structures" (ACI-349). The design fails to meet the Code because ACI-349 requires the structure to be ductile. (S66-4)

NRC Response: By way of background, the AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never before reviewed by the NRC. The NRC staff conducted a careful review of the unique and complex design of the shield building to ensure that under design-basis loads, including the SSE, the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC relied on the applicable regulatory requirements, such as Appendix S to 10 CFR Part 50, "Earthquake Engineering Criteria" and Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plant Structures." The NRC staff utilized the implementation guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)" and independent reviews by seismic design experts to ensure that the shield building met the applicable regulatory requirements.

The specific issues regarding ACI-349 standards regarding ductility arose around SC Module #2 and the out-of-plane shear test that resulted in a non-ductile failure mode under specific testing conditions. These testing conditions were intended to represent a limiting condition for out-of-plane shear loading, which is not expected to be realized in the actual structure. While both the nonlinear seismic and AIA analyses performed by the applicant were capable of modeling this non-ductile behavior if similar conditions existed, no such response was predicted by the analyses. In fact, the AIA analysis predicted that the shield building, including Module #2, would behave in a ductile manner by exhibiting large deformations under aircraft impact loading with significant margin before failure, including out-of-plane shear failure.

For the above reasons, the NRC concluded that the AP1000 shield building design meets the Commission's regulations and provides reasonable assurance that the building will remain functional under design-basis loads. Independent reviews by the NRC' s Office of Nuclear Regulatory Research and the Advisory Committee on Reactors Safeguards (ACRS) agreed with the NRC staff's conclusion that the design meets regulatory requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: To ensure the safety of the AP1000, and any future reactor designs involving SC composites, the NRC should develop a standard for this novel type of design that would apply both to the AP1000 and other reactor designs that might seek to use it in the future. The NRC ACRS notes that "the effort and scope of analysis and assessment required for the shield building in this case suggests that if SC composites are to be more widely used in nuclear applications, a consensus code should be developed, as has been done for other types of nuclear construction." The Commission should reverse its approval of the AP1000 until such a standard is developed, and then apply this standard to the AP1000 before reconsidering the design. (S66-5)

NRC Response: The NRC disagrees that it is necessary to await development of a consensus standard before approving a design. Rather, the NRC may approve a design based upon design-specific analyses. See NRC response to the previous comment. Consensus design codes are developed in a collaborative process through standards development organizations, such as the ACI and the American Institute of Steel Construction (AISC). As a stakeholder, the NRC participates in the voluntary consensus standards setting process to provide regulatory perspectives and assure relevance to regulatory reviews, but the NRC does not "develop" voluntary consensus standards. Moreover, unless such standards are incorporated into NRC regulations, they are not binding on applicants or licensees. The NRC is currently participating in an effort by the AISC to develop a consensus standard for SC composite structures similar to those used in the AP1000 shield building. The AISC has not issued a final voluntary consensus standard for SC composite structures. However, should such a voluntary consensus standard be issued by the AISC, then the NRC will consider using this new standard.

In view of the above, the NRC will not suspend the rulemaking to amend the certification of the AP1000 design to await the development of such a code and the application of that code to the AP1000 amendment. For both codified and endorsed codes and standards, NRC regulations allow the use of alternative approaches, provided the proposed alternative would provide an acceptable level of quality and safety. The applicant met NRC regulations regardless of the lack of a consensus standard for SC composite structures.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Shield Building –Testing and Analysis

Comment: The comment states that Westinghouse's conclusions are based on questionable computer simulations in place of the physical tests that it should have done. The computer analysis that Westinghouse did was flawed, because it used off-the-shelf, commercially available codes to evaluate a first-of-its-kind design that could not be expected to be accurately modeled in this manner. (S66-6)

NRC Response: There are inherent uncertainties associated with modeling codes, including the commercially available general purpose analysis codes such as ANSYS, LS-DYNA, and ABAQUS used by the applicant. These analysis codes are extensively used in the nuclear industry, as well as in other industries, to solve highly complex physical and numerical modeling problems, including the response of concrete components under impact and impulsive loads, and the uncertainties are well-quantified.

As discussed in detail in the SER, modeling uncertainties were recognized and accounted for in the analysis and design of the AP1000 shield building. In the analyses under design-basis loads such as SSE, tornadoes, and wind, the applicant used conservative material properties for concrete and steel. That is, the properties assumed for the analyses were not as robust as the actual material properties. Load amplification factors and capacity reduction factors were utilized. The applicant used realistic three dimensional finite element models with varying degrees of refinements to minimize uncertainties associated with irregular geometry and stiffness variation and to represent complex dynamic response. The use of these conservative assumptions collectively outweighs the uncertainties in the computer codes.

The applicant also recognized and addressed modeling uncertainties in the AIA. The assessment was performed in accordance with the NEI methodology, NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs." This methodology addresses uncertainties through various conservative assumptions including material properties, load characterization, and failure criteria. For this analysis, the applicant developed a realistic nonlinear three dimensional model of the shield building, which was benchmarked to relevant international impact tests of composite SC wall panels. The analysis results showed that the shield building, including Module #2, would behave in a ductile manner by exhibiting large deformations under aircraft impact loading with significant margin before failure, including out-of-plane shear failure.

The NRC staff concluded that the applicant appropriately applied the modeling codes to the AP1000 shield building design and appropriately considered and accounted for modeling uncertainties, and that the design meets regulatory requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Westinghouse does not appear to have considered the back-and-forth forces ("cycle dynamic loading") that occur during an actual earthquake. The "static push-over" analysis that Westinghouse did may therefore have been inappropriate because it failed to accounts for the real back-and-forth forces in an earthquake. (S66-7)

NRC Response: As discussed in the FSER, the NRC performed a detailed review of the AP1000 shield building analysis and carefully considered issues related to: acceptability of analyses results, and the interpretation of the pushover analysis results.

(a) Throughout the review process, the NRC (with support from expert consultants) identified additional information needed to complete the review and provided its evaluation of the acceptability of the analysis results. The applicant responded to the NRCs questions and revised the application to reflect issue resolution. The NRC staff found the analyses results as documented in the final application to be acceptable.

(b) The applicant conducted analysis for loads well-beyond the design-basis loads in the form of a pushover analysis. The pushover approach is an accepted industry practice for estimating the inelastic response of structures to seismic loading. The NRC staff recognizes the limits of applicability of the pushover method and confirmed that the applicant addressed these limitations in its implementation of the method. Because the dominant horizontal vibration mode of the shield building is similar to that of a cantilever-beam, the pushover analysis provides responses (stresses, strains, and displacements) that are comparable to those obtained from a dynamic analysis. The

pushover analysis is performed by calculating shield building responses resulting from increasing levels in horizontal seismic demands. The analysis is usually performed until a structural limit state is reached such as buckling, concrete crushing, or steel reinforcement failure. For the shield building structure, these limit states are well above the SSE level seismic demands and therefore bound the results of SSE level dynamic seismic analysis. The pushover analysis confirmed that, up to the SSE demands, the shield building would respond in the elastic range with small stresses and strains. The structure response to the Review Level Earthquake (1.67 SSE) shows that, although yield would start in a few locations, the strains would still be small and out-of-plane shear failure would not occur.

The NRC concluded that the AP1000 shield building design meets regulatory requirements and appropriately considered the loads. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Westinghouse should re-do its analyses without use of the "seismic wave incoherency model to effectively reduce…ground motion" during an earthquake. The earthquake forces are underestimated, and the NRC should require that estimates of seismic forces be drawn from consensus, peer-reviewed scientific literature. (S66-9)

NRC Response: The NRC interprets this comment to relate to the use of incoherent ground motion in the seismic analysis of the Westinghouse AP1000 standard plant. The concept of incoherent seismic ground motion has been documented in the open literature since the 1980s. The nuclear industry originally proposed the use of incoherency models in the seismic analysis of new NPPs. The approach presented to the NRC was based on mathematical models published in peer-reviewed technical journals and reports. In support of the NRC's assessment of the proposed approach, a panel of experts in the fields of seismic design, site-response, and soil-structure interaction was established to conduct a thorough review. The NRC review process also included several interactions with stakeholders in public forums. These stakeholders did not identify any concerns with the use of the concept of incoherent seismic ground motion. The NRC found the approach acceptable and provided implementation guidance in Interim Staff Guidance (ISG) DC/COL-ISG-01, "Seismic Issues Associated with High Frequency Ground Motion."

Based on the Westinghouse use of an approach consistent with DC/COL-ISG-01, the NRC found Westinghouse's implementation of incoherency models acceptable for the seismic design of SSCs. Accordingly, the NRC disagrees that re-calculation of seismic demands is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should require Westinghouse -Toshiba to provide real-world testing of the AP1000 shield building design, rather than justify the design adequacy through analysis (calculations). Once this information is provided, the NRC should provide an additional opportunity for public comment on the shield building. (S63-3)

NRC Response: The NRC interprets this comment as proposing that further testing of the steel composite modules that are part of the shield building design is necessary. The NRC disagrees with this comment. In its FSER, the NRC concluded that Westinghouse had performed sufficient testing to benchmark the computer analyses. Tests were conducted for various parts of the structure (wall and connections) for multiple loading conditions. In particular, the staff

concluded that testing of composite SC elements validated the applicability of ACI-349 code design equations to the SC shield building structure. Therefore, there is no need for further testing. The NRC noted that some of the testing that was done subjected a module section to loads much higher than predicted to occur and that the specimen failed under the extreme loading. Since the analysis results were made available for public comment, and there is no need for further testing, there is no new information warranting an additional opportunity for provide for public comment.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should require Westinghouse, and other reactor license applicants, to complete and pass physical tests of all materials used in the design, rather than using computer models to substitute for tests that their materials have failed. There should be clear regulations indicating any exceptions where computer analyses are appropriate – and these regulations should require the use of code that is suitable to the design of the particular reactor under consideration. Where computer models are necessary, the NRC should set standards defining the quality of the models that applicants are required to use, and should conduct independent validations of those models and of the original code. (S66-8)

NRC Response: The NRC interprets this comment as proposing, in part, that further testing of the steel composite modules is necessary. The NRC disagrees with this comment. In its FSER, the NRC concluded that Westinghouse had performed sufficient testing to benchmark the computer analyses. Tests were conducted for various parts of the structure (wall and connections) for multiple loading conditions. In particular, the NRC concluded that testing of composite SC elements validated the applicability of ACI-349 code design equations to the SC shield building structure. The NRC noted that some of the testing that was done subjected a module section to loads much higher than predicted to occur and that the specimen failed under the extreme loading. As explained above, the test failure was not material to the NRC's ultimate conclusion regarding the shield building.

Standard engineering practice is to conduct benchmarking when new codes or applications of codes are planned to help verify that the results of the analyses are representative of performance. For the analysis of the shield building, the applicant developed a realistic nonlinear three dimensional model of the shield building, which was benchmarked to relevant international impact tests of composite SC wall panels as well as tests performed at Purdue University. In its FSER, the NRC, with independent advice from outside experts, accepted the combination of analysis and testing to demonstrate adequacy of the building design.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC did not require full scale testing of the shield building as it did for the Mark 3 containment. (S55-13)

NRC Response: The shield building is not the containment; thus, a previous decision on testing for a containment design is not relevant to the DCA. The NRC accepted the benchmarking testing done for the shield building as sufficient to support the analysis, as discussed in the FSER and other comment responses above. To the extent that this comment refers to testing of the containment, this is discussed in the Containment section below. No change was made to the rule, the DCD, or the EA as a result of this comment.

Shield Building – Other Comments

Comment: The original code and data should be made available for public review, while accounting for real proprietary and security concerns. As it stands, Westinghouse may be relying on defective models that provide no meaningful assurance of whether the reactor is safe. (S66-8)

NRC Response: The NRC carefully weighs the commercial impacts of public release of information with the public's wish to view such information. Because of the novel design of this structure, the applicant performed many analyses and tests to prove its adequacy. The NRC made as much information public as possible while still satisfying its obligations to appropriately protect valuable trade secret or commercial information. Further, the proposed rule included provisions by which a person wishing to comment on the rule could seek access to the protected information. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: One comment states that there is new evidence, made publicly available after the close of the public comment period, of flaws in the AP1000 reactor shield building design information. This new information shows that that Dr. John Ma's analysis, which he prepared in support of his nonconcurrence, "conclusively demonstrates that the Westinghouse-Toshiba calculations on structural integrity are inadequate and do not meet either NRC or American Concrete Institute requirements." (S63-2)

NRC Response: The NRC interprets this comment as referring to two technical issues that were identified during Spring 2011. They relate to combinations of seismic and thermal demands for the shield building and the method used to analyze the water storage tank for seismic events. The NRC conclusions about these matters are summarized below and in the FSER. For the reasons described below, the NRC disagrees that the calculations of structural integrity are inadequate and do not meet applicable requirements.

In the advance final safety evaluation report (AFSER) (December 2010) Section 3.8.4.1.1.3.1,"Design Methodology and Process for the Shield Building Design" and in NUREG-1793, Section 3.8.4.3, "Loads and Load Combinations," the NRC staff accepted ACI-349 load combinations as part of Westinghouse's design criteria for the shield building. AFSER Section 3.8.4.1.1.3.4 summarizes the NRC staff's basis for accepting the seismic demands on the shield building. The thermal analysis criteria and approach were accepted by the NRC staff in AFSER Section 3.8.4.1.1.3.10, "Daily Temperature and Thermal Effects" and NUREG-1793, Section 3.8.3.4.3, "Thermal Analysis." The NRC staff's review of DCD Revision 19 and supporting calculations indicates that Westinghouse has addressed the impact of the combined thermal and seismic loads on the shield building design utilizing methods and procedures consistent with DCD Revision 18 commitments.

In reference to the NRC staff's acceptance of the shield building design, demand-to-capacity ratios were relevant factors in the NRC staff's acceptance of the use of composite SC modules. Revised analysis results indicate that demand-to-capacity ratios for the shield building have increased slightly as a result of combining both thermal and seismic effects. Even with these increases, ample margin remains in the design relative to the ACI-349 code allowable capacity

limits. Therefore, the NRC staff's position on the acceptability of the composite SC modules remains unchanged.

DCD Revision 18 did not reflect the implementation of the seismic analysis method for the passive containment cooling system (PCCS) tank as committed to by Westinghouse in the shielding building report. To address this issue, Westinghouse revised the DCD to reflect the implementation of the methodology committed to in the shield building report and updated an analysis input parameter in the calculation of the seismic demands. No design changes resulted. Revision 19 of the DCD includes an updated description of the method used to perform the seismic analysis of the tank and updated design summary tables of analysis results for the tank wall. The values of calculated concrete reinforcement increased, but the provided wall reinforcement, representing the actual design, did not change and continues to provide ample margin in the design in this regard. The input parameter change relates to removing intentional amplification of seismic demands applicable to other areas of the shield building that had been used previously in the analysis for the tank for ease of analysis, but which is not representative of actual conditions at the tank location.

In DCD Revision 19, Westinghouse states that they are using the equivalent static method for calculating the seismic demands on the PCCS tank walls. This method was identified and described in DCD revision 18 to justify the adequacy of portions of the shield building, as also reflected in the shield building report dated September 30, 2010. In AFSER Section 3.8.4.1.1.3.4, "Seismic Demand and Analysis Method," the NRC accepted Westinghouse's use of the equivalent static method for the analysis of the shield building roof, including the PCCS tank, consistent with the commitment in the shield building report because the method of analysis is consistent with Standard Review Plan (SRP) guidance and would more appropriately model the hydrodynamic forces. The revised analysis approach in DCD Revision 19 is consistent with the previously reviewed and accepted approach. Further, the comment did not identify any other specific technical concern as unresolved. Accordingly, the NRC does not agree that there are unresolved technical issues.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A *basic problem with the AP1000 design is the modular construction of the shield building and the tank of water on top. (S58-6)*

NRC Response: The NRC disagrees with this comment. The comment does not identify any safety concern regarding use of modular construction. The responses to comments immediately above address the safety of the composite modules. The tank is a reinforced concrete design, seismically designed, and missile protected, and the building is designed to withstand the effects of natural phenomena such as earthquakes, winds, tornadoes, or floods. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Two *comments expressed concern that the 800,000 gallon tank of water "suspended above the reactor core" would be subjected to severe stress and instability in the event of an earthquake, tornado or hurricane. (S55-23, S58-7)*

NRC Response: The NRC disagrees with these comments to the extent it suggests the tank would fail as a result of stress. The water storage tank, located on the top of the shield building (outside of the containment) is designed for SSE loads and protected by thick walls from

tornadoes or other external events. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The design of the steel and concrete composite structural module must demonstrate the ability to function as a unit during DBEs. (S58-9)

NRC Response: This comment quotes from an NRC letter of October 2009, where this concern was raised about an earlier design of the shield building. Several modifications were subsequently completed. The NRC staff reviewed the revised design and concluded that the design was acceptable in its FSER. No change was made to the DCA rule, the DCD, or the EA as a result of this comment.

Containment

This subject area includes comments concerning the AP1000 containment design, including the "chimney effect," corrosion, hydrogen, severe accident performance, and sump performance.

To help readers understand the NRC's responses to public comments on the AP1000 containment, a brief description of the containment is presented below, together with a summary of the changes to the containment that are being approved by the amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

The containment vessel is a single steel pressure vessel, inside of which is located near the reactor vessel with the nuclear fuel, the steam generators, the refueling water storage tank, and various equipment for power generation, refueling, and emergency response, and supporting electric power, control, and communications.

The steel containment building stands independently inside the shield building. The containment's primary purpose is to retain pressure up to the maximum "design pressure" should an accident occur in which the reactor vessel or associated equipment releases reactor coolant into the containment atmosphere. The containment also acts as the passive safety-grade interface to the ultimate heat sink.

The primary containment vessel prevents the uncontrolled release of radioactivity to the environment. The AP1000 primary containment consists of a cylindrical steel shell with ellipsoidal upper and lower heads. The steel thickness is increased in the transition region where the cylindrical shell enters the foundation concrete to provide additional margin in consideration of corrosion.

Safety-related coatings are applied to both the interior and exterior surfaces of the containment vessel. These coatings have several functions. The coatings provide corrosion protection, promote wet-ability, and enhance heat conduction. Wet-ability and formation of a water film on the exterior containment surface are important to the passive cooling function. The coatings on the interior of the containment vessel are designed to remain intact for any postulated pipe break. Periodic inspections are required of the containment internal and external surfaces and of the coatings on those surfaces.

As the interface to the ultimate heat sink (the surrounding atmosphere), the primary containment is an integral component of the PCCS. The exterior of the containment vessel provides a

surface for evaporative film cooling and works in conjunction with the natural draft airflow created by the shield building baffle and chimney arrangement to reduce the pressure and temperature of the containment atmosphere following a DBA. The source of water for the evaporative cooling is the passive containment cooling water storage tank (PCCWST), located at the top of the shield building.

Design changes within the scope of the amendment with respect to the containment vessel are certain details about coatings with respect to long-term core cooling capability and the calculated peak accident pressure (from correction of errors). Other changes include addition of a vacuum relief system to provide protection for external pressure events.

Containment – Cooling Capability

Comment: Several comments stated that the thin steel containment shell over the reactor will not be effective during severe accidents. (S24-1, S29-8, S49-5, S53-5, S55-10, S55-19, S65-5)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with the assertion that the containment would not be effective during severe accidents. The NRC considers a single metal containment vessel to be acceptable if it meets the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section III, Subsection NE. This part of the ASME Code contains requirements for the material, design, fabrication, examination, inspection, testing, and overpressure protection of metal containment vessels. Many such vessels are in use at operating NPPs. The AP1000 containment is designed to meet ASME Code requirements for a pressure of 6.9 kPa (59 psi) and a temperature of 149 degrees C (300 degrees F). Its thickness includes an allowance for corrosion that may occur over the period of licensed operation of the plant. The NRC notes that the AP1000 steel containment is 1.75 inches, several times thicker than other steel containments.

The AP1000 steel containment building has an additional function: transferring heat from containment to the atmosphere. The Westinghouse analysis shows that the containment building and the shield building, working as a system, would transfer heat to the atmosphere during severe accidents as well as DBEs. Experiments were conducted to demonstrate that these predictions are based upon physical phenomena that, once initiated, can be relied upon to work even when there is no ac power. In short, after careful review of the Westinghouse analysis, NRC concluded that the containment building is robust and will perform its safety functions effectively if a severe accident occurs at an AP1000 plant.

The features of the AP1000 design just described that demonstrate that the containment shell would be effective during severe accidents have already been certified in 10 CFR Part 52, Appendix D (DCD, Revision 15). The current amendment to the AP1000 design does not propose any modification to these features.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A few comments stated that the AP1000 containment would not be adequately cooled under conditions similar to Fukushima. (S29-9, S49-5)

NRC Response: The NRC interprets this comment to mean the ability of containment to be cooled following an earthquake, tsunami and SBO is inadequate. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the PCCS is seismically qualified, and has been reviewed for survivability for the reference-level earthquake (1.67 times the SSE). In regard to SBO, only a few dc-powered (battery-powered) valves need be actuated to start the gravity flow of water from the water storage tank. The air cooling does not rely on motive power. Thus, the NRC concludes that the containment would be adequately cooled in the event of an SSE, or even some severe earthquakes, in combination with an SBO. The current amendment to the AP1000 design does not propose any modification to these features. Tsunamis would be evaluated as part of the siting review for a COL application referencing the AP1000 design. An AP1000 plant would be located with the plant grade above the design-basis flood level. No change was made to the rule, the DCD, or the EA as a result of this comment.

Containment – "Chimney Effect"

Comment: The comment states that the NRC should not use zero probability of containment failure or leakage as the basis for the SAMDA analysis for new reactors, which is in turn reflected in the analysis of severe accidents. (S39-3, S39-8, S55-1, S55-7, S55-8)

NRC Response: While these comments are primarily directed to the AP1000 SAMDA evaluation, it also appears directed to containment analysis. Neither Westinghouse nor the NRC has asserted that the containment has a zero probability of leaking. A certain amount of leakage is assumed to occur even if the containment remains intact. An applicant must show that the consequence of this leakage is acceptable for a hypothetical DBA. For beyond-DBAs, the applicant must show that larger leaks, should they occur, do not create unacceptable risk. Assumptions regarding the effectiveness of SAMDAs, including to what extent a SAMDA reduces releases from containment, are discussed below under the SAMDA heading. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A few comments stated that a basic problem with the AP1000 design is the ventilation system, which allows the free flow of air from inside the reactor containment building to outside air, allowing radiation to escape in the event of a reactor core breach. (S55-21, S58-8)

NRC Response: The NRC disagrees with these comments. The AP1000 design does not allow the free flow of air out of the containment. Rather, it allows the free flow of air into and out of the shield building, which protects and cools the containment. This air flows along the outside of the containment wall, removing heat. In the event of core damage, radioactivity will escape the reactor coolant system and contaminate the atmosphere inside containment. For that reason, there is no pathway allowing air from inside containment to commingle with the air in the shield building. There are penetrations that allow piping and electrical wiring to pass between the containment and the auxiliary building. Some leakage from the containment is assumed for the purpose of assessing radiological consequences. Air from the auxiliary building is filtered to remove radioactivity before the air is released to the environment.

If the comment means that the containment would leak as a result of cracking or corrosion, leading to the release of radiation, this comment is discussed in response to comments that follow under the comment category sub-heading of Corrosion and Cracking below. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Several comments said the containment design was flawed because if there were cracks or through-wall holes in the containment structure, excessive amounts of radiation would be released during LOCAs, as pressurized steam would be forced through the hole and then vented directly into the atmosphere, without any filtering (a.k.a. the "chimney effect"). Some comments indicate that the NRC underestimates the radiation dose consequences of containment failure in the AP1000 due to corrosion, cracking and leakage. The AP1000 design would siphon radiation leakage from the reactor containment to the atmosphere unfiltered and unmonitored. (S39-1, S39-2, S40-2, S43-1, S43-2, S55-21, S55-22, S58-13)

NRC Response: The containment design was previously certified; therefore, this comment is out of scope. Comments were sought on a DCD amendment application, which is the subject of this rulemaking, and which does not include changes to the containment design. Comments about corrosion are discussed below. No change was made to the rule, the DCD, or the EA as a result of this comment.

Containment – Corrosion and Cracking

Comment: There is a preexisting condition in the AP1000 design that could lead to a reduction in its wall thickness that would result in a rapid release of radiation. (S58-11)

NRC Response: Although the comment appears to be referring to corrosion, it does not provide details of a preexisting condition that would challenge the containment design. The NRC considers a single metal containment vessel to be acceptable if it meets the requirements of the ASME B&PV Code, Section III, Subsection NE. This part of the ASME Code contains requirements for the material, design, fabrication, examination, inspection, testing, and overpressure protection of metal containment vessels. Many such vessels are in use at operating NPPs. The AP1000 containment is designed to meet ASME Code requirements for a pressure of 6.9 kPa (59 psi) and a temperature of 149 degrees C (300 degrees F). Its thickness includes an allowance for corrosion that may occur over the design life of the plant. The design includes safety-related coatings on both the inside and outside containment wall. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Rust has developed on the outside and inside of containments, and was not identified during any visual examination until the hole propagated completely through the containment wall. (S55-3)

NRC Response: The NRC acknowledges that several cases of through-wall corrosion of steel containment liners have occurred in operating plants as discussed in NRC Information Notice (IN) 2010-12. In the concrete containment/steel liner systems described in this notice, corrosion occurred between the concrete and the steel liner, and was only discovered when through-wall cracks were identified on the inside surface of the steel liner. However, the design of the AP1000 steel containment is different from the concrete-containment-with-steel-liner design used in operating plants. The AP1000 steel containment is an independent, free-standing steel vessel. In addition, the AP1000 steel containment vessel is approximately 4

to 6 times thicker than the steel liners that were found to be corroded in operating plants. The AP1000 containment thickness includes an allowance for corrosion that may occur over the period of licensed operation of the plant. Further, the AP1000 steel containment vessel is coated on both the inside and outside with a safety-related inorganic zinc coating. The cases of through-wall corrosion in the containment liners found in operating plants were caused by embedded foreign objects (e.g., piece of wood) that were unintentionally left in the concrete during construction and were in direct contact with the uncoated, exterior surface of the carbon-steel liners. For the AP1000, the shield building is composed of pre-fabricated, structural modules (i.e., concrete between two steel plates). Only a small portion of the lower shield building uses poured concrete in which wood might be used. The shield building, however, does not directly contact the steel containment vessel. Rather, the shield building is separated from the steel containment vessel by several feet. Unlike concrete containments in operating plants where only the interior surface of the steel liner is accessible for visual inspection, both the interior and exterior surfaces of the AP1000 steel containment vessel are accessible for visual inspection for the entire life of the plant during refueling outages. Such inspections are required by the ASME Code. The NRC finds the containment design to be acceptable and the in-service inspection (ISI) requirements to be adequate to reduce the likelihood of through-wall corrosion to very low levels in the AP1000 plant. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comment asserts that the nuclear power industry data has numerous examples of containment failure where cracks have developed and propagated completely through containment. (S39-9, S55-4)

NRC Response: The NRC does not agree with the comment. The NRC defines a “containment failure” as a condition in which the containment structure is no longer capable of performing its intended safety function when required. Therefore, the term “containment failure” used in the comment above is considered by the NRC to mean “containment degradation issues” in its response to the comment.

There have been three known instances of cracking in steel containments in the nuclear industry thus far in the U.S. The modes in which the cracks initiated are not relevant to the AP1000 design. All of these cracks occurred in boiling-water reactor (BWR) Mark I containments, which are different from the AP1000 containment in many ways, including geometry, materials, environment, loading, and function.

The first two instances of cracks found in containment occurred at Hatch Units 1 and 2. The cracks were caused by malfunctioning systems for rendering the containment atmosphere inert. (Nitrogen is added to the containment atmosphere. This reduces the concentration of oxygen, preventing the combustion of hydrogen that may be generated if the core is damaged.) In the case of Hatch Unit 1, overcooling by nitrogen (which had been stored as a liquid, but not adequately warmed) imposed large thermal stresses on certain lines within the containment boundary (See NRC IN 85-99; ADAMS Accession No. ML082840475). This caused a crack to grow through the wall. In the case of Hatch Unit 2, a similar condition caused temperatures to drop below the containment vessel’s reference temperature for nil-ductility transition (RT_{NDT}) (IN 84-17 (ADAMS Accession No. ML083181180)) and IE 84-0 (ADAMS Accession No. ML082970346). The attendant thermal stresses directly caused cracking in the vent header. In contrast, the AP1000 has no cryogenic systems connected to containment. Neither cooling to temperatures where brittle fracture may occur nor failure due to thermal stress are credible for

AP1000, and therefore, these types of events have no bearing on certification of the AP1000 design.

The third instance of cracks found in a BWR Mark I containment occurred at Fitzpatrick, where the torus developed a through-wall crack. The crack was caused by dynamic loads that are imposed on a BWR Mark I containment when steam is exhausted from the turbine that drives the high-pressure coolant injection pump. Plant-specific details of the exhaust-line configuration contributed to the severity of the stresses at Fitzpatrick (See NRC IN 2006-01; ADAMS Accession No. ML053060311). However, cracking did not occur at other, similar plants in the U.S. No such loads are imposed on the AP1000 containment, so this event is not relevant to certification of the AP1000 design either.

There have also been few examples of through-wall corrosion on steel liners in concrete containments. The liner corrosion and concrete degradation issues have been described in several NRC INs: 2010-012, 2010-014, 2004-009, 1997-010, 1989-079, and 1986-099, as well as Technical Letter Report Revision 1 – "Containment Liner Corrosion Operating Experience Summary" (ADAMS Accession No. ML112070867). These events are not directly applicable to the AP1000, which has a free-standing steel containment vessel that is coated and accessible for inspection on both surfaces.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comment states that inspection procedures heralded by the nuclear power industry have repeatedly failed to identify cracks, holes and containment coating deterioration until gross degradation has already occurred. (S55-6)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. A summary of the evolution of containment inspection requirements can be found in ORNL/TM-2005/520, "Final Report Inspection of Aged/Degraded Containments Program" (ADAMS Accession No. ML093490992). NRC regulations (10 CFR 50.55a) were revised in 1996 to reference the 1992 Edition and Addenda and subsequently later editions and addenda of Subsections IWE and IWL of Section XI of the ASME B&PV Code. This was done to ensure that critical areas of the containments are routinely inspected to identify and address structural deterioration or degradation that may potentially affect containment integrity, and to take corrective action when such degradation is identified. Operating experience has shown that corrosion and containment degradation occur when licensees do not adequately perform these containment liner inspections. NRC-required inspections have resulted in early detection and mitigation of damaged coatings and moisture barriers, as documented in Technical Letter Report, "Containment Liner Corrosion Operating Experience Summary" (ADAMS Accession No. ML112070867).

The structural integrity and leak-tight integrity of containment structures is ensured by the following programs mandated by the regulations: (1) containment ISI program required to be performed in accordance with ASME Section XI, Subsections IWE and IWL, as mandated by 10 CFR 50.55a, (2) containment leakage rate testing program (requires periodic local leak-rate tests and integrated leak-rate tests) pursuant to Appendix J of 10 CFR Part 50, and (3) requirements for monitoring the effectiveness of maintenance of SSCs at NPPs pursuant to 10 CFR 50.65. Regulatory oversight of licensee implementation of these requirements is

conducted under the NRC's reactor oversight program. The NRC notes that while the containment ISI program, in accordance with ASME Section XI, Subsections IWE and IWL, has generally been effective in identifying and managing the vast majority of degraded conditions, the NRC agrees that there have been isolated instances of highly localized through-wall corrosion of containment metallic liners that initiated in inaccessible areas (i.e., on the liner-concrete interface). However, these isolated instances did not result in degradation of an extent that would compromise containment structural and leak-tight integrity. The NRC has issued INs to inform licensees of operating reactors of the conditions surrounding such instances of through-wall liner corrosion for review for applicability to their specific plants.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC has no database to track containment failures and has not conducted a complete investigation of the related containment problems at the U.S. reactors. (S39-5)

NRC Response: The NRC disagrees with this comment to the extent it states NRC has not conducted a complete investigation of containment problems. The comment refers to specific containment problems at operating NPPs, including pitting, general corrosion, and liner failure. The NRC's definition of a "containment failure" is a condition in which the containment structure is no longer capable of performing its intended safety function when required. Therefore, the term "containment failure" used in the comment above is considered by the NRC to mean "containment degradation issues" in its response to the comment.

The NRC operating experience program (OEP) provides a means to collect and review information related to the industry, including containment degradation issues. It draws on various sources including event notifications, licensee event reports, preliminary notifications, 10 CFR Part 21 reports, international reports, ISI summary reports of inspection findings, as well as daily information collected from the four NRC regions. This information is tracked through an NRC operating experience issues tracking database, which can be used in conjunction with the operating experience sources referenced above to retrieve the information for further review. The program also ensures that the appropriate stakeholders are made aware of the information, including a technical review group for containment issues, which periodically reviews the information to determine if further NRC actions are warranted.

In addition, the Office of Nuclear Regulatory Research recently published a revision to Technical Letter Report, "Containment Liner Corrosion Operating Experience Summary" (ADAMS Accession No. ML112070867), updating documentation of our understanding of the mechanisms that may be responsible for through-wall corrosion of containment liners. The NRC has also engaged committee members for ASME Section XI to devise a formal tracking mechanism to monitor industry operating experience and events involving containment liner corrosion. This was documented in NRC IN 2010-012 (ADAMS Accession No. ML100640449). Further, each safety-significant containment degradation issue that has been reported to the NRC or identified through NRC inspection is reviewed, inspected and evaluated by the NRC on a case-by-case basis under the reactor oversight program, based on which regulatory actions are taken, as warranted, to provide reasonable assurance that the ability of the containment to perform its intended function is maintained through its entire service life.

The NRC considered operating experience when it certified the AP1000 design, including the containment vessel design. The NRC review addressed corrosion protection and inspection of

the vessel, and the AP1000 amendment does not propose changes to these aspects of the design.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comments identify corrosion of steel containments or liners as a containment flaw and offers NRC IN 2004-09 as evidence that it is problematic in the industry; even if the inside and the outside of the containment are coated for protection there may be pinholes in the paint layer. (S39-6, S55-5)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The comment offers no new information related to the scope of the rulemaking. 10 CFR 55.55a was revised in 1996 to include Subsections IWE and IWL of Section XI of the ASME B&PV Code. These Subsections provide detailed requirements for the inspection of steel containments and liners in order to identify when degradation of steel containments and liners occurs and to prevent further degradation. Furthermore, containment coatings are safety-related and their application is subject to the requirements in 10 CFR Part 50, Appendix B, which is used in conjunction with the ASME Code to require that these inspections are conducted. IN 2004-09 documents cases for which inspections performed as a result of the revision to the rule identified degradation of containment coatings and liners. Additionally, corrective actions were taken for these instances, as required by the subsections of the ASME Code, to prevent further degradation. These periodic NRC-required inspections, which are required by 10 CFR 55.55a and Appendix B, have resulted in early detection and mitigation of damaged coatings and moisture barriers, as documented in Technical Letter Report, “Containment Liner Corrosion Operating Experience Summary” (ADAMS Accession No. ML112070867).

The AP1000 containment is a free-standing steel vessel, 4 to 6 times thicker than the liners that were found to have through-wall corrosion. The vessel itself it subject to ASME Section XI inspections, and both the inside and outside surfaces are coated with a safety-related coating and accessible for inspection. Application of the coating, inspection during application, and ISI (monitoring) are safety-related activities developed and performed by the COL applicant. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comments state that containment protective coating does not perform as well as the nuclear power industry claims. (S39-6, S55-5)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, performance of the AP1000 containment coatings will be assessed through in-service monitoring. The details of this safety-related activity are the responsibility of the COL applicant and not part of the AP1000 design certification. Since coatings performance depends partly on activities such as surface preparation and application, it is largely assured by a licensee’s Quality Assurance Program. The NRC based its review of protective coatings for the AP1000 containment on meeting appropriate quality assurance requirements (10 CFR Part 50, Appendix B) and conformance to Regulatory Guide (RG) 1.54, Revision 1, “Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants.” The inorganic zinc coating on the inside and outside of the AP1000 containment vessel is designated as safety-related and is required to pass a laboratory qualification test under simulated DBA conditions.

Application of the coating, inspection during application, and ISI (monitoring) are safety-related activities developed and performed by the COL applicant. No change was made to the rule, the DCD, or the EA as a result of this comment.

Containment – Other Comments

Comment: The comment states that the inability to predict containment response to concrete cutting at Crystal River with computer-aided design and sophisticated computer codes proves there are weaknesses in the computer analysis for the AP1000 containment and shield building. (S55-7, S55-13)

NRC Response: The comment provides no basis to establish any connection between analyses done for Crystal River and analyses performed for AP1000. The NRC notes that calculations for steel containments are different than those done for concrete containments. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: *The AP1000 containment interior has an inorganic zinc coating. The DCD discusses the production of hydrogen caused by fuel damage, but does not go into detail on the hydrogen production caused by the interaction of zinc and steam to produce ZnO and H2. Given the recent events in Japan, is it possible to have a station black-out during full power operation could lead to the containment being filled with steam by the activation of the ADS. (S2-1, S49-4)*

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. Nevertheless, SBO is not expected to lead to actuation of the ADS. The passive residual heat removal heat exchanger within the IRWST provides the necessary core cooling. The comment immediately below provides more information about hydrogen production from zinc-steam interaction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: If the hydrogen re-combiner malfunctions, does the steam/zinc coating interaction produce enough H2 gas in containment to reach explosive levels between the time the Class 1E batteries can no longer operate the hydrogen ignition system (4 hours) and the 72-hour mark for safety system operation? (S2-2)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. There has been no increase in the amount of inorganic zinc coating in the containment since the AP1000 design certification was initially certified. This area was effectively addressed in the design certification as documented in NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design” (September 2004).

Nonetheless, the NRC addresses the technical issue raised in the comment as follows: The NRC’s regulations at 10 CFR 50.44, “Combustible gas control for nuclear power reactors,” were revised in 2003 to reflect the importance of hydrogen generation during a severe accident resulting from a 100% fuel clad-coolant interaction. The quantity of hydrogen generated from this reaction is several orders of magnitude larger than the contribution from the corrosion of metals or from radiolysis.

For severe accident hydrogen control, the AP1000 containment has 64 hydrogen igniters. The igniters are divided into two power groups, normally provided by offsite power. However, should offsite power be unavailable, each of the power groups is powered by one of the onsite nonessential diesels. Should the diesels fail to provide power, the non-Class 1E batteries for each group will support approximately 4 hours of igniter operation. The hydrogen ignition subsystem conforms to the requirements of 10 CFR 50.44 by providing reasonable assurance that uniformly distributed hydrogen concentrations generated from a 100% fuel clad coolant interaction inside containment will not exceed detonable levels, as concluded in NUREG-1793, Section 6.2.5.10. As such, the AP1000 is designed to mitigate, without detonation, a quantity of hydrogen much larger than could be generated through the corrosion of the inorganic zinc coating.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: It is now evident that a detonation shock wave (not deflagration) occurred at Fukushima Unit 3, destroying much of the structure. The AP1000 containment is not designed to withstand a detonation shock wave. Until the cause of the detonation is determined, the NRC should not certify the AP1000 design. (S55-11)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with the assumption embedded in the comment that the AP1000 design may be subject to a detonation shock wave. Both the design of the steel containment vessel and the corresponding severe accident analysis were in the scope of the initial design certification and were evaluated. This included evaluation of hydrogen-generated pressure loads, as explained below. In addition, no changes have been proposed to the design in this regard in the current DCA application. Nonetheless, the NRC staff addresses the technical aspects of the comment as follows: The NRC staff documented its evaluation of the AP1000 design and supporting analysis in NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design” (September 2004). The NRC staff found that the combustible gases would not accumulate to a level that would support combustion or detonation. This included consideration of local gas concentrations, which may be higher than the average concentration in the containment atmosphere.

To prevent detonation, NRC regulations require applicants for light-water reactor designs to do one of two things. One option is to inert the containment, displacing the oxygen so there is nothing with which a combustible gas can react. The other is to limit hydrogen concentrations to the point where detonation cannot occur.

Hydrogen is generated when the fuel cladding reacts with reactor coolant, which can happen at the very high temperatures expected when the core is not adequately cooled. Applicants must assume that all the cladding in contact with active fuel reacts with water. If the resulting hydrogen were uniformly distributed in the containment atmosphere, its concentration must be less than 10 percent (by volume). The applicant calculated that concentrations of combustible gases would not reach this concentration anywhere in containment, even locally.

Applicants must also demonstrate that containment can withstand accident conditions, including pressurization induced by burning this hydrogen. The analytical technique used must be acceptable to the NRC staff. Both containment and accident mitigating features must maintain their structural integrity. To evaluate containment capacity, Westinghouse considered various failure modes—ways that the containment might fail. These involved the cylindrical shell, top and bottom heads, equipment hatches and covers, personnel airlocks, as well as mechanical and electrical penetrations. The results showed significant design margin to accommodate hydrogen-generated pressure loads that could be generated during severe accidents.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A *robust AP1000 containment with a system to collect and treat any leakage is necessary. Events at Fukushima demonstrate that even after the roofs of the secondary containment buildings were blown off by hydrogen explosions, the primary containment structure at each reactor was intended as the last defense against major radiation releases. (S39-7)*

NRC Response: The NRC agrees with this comment to the extent that it proposes a robust containment to minimize the release of radioactive materials. The NRC considers a single metal containment vessel to be acceptable if it meets the requirements of the ASME B&PV Code, Section III, Subsection NE. This part of the ASME Code contains requirements for the material, design, fabrication, examination, inspection, testing, and overpressure protection of metal containment vessels. Westinghouse has satisfied the NRC that the containment building is robust and will perform its safety functions effectively if an accident occurs at an AP1000 plant. See comment discussion under the heading of Containment – comments about cooling above. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comment states that the NRC has not adequately analyzed the un-reviewed safety issue raised by Mr. Gundersen in his assertion that the shield building does not function as a secondary containment. (S55-9)

NRC Response: The NRC recognizes that the shield building does not function as a secondary containment and no reliance is put on it for this function. In its SERs on the initial certified design and on the amendment to that design, the NRC does not attribute any containment functions to the shield building (See NUREG-1793 and Supplement 2 to that NUREG). This comment offers no new information on the scope of the AP1000 DCA. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC did not require full scale testing of the AP1000 containment as it did for the Mark 3 containment. (S55-13)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, as part of the initial certification for AP1000 (and for AP600), Westinghouse conducted an extensive test program of the new safety features such as the PCCSs to demonstrate their acceptability. There were no changes to these features within the scope of the current amendment. No change was made to the rule, the DCD, or the EA as a result of this comment.

SAMDA

This subject area includes comments on the SAMDA and related analysis for the AP1000 design.

Comment: The comment states that the NRC should not use zero probability of containment failure or leakage as the basis for the SAMDA analysis for new reactors, which is in turn reflected in the analysis of severe accidents. (S39-3, S55-1, S55-7, S55-8)

NRC Response: Neither Westinghouse nor the NRC has asserted that containments have zero probability of leaking. A certain amount of leakage is assumed to occur even if the containment remains intact. An applicant must show that the consequence of this leakage is acceptable for a hypothetical DBA. For beyond-DBAs, the applicant must show that larger leaks, should they occur, do not create unacceptable risk.

The NRC provides the following discussion to give more information about the SAMDA analysis done as part of the initial certification, and to explain the purpose of the assumption of zero probability of leakage which was employed solely for the purpose of weighing SAMDAs.

The SAMDA analysis explicitly assumed that any failure of the primary containment would result in releases directly to the environment. No credit was taken for scrubbing of radionuclides by water flowing over the postulated hole in containment, their deposition within the shield building, the elevation of the point of their release, or for other dynamic effects that would reduce the consequences of their release. The NRC found Westinghouse's analysis to be more conservative than modeling a release to the shield building. The analysis bounded the largest predicted release consequence from the certified design (no filtered vent). The predicted consequence is a large release, as reported in Chapter 49 of Westinghouse's probabilistic risk assessment (PRA) report. The severity of this bounding event maximizes the assessed benefit of each SAMDA evaluated. Conversely, the assumption that each SAMDA, if incorporated into the design, would eliminate all release of radioactive material from containment maximizes the benefits of each SAMDA compared to its costs, so that it is more likely that the SAMDA will be cost beneficial and will therefore warrant inclusion in the design.

For example, a filtered vent of the primary containment would not mitigate all accidents. A filtered vent is not used unless the containment is challenged; scenarios where the containment remains intact are not mitigated by the system. Neither will a filtered vent mitigate the consequences of releases by pathways that may exist even when the containment is undamaged. (This could be an isolation valve that opens or does not close. A release could also be caused by a bypass of containment through an interfacing system.) Containment failures due to dynamic phenomena such as a hydrogen burn or steam explosion cannot be mitigated by a filtered vent. A filtered vent is not capable of relieving such a rapid pressure increase in containment. Consequently, the filtered vent should not be credited for mitigating the release resulting from any of these scenarios. Accordingly, the analysis assumptions make it more likely that a filtered vent will be cost-beneficial and incorporated into the design. Of course, even with these favorable assumptions, it was not cost-beneficial to incorporate a filtered vent into the AP1000 design.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comments state that the AP1000 design-basis or SAMDA analysis does not anticipate a reduction in containment wall thickness that would result in a rapid release of radiation. (S39-4, S58-12)

NRC Response: The NRC disagrees with these comments. To the contrary, the AP1000 design considers potential containment wall thinning, and therefore, calls for the application of protective coatings to prevent such thinning. In addition, key parts of the containment wall are thicker than necessary to perform design functions so that if corrosion were to begin when the plant starts up, at the end of its design life the containment would still have the thickness and strength to perform all of its design functions.

Nevertheless, the SAMDA analysis anticipates a spectrum of containment failures. The analysis considers the potential for a large, undetected opening in containment to exist before an accident occurs. Radioactivity released through this hole is considered to be injected directly into the environment. This assumption increases the likelihood that additional design features will be justified as cost-beneficial as explained in the previous comment. No changes to the rule, the DCD, or the EA were made as a result of this comment.

*Comment: The net effect of all these non-conservative assumptions in the Westinghouse AP1000 design is that post accident radiation doses to the public could be several orders of magnitude higher (one hundred to one thousand times higher) than those assumed by Westinghouse in its AP1000 design. Such calculational flaws quite seriously impact emergency planning over a much broader area than that presently assumed in the Westinghouse SAMDA analysis and NRC staff review. (S*55-20)

NRC Response: The NRC does not agree with this comment. Westinghouse made conservative assumptions in calculating the benefit of each SAMDA. The benefit is calculated from the consequences that might be avoided if a design alternative is adopted. A bigger benefit from a design alternative justifies a higher cost, making it more likely that an alternative will be implemented.

Westinghouse assumed that each SAMDA will eliminate all failures it is intended to mitigate. Realistically, no system will perform so well, but assuming that it can do so makes the design alternative look better. This is a conservative assumption that bounds the possible benefit.

Westinghouse also made conservative assumptions about the damage avoided, erring on the side of high consequences. This provides additional confidence that the benefit has not been underestimated. The release rate for a severe accident was never assumed to be less than the maximum leakage allowed by design (into the auxiliary building). However, consequences included in the analysis ranged up to the large release expected if an undiscovered hole (not merely a crack) exists in containment when a severe accident occurs. As the comment indicates, the resulting dose to the public would be orders of magnitude higher, much more than regulations allow. The NRC does not consider the SAMDA analysis to be realistic, but the results make a convincing case that no identified SAMDA is worth the expense. Emergency planning is not part of the SAMDA analysis, and offsite emergency planning is site-specific.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Spent Fuel

This subject area includes comments on onsite SFP storage and long-term storage/disposal of spent fuel, whether related to the AP1000 design or in general.

The SFP is a safety-related structure, housed in the auxiliary building that provides protection from aircraft impact or other external hazards.

For the first 72 hours, including response to an SBO event, the SFP design relies upon the natural heat capacity of the water in the pool to absorb the heat from spent fuel elements, and boil the water in the pool. Thus, the safety-related means of heat removal for 72 hours is by heat-up of the volume of water in the pool and in safety-related water sources such as the cask washdown pit. A nonsafety-related SFP cooling system is also installed. Onsite, protected sources of water are available for up to 7 days, controlled from areas away from the pool. In modes with high heat load in the pool, two sources of ac power are specified in the availability controls. Water can be sprayed into the pool from two nozzle headers on opposite sides of the pool. A cross-connection also exists to the residual heat removal system. Those design features needed to provide make-up water after 72 hours and up to 7 days, such as the passive containment cooling water ancillary storage tank, and ancillary diesel generators (DGs), are protected from external hazards including the SSE, tornado, and flooding.

Design changes within the scope of the current amendment are the number of fuel assemblies stored, the rack designs for new and spent fuel storage, the criticality analysis for spent fuel in the pool (including use of boron material attached to the storage cells), installation of spray headers, and credit for additional water sources for pool makeup.

Comment: A number of comments expressed concern that existing storage methods are inadequate. Some offered proposals for backup control, monitoring and power systems. A few stated that early lessons learned from Fukushima reveal that the SFPs should not be densely packed; there should be a robust containment around the fuel pools; there should be redundant cooling systems for the fuel pools; the buildup of hydrogen in the fuel pools needs to be addressed; and there should be back up power for pumps, cooling systems and monitoring systems. (S46-1; S57-1 through -8)

NRC Response: As discussed in the FSER, the AP1000 design meets current requirements. The Commission established an NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to the NRC's regulatory framework that should be conducted by the NRC. The NTTF issued its report (ADAMS Accession No. ML111861807), dated July 12, 2011 and recommended that enhancements be made to SFP makeup capability and instrumentation for the SFP. Due to the AP1000's passive design, the NTTF recommended that design certification rulemaking activities continue.

It is important to note that the AP1000 SFP design is significantly different from the pool designs at the Fukushima Daiichi reactor in Japan and all of the operating reactors in the U.S. In addition to having a forced cooling system that utilizes pumps that rely upon ac electrical power for operation, the AP1000 also has a passive safety-related pool cooling capability that does not require ac electrical power to operate. Thus, the fuel remains adequately cooled for 72 hours in the event of an SBO.

NRC regulations require that the AP1000 SFP be designed with adequate SFP criticality controls and cooling capability to handle all operational conditions and postulated accident scenarios. The NRC reviewed the AP1000 SFP design presented in the AP1000 DCD amendment, evaluated the design against applicable regulations and guidance, and determined that the AP1000 SFP design meets all applicable requirements. The engineering calculations and analyses that were performed to support the SFP safety analysis were based on the geometry of the pool and the fuel stored in the SFP. Therefore, the density of spent fuel in the SFP was considered in both criticality and cooling calculations.

The comments presented potential concerns related to the density at which fuel is packed into the SFP, but do not list any specific deficiencies in the AP1000 criticality analysis. The AP1000 DCD Revision 18 criticality analysis was reviewed following the guidance found in SRP Section 9.1.1, Revision 3, “Criticality Safety of Fresh and Spent Fuel Storage and Handling,” to ensure that the applicant is in compliance with the applicable regulations (GDC 62, “Prevention of Criticality in Fuel Storage and Handling,” and 10 CFR 50.68, “Criticality Accident Requirements”). These requirements are generally performance-based with limitations on the reactivity values, and as such, there are no specific physical design requirements such as minimum geometric spacing which must be met. The AP1000 SFP criticality analysis demonstrates that, with the proposed storage arrangement of the SFP, the reactivity requirements are met. Therefore, the NRC staff has determined that the AP1000 SFP storage arrangement is acceptable based on the criticality analysis.

The AP1000 SFP cooling review results presented in the NRC safety evaluation were based on the SFP design in AP1000 DCD Revision 18. The AP1000 DCD Revision 18, SFP cooling analysis was reviewed following the guidance found in NUREG-0800 Section 9.1.3, Revision 3, “Spent Fuel Pool Cooling and Cleanup System,” to ensure that the applicant is in compliance with the applicable regulations (GDC 2, “Design Bases for Protection Against Natural Phenomena,” GDC 4, “Environmental and Dynamic Effects Design Bases,” GDC 5, “Sharing of Structures, Systems, and Components,” GDC 61, “Fuel Storage and Handling and Radioactivity Control,” and GDC 63, “Monitoring Fuel and Waste Storage”). The increase in pool capacity (between DCD Revisions 15 and 18) allows the SFP to store 270 additional fuel assemblies. The number of fuel assemblies assumed to be offloaded during each refueling, and the frequency of refueling is not affected by this change. As a result of the increased SFP capacity, an additional 270 fuel assemblies will remain in the pool for a longer period of time. These assemblies would have over 10 years of decay time, which will result in a decreasing heat load from them. Therefore, the heat load contribution from these additional assemblies represents only a small fraction of the overall pool heat load. The safety-related cooling for the AP1000 SFP is dependent only on the use of passive safety features for the first 72 hours. The seismic Category I PCCWST contains water that drains by gravity into the SFP to provide safety-related makeup water to ensure that the spent fuel remains covered with water. The NRC staff reviewed the pool cooling analysis performed by the applicant and determined that the AP1000

SFP has adequate cooling and makeup water sources to cool the spent fuel stored in the pool under all anticipated operational occurrences and accident scenarios.
The Commission established a NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to the NRC's regulatory framework that should be conducted by the NRC. The NTTF recommended no changes to the AP1000 design. Should the Commission implement new requirements for spent fuel storage that are applicable to the AP1000 design, the NRC will use its regulatory processes to apply them.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: In light of the Fukushima Daiichi accident, the SFP cannot be in proximity to the reactor core, pressure vessel or containment and should be passively cooled. The comment indicates this is a lessons-learned from the Fukushima accident. (S52-1e)

NRC Response: Although the comment does not specify what distance constitutes "in proximity," the SFP for the AP1000 is in the auxiliary building, which is a substantial structure, and outside of the containment that houses the reactor core and pressure vessel. The AP1000 passive cooling offers benefits unique to this design. The NRC has found both passive and active cooling systems for SFPs to be acceptable. The AP1000 DCA has been found to comply with NRC regulations. The NRC's Fukushima Daiichi NTTF noted in its report that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing the AP1000 design certification rulemaking without delay (see NTTF Report, pages 71-72). Consistent with this recommendation, the NRC believes that the AP1000 final rulemaking can and should proceed without delay because: (i) the NRC has determined that the AP1000 DCA meet current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iv) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so under 10 CFR 52.63. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The SFP should be redefined as a subcritical assembly with the potential to go critical with no active or passive control mechanism. (S52-1f)

NRC Response: The NRC disagrees with this comment. Nuclear reactor plants include facilities for storage of new and spent fuel. The new fuel storage facility includes the fuel assembly storage racks, the concrete storage vault that contains the storage racks, and the auxiliary components. The spent fuel storage facility includes the spent fuel storage racks, the spent fuel storage pool that contains the storage racks, and the associated equipment storage pits.

The NRC reviewed the AP1000 design, specifically the new and spent fuel storage facilities and verified that the storage facilities maintain the new and spent fuel in subcritical arrays during all credible storage conditions, in accordance with GDC 62 and 10 CFR 50.68, and that new and

spent fuel will remain subcritical during fuel handling, in accordance with GDC 62 and 10 CFR 50.68. NRC requirements permit the use of control mechanisms such as soluble boron, boronated steel racks, and assembly inserts. The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: If an in-containment SFP is maintained, then a fuel transfer crane must be designed so it is available to remove fuel during post-accident cleanup or a second means of moving fuel must be available. (S52-1h)

NRC Response: For the AP1000 design certification in the proposed rulemaking, the SFP is not located in containment. The NRC has concluded from its evaluation that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public health and safety. Therefore, no change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Spent fuel should not be stored within the reactor containment. (S55-18)

NRC Response: The AP1000 design has a spent fuel storage pool in the auxiliary building, not in the reactor containment. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Spent fuel should be moved to dry cask storage as soon as possible. (S55-18)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC has established regulatory requirements to provide reasonable assurance of adequate protection of public health and safety in regard to spent fuel assemblies whether they are in pool storage or dry storage. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comment submits an article about an "emergency fuel pool cooling system (EFPCS) developed by Westinghouse" and requests that the information in it be considered concerning the design of the AP1000 spent fuel system. The AP1000 SFP was requested by Westinghouse to be packed more densely than originally planned. The comment states that the NRC must reanalyze the ability of the AP1000 SFP to be cooled in case of SBO and that NRC must review the ability of the Westinghouse "stand-alone emergency fuel pool cooling system" concept to be applied to the AP1000 SFP. The article discusses this design in response to the Fukushima accident. (S64-1)

NRC Response: The Commission established an NTTF to perform a review of the Fukushima Daiichi accident. This NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to the NRC's regulatory framework that should be conducted by the NRC. Among the technical issues that were evaluated, the NTTF considered enhancements to SBO coping capability (10 CFR 50.63, "Loss of all alternating current power") for all operating and new reactors in the U.S. The NTTF recommended no changes to the AP1000 design at this time. Any subsequent recommendations that the Commission may

decide are applicable to the AP1000 SFP design will be appropriately addressed through the NRC regulatory process. Because the design meets current requirements, no additional review of this potential change is necessary for the AP1000. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Numerous comments raised the issue of nuclear waste (spent fuel rods) as a reason to oppose nuclear power. One stated that it would end up being dumped on Native American lands like Yucca Mountain and other areas and cause cancer in entire communities. Others cited the long period of time that spent fuel is radioactive. (S1-3, S1-5, S11-2, S15-1, S27-4, S31-1, S44-4, S46-1, S46-2, S47-1)

NRC Response: The AP1000 design includes an SFP where spent fuel rods will be stored. The transfer of spent fuel to a permanent repository or other facility is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

However, current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101, et seq.) mandates that high-level wastes (such as spent fuel) are to be buried at a deep geologic repository. In addition, in the Commission's Waste Confidence Decision and Rule (10 CFR 51.23(a)) (75 FR 81032), the Commission has made the generic determination that if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations.

NRC regulations also provide requirements for temporary storage of spent fuel, such as in dry casks, in 10 CFR Part 72. Sections 72.104 and 72.106 establish the guidelines for radiological releases from normal operations and accidents respectively.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental

This subject area includes comments on environmental concerns, whether related to the AP1000 design or in general.

Comment: Nuclear reactors will fail and radiation will be released, slowly poisoning the planet. (S47-2)

NRC Response: The NRC disagrees with this comment. The NRC has found the AP1000 design to provide reasonable assurance of adequate protection of the public health and safety, and has determined that the AP1000 design meets its regulations, as documented in its FSER (NUREG-1793, Supplement 2). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Small radiation leaks from nuclear plants cannot be prevented, and that radiation remains for a long time. Evidence of the effects of low levels of radiation can be found in Chernobyl, Iraq, Belarus, and others where depleted uranium or other radioactive products have been distributed. Based on this information, the NRC should not license facilities that release nuclear materials. (S1-5, S30-1, S65-3)

NRC Response: The NRC interprets this comment to express concern about the risks of releases of low-levels of radioactivity from NPPs and its presence in the environment. The NRC has established strict limits on the amount of radioactive emissions from NPPs to the environment and has regulations that establish standards for protection against ionizing radiation associated with the operations of NPPs. These limits are set forth under 10 CFR Part 20, Subpart D, "Radiation Dose Limits for Individual Members of the Public," and 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents." The NRC has documented in its FSER for the AP1000 design, as amended, that it meets these requirements, and that an applicant proposing to build an AP1000 power plant at a specific site would be required to demonstrate that the plant, in light of site-specific conditions, would comply with all applicable NRC regulations. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Substances such as plutonium are environmental hazards and deadly substances created by nuclear fission in a reactor are unnatural. This radiation contaminates our world for thousands of years. We don't need nuclear reactors, as they are not safe for people and the planet. The NRC should focus on preserving the planet and protecting the public. The environmental effects of TMI and Chernobyl accidents continue through this day with no end in sight, and the effects from the Fukushima accident are immeasurable and will continue for the foreseeable future. (S10-1, S31-7, S42-1)

NRC Response: The NRC interprets this comment to express concern about the longevity and toxicity of spent nuclear fuel, and to oppose the construction and operation of NPPs. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC has found the AP1000 design, as amended, provides reasonable assurance of adequate protection of public health and safety. The NRC has determined that the AP1000 design, as amended, meets NRC requirements as documented in its FSER (NUREG-1793, Supplement 2). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: No more money spent on anything, but radwaste clean-up. (S21-5)

NRC Response: The NRC takes no position on this comment. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The cost of designing, building, or operating a NPP is not a matter that the NRC regulates. The NRC makes no judgment on NPPs' costs. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Nuclear energy will lead the world to extinction. (S28-1)

NRC Response: The NRC interprets this comment to provide a general opinion against the use of nuclear power in the U.S. rather than providing a specific comment on the scope of the AP1000 DCA rulemaking. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. No change was made to the rule, the DCD, or the EA as a result of this comment.

Other AP1000 Topics

This subject area includes comments which are *related to the AP1000 design*, but are not addressed under other subject areas. These comments address topics such as quality assurance, location of batteries, decommissioning, handling/redaction of information, nitrogen injection, the NRC's process for reviewing the AP1000 amendment and associated rulemaking, and general support for the AP1000 design.

Other AP1000 Topics – AP1000 Safety

Comment: Two comments expressed concern about the AP1000 as an untested design. (S18-1, S29-2)

NRC Response: The AP1000 design certification or this DCA is not an authorization of construction. Substantial testing of new technology employed in the AP1000 design was done, as documented in Chapter 21 of NUREG–1793. Other testing will be performed to verify proper construction and operation of any AP1000 plant. The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that are the subject of this DCA, and has determined that the AP1000 design meets its regulations. NRC review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed a comprehensive review and evaluation of the subsequent revisions to the original AP1000 certified design and documented its evaluation in its FSER issued publicly on August 5, 2011 (ADAMS Accession No. ML112061231). The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: The AP1000 is an untested, unlicensed reactor design and should not be constructed in Georgia, South Carolina, and other states, as evidenced by the incidents at TMI, Chernobyl, and Fukushima. (S44-1)

NRC Response: Neither the AP1000 design certification nor this DCA is an authorization of construction. There was substantial testing of new technology employed in the AP1000 design, as documented in Chapter 21 of NUREG–1793. Other testing will be performed to verify proper construction and operation of any AP1000 plant. The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis

methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: The AP1000 reactor in particular is even less safe than other plant designs. (S1-2)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with this comment. In its FSER, as documented in NUREG-1793, Supplement 2 (ADAMS Accession No. ML112061231), the NRC found that the AP1000 design meets NRC regulatory requirements and provides reasonable assurance of adequate protection of public health and safety. The AP1000's passive design offers several important safety benefits. Safety systems of the AP1000 reactor are designed to provide adequate core cooling even without ac electrical power from offsite or the onsite nonsafety-related DGs. Rather, the safety systems rely on power from the safety-related batteries for core cooling. The reliability of core cooling is not limited by the availability of offsite power or onsite nonsafety-related DGs. This is a fundamental strength of passive designs. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: There are a number of apparently significant safety questions regarding the AP1000 reactors planned for Plant Vogtle in Georgia. (S8-3, S33-1)

NRC Response: The comment has not provided any specific safety concerns for the NRC to consider. The NRC found that the AP1000 design meets NRC requirements and provides adequate protection of public health and safety, as documented in NUREG-1793, Supplement 2 (ADAMS Accession No. ML112061231). Neither the AP1000 design certification nor this DCA is an authorization of construction, and the NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Approval of the AP1000 design, currently being considered for construction in Georgia, South Carolina, and elsewhere would have profound implications for human and environmental safety. (S40-4, S48-6)

NRC Response: The NRC interprets this comment to express general concern about the safety and environmental impacts of AP1000 NPPs. The NRC has found the AP1000 design, as amended, provides reasonable assurance of adequate protection of public health and safety, as documented in its FSER (NUREG-1793, Supplement 2). Neither the AP1000 design certification nor this DCA is an authorization of construction, and the NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should consider Congressman Edward Markey's concern, expressed in his March 7, 2011, letter, that a natural disaster or terrorist attack on the AP1000 could result in catastrophic core meltdown. (S48-4)

NRC Response: The NRC has reviewed and responded to the referenced letter. The NRC response can be found under ADAMS Accession No. ML112450407. The NRC disagrees with

this comment. The NRC has found the AP1000 design to provide reasonable assurance of adequate protection of the public health and safety, and has determined that the AP1000 design meets its regulations, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should take all possible precautions before moving forward with the Westinghouse AP1000 reactor design. (S29-5, S49-3)

NRC Response: The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that is the subject of this DCA, and has determined that the AP1000 design meets its regulations. NRC review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed a comprehensive review and evaluation of the subsequent revisions to the original AP1000 certified design and documented its evaluation in its FSER issued publicly on December 28, 2010 (ADAMS Accession No. ML103260072). The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: Using a special liquid nitrogen technology called CryoRain would ensure improved worker safety and prevent possible reactor core meltdown. (S50-1)

NRC Response: The NRC does not have enough information to evaluate the specific technology offered in the comment. Further, it was not proposed by Westinghouse for inclusion in the DCA certification. The NRC has found the AP1000 design to provide reasonable assurance of adequate protection of the public health and safety, and has determined that the AP1000 design meets its regulations, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: There is a definite need for a backup offsite shielded reactor plant control center with full reactor plant status can be managed. (S52-1c)

NRC Response: The NRC interprets this comment to mean that the habitability of the control room as proposed in the AP1000 design is not adequate in light of the Fukushima accident. The AP1000 control room is designed to protect reactor operators and the associated plant monitoring and control functions during normal operation DBEs, and severe accidents. Specific details of the NRC's review of the control room design may be found in the FSER Section 6.4, "Control Room Habitability Systems" (NUREG-1793, Supplement 2). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Standby backup power by diesel and batteries should be a minimum of 100 feet above and some distance from the plant to offset the loss of offsite power for plants with water ingress. Spare battery power should also be kept offsite. (S52-1d)

NRC Response: The NRC does not agree that the safety-related dc batteries and their associated systems need to be relocated above grade level. GDC 2 requires the design bases for SSCs that are important to safety, including the safety-related batteries, to reflect the most severe natural phenomena (including earthquakes, tornadoes, floods, hurricanes, and tsunamis) that have historically been reported for the site and surrounding area, with margin to account for uncertainty in the historical data, such that these SSCs will withstand the effects of natural phenomena without the loss of the capability to perform their safety functions. The AP1000 safety-related SSCs (including the Auxiliary Building, which houses the dc batteries) are designed to withstand the effects of seismic events and external floods. The AP1000 design, as described in the DCD, meets the requirements of GDC 2 with respect to such seismic events and floods. Under 10 CFR 52.79(d), an applicant for a COL referencing the AP1000 standard design will be required to demonstrate that the site characteristics, including seismic events and floods, fall within the site parameters specified in the AP1000 DCD, which were used to establish the design bases for the standard design. The Fukushima NTTF has completed its short-term analysis of the Fukushima Daiichi Plant accident. The NTTF Report indicates that no change to the AP1000 design certification is necessary, because of, among other things, the passive design features of the AP1000. The comment did not present any independent information showing any particular safety problem with AP1000 design. For these reasons, the NRC declines to adopt the comment's suggestion. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Key valves for emergency core cooling must be identified and required to be non-electrically activated or have a secondary way of monitoring status remotely. (S52-1g)

NRC Response: The AP1000 DCA has been found to comply with NRC regulations. Further, the AP1000 safety-related emergency core cooling system (ECCS) valves are activated by stored energy systems (batteries). The passive AP1000 ECCS, once activated, does not rely on ac power to operate, as does a conventional ECCS. As the NRC's Fukushima Daiichi NTTF noted in its report that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing the AP1000 design certification rulemaking without delay (see NTTF Report, pages 71-72).

The Commission provided direction to the NRC staff via SRM to engage the public in providing input on the NTTF recommendations (reference SRM-SECY-11-0093, dated August 19, 2011, and SRM-COMWDM-11-0001/ COMWCO-11-0001, dated August 22, 2011).

The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Volumetric guidance analysis for decay heat cooling contingency plans is needed to understand limitations on volume and transfer of liquids among volumes. (S52-1i)

NRC Response: The inventory of liquid relied upon in the AP1000 design for the removal of decay heat has been established for all DBEs (including SBO) and for beyond-DBEs including severe accidents. All the water that will be needed in containment is already there before plant operation begins, either within the reactor coolant pressure boundary or held in the IRWST. A 3-day supply of water for passive containment cooling is stored in a tank atop the shield building. An onsite storage tank holds an additional 4-day supply of water to refill that tank, and redundant ancillary generators are prepositioned in the annex building with redundant pumps that can each transfer as much water as is needed. Together with a 4-day supply of fuel for these generators, all of this "ancillary" water and equipment is located in structures that are designed to survive seismic events, high winds, and the missiles generated by high winds (FSER Section 3.3). The NRC has concluded from its evaluation that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: For NPPs in earthquake zones, we cannot expect structural integrity. Thus, the plans should be designed so that volumes and channels are such that they minimize connections to adjacent volumes from which contaminated liquid effluents can flow. (S52-1j)

NRC Response: The NRC disagrees with this comment. Applicants for a license must demonstrate that the plant can shutdown safely after any earthquake that would be predicted to affect the plant if built at the proposed location. More than this, the applicant must show that there is a large margin in the seismic capacity of all of the necessary SSCs to perform safe-shutdown. In the event of a beyond-design-basis earthquake, the applicant must show that there is still a high confidence of a low probability of failure. During all DBAs and severe events, the containment vessel of the AP1000 prevents the uncontrolled release of radioactivity to the environment. In addition, Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," Criterion 2, requires that SSCs important to safety (e.g., the liquid waste management system), be designed to withstand the effects of natural phenomena without the loss of capability to function, and that these SSCs be designed to withstand accident conditions in combination with the effects of natural phenomena. Technical specifications include the design feature specifications that limit volume and type of tank contents to limit the potential for a release. The NRC has concluded from its evaluation (FSER Section 3.8.7 for Category I structures) that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Color code components so that in case of accident, we will quickly identify major components from digital images. (S52-1k)

NRC Response: The NRC disagrees with this comment. Major components are easily identifiable by the approximate location in the plant. For example, the main turbine generator is a large component and is located within a large floor of the turbine building. The NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. The NRC has concluded from its evaluation that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public

health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The evaluation of power supplies should be considered in the design process. (S55-17)

NRC Response: The NRC agrees, and has evaluated the ac and dc power systems included in the AP1000 design in the original certification and insofar as the design has changed in the certification amendment. As indicated in the FSERs for the original certification and the amendment, the AP1000 ac and dc power systems meet all applicable regulatory requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The passive containment water storage tank's 8-million pounds of water must be refilled within 3 days after an accident, which is an unreasonably short time period in the case of a natural disaster that has damaged access to the plant. (S55-25)

NRC Response: NRC disagrees with this comment. The AP1000 design includes specific provisions for safe-shutdown capabilities using onsite supplies for the period between 3 days and 7 days in an accident scenario. This is discussed in the NRC FSER in Chapter 22. The AP1000 has ancillary systems to perform this function.

Two ancillary DGs are installed to provide power starting 72 hours after an accident. Each DG provides power to one of the two PCCS pumps. Either one of these pumps can refill the water tank on top of the shield building. The pumps and the generators (with a tank holding enough fuel to last 4 days) are in the annex building, next to the auxiliary building. The part of the annex building where this equipment is installed, as well as the tank itself, is designed to withstand earthquakes, high winds, and the missiles that high winds can generate. Operators have 7 days from the beginning of the accident to replenish the fuel supply and initiate another source of water. A connection point for an alternate water supply is included in the AP1000 design, as well. The NRC has concluded from its evaluation that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public health and safety. No change to the rule, DCD or EA was made as a result of this comment.

Comment: Relocate the safety-related dc batteries and their related systems to a grade level such that they are not subject to external flooding in the event of a natural disaster such as tsunami, tornado, hurricane, or heavy rain. Specifically, the safety-related battery banks (Class-1E grade batteries) are housed below grade (ground) level in the auxiliary building. Not only the battery banks, but also electrical penetrations to primary containment are below grade level. In an earthquake, tornado or any other natural disaster, battery room doors may not remain water-tight. Water may enter through the doors and it may incapacitate battery banks. Water may also enter battery rooms if doors are open for maintenance/testing/replacement of cells. Therefore, the safety-related batteries should be located above grade. (S62-1)

NRC Response: The NRC does not agree that the safety-related dc batteries and their associated systems need to be relocated above grade level. GDC 2 requires the design bases for SSCs that are important to safety, including the safety-related batteries, to reflect the most severe natural phenomena (including earthquakes, tornadoes, floods, hurricanes, and tsunamis) that have historically been reported for the site and surrounding area, with margin to account for

uncertainty in the historical data, such that these SSCs will withstand the effects of natural phenomena without the loss of the capability to perform their safety functions. The AP1000 safety-related SSCs (including the Auxiliary Building, which houses the dc batteries) are designed to withstand the effects of seismic events and external floods. The AP1000 design, as described in the DCD, meets the requirements of GDC 2 with respect to such seismic events and floods.

Below, the NRC addresses the more specific points in the comment. While it is true that safety-related batteries are located below grade per the AP1000 DCD, all the components of safety-related dc systems are housed in seismic Category I structures, which are also designed to withstand flooding. That is, these structures are designed to withstand the seismic and flooding events specified in the DCD. Under 10 CFR Part 52.79(d), an applicant for a COL referencing the AP1000 standard design will be required to demonstrate that the site characteristics, including seismic events and floods, fall within the site parameters specified in the AP1000 DCD, which were used to establish the design bases for the standard design. A COL applicant referencing the AP1000 standard design must show that the most severe seismic and flooding events reported historically for its site, with margin, fall within the events specified in the DCD, thus satisfying GDC 2. Additionally, safety-related dc electric systems must meet GDC 4 (for internal environmental and dynamic effects) and GDC17 (for independence and redundancy, and the capacity to perform their functions assuming a single failure).

According to the DCD (as reviewed by the NRC staff in Section 3.4.1 of the FSER for the AP1000), the plant design protects safety-related systems and components from exterior sources (e.g., floods, ground water) by locating them above design flood level, with the land sloping away from the building, or enclosing them in concrete structures protected from ground water. The seismic Category I structures (including the Auxiliary Building, which houses the dc batteries) that may be subjected to the design-basis flood are designed to withstand the flood level and ground water level as stated in the DCD. This is done by locating the plant grade elevation above the flood level and incorporating structural provisions into the plant design to protect the SSCs from the postulated flood and ground water conditions.

The DCD describes the following design features for seismic Category I SSC's:

- Walls below flood level designed to withstand hydrostatic loads
- Curbs and elevated thresholds
- Water stops in all expansion and construction joints below flood and ground water levels
- Waterproofing of external surfaces below flood and ground water levels
- Water seals at pipe penetrations below flood and ground water levels
- Roofs designed to prevent pooling of large amounts of water in accordance with RG 1.102
- No exterior access openings below grade

These measures not only protect against external natural floods, but also guard against flooding from onsite storage tank rupture. Because the plant grade is above the design flood level, the seismic Category I structures remain accessible during postulated flood events. Accordingly, safety-related structures housing the safety-related dc electric systems are designed to withstand the effects of external flooding identified in the comment.

In Section 3.4.1 of the FSER, the NRC staff finds that the design certification applicant has properly identified the design-basis flood assumed for the design and also specified the site parameters, design characteristics, and any additional requirements and restrictions necessary for the COL applicant to adequately protect against the most severe flood conditions historically reported for the site, with margin to account for uncertainty in the historical data, to ensure that safety-related SSCs will be adequately protected from flood conditions at the site.

Further, the design minimizes the number of penetrations through exterior walls below grade and the penetrations below the maximum flood level will be watertight. Process piping and electrical raceways below grade will be embedded in the wall or welded to a steel sleeve. Below grade there are no access openings or tunnels penetrating the exterior walls of the nuclear island.

In RG 1.102, the NRC describes the types of flood protection acceptable for safety-related SSCs. In Position C.1 of RG 1.102, the NRC defines the various types of flood protection it finds acceptable. One of the acceptable methods of flood protection incorporates a special design of walls and penetrations. The walls are reinforced concrete, and are designed to resist the static and dynamic forces of the design-basis flood and to incorporate water stops at construction joints to prevent in-leakage. Penetrations are sealed and also capable of withstanding the static and dynamic forces of the design-basis flood. The AP1000 flood design incorporates these protective features and conforms to the guidelines of Position C.1 of RG 1.102.

The seismic Category I structures provide protection for the dc batteries and their related systems against external flood and groundwater damage. All exterior access openings are above flood level and exterior penetrations below design flood and groundwater levels are appropriately sealed.

As documented in the NRC staff evaluation in Section 3.4 of the FSER, the AP1000 design regarding flood protection satisfies the guidelines described in SRP Section 3.4.1, Revision 3 and provides reasonable assurance that the AP1000 safety-related SSCs (including the dc batteries and their associated systems) will maintain their structural integrity and perform their intended safety functions when subjected to design-basis flood, and satisfies the requirements of GDC 2 and GDC 4.

With respect that the portion of the comment that indicates that water may enter the battery rooms if the watertight doors are open for maintenance, testing or replacement of the battery cells, the NRC staff agrees that this scenario is possible. However, one important feature of the AP1000 includes the physical separation of safety divisions for the four safety-related battery banks. The doors for the battery rooms are normally closed because they also serve as fire barriers. Accordingly, if one of the battery room doors is open during a flooding scenario, as suggested, the other batteries will still be adequately protected to ensure the safety-related SSCs can perform their function.

Therefore, the NRC has concluded that the AP1000 design provides reasonable assurance that safety-related SSCs (including the dc batteries and their associated systems) will maintain their structural integrity and perform their intended safety functions when subjected to design-basis flood, and satisfies the requirements of GDC 2 and GDC 4. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A report prepared by Congressman Markey's Office, "Fukushima Fallout: Regulatory Loopholes at U.S. Nuclear Power Plants," (Markey Report), is described by his office as a summary of NRC regulatory inadequacies, practices and decisions that impair effective nuclear safety oversight in the U.S. The report, created in the wake of the Japanese catastrophe, highlights the following key findings:

- *Widespread malfunctions and inoperability of emergency DGs at NPPs*
- *The absence of emergency back-up power requirements at some SFPs*
- *The absence of requirements to prevent hydrogen explosions at reactors and SFPs*
- *Outdated seismic safety requirements, even as applications for new licenses and license extensions for many nuclear reactors continue to be processed by the NRC.*

The Markey Report claims the reasons for these problems is due to NRC staff having, "acquiesced to industry requests for a weakening of safety standards." This weakening of safety standards at the behest of Westinghouse-Toshiba has led to flaws in the AP1000 design and operation procedures. NRC staff decisions are being made for financial considerations rather than to protect public safety. (S63-1)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with this comment. The report appears to be focused on currently-operating reactors (e.g., the discussion of seismicity is not a design matter, but a concern about the NRC's requirements for subsequent updating of the seismicity based upon newly-developed geological information); and the Markey Report does not consider extensive NRC efforts to address new geological information under NRC's Generic Safety Issue Number 199 many years before the Fukushima Daiichi Plant accident.

The NRC was unable to identify any specific discussion in the Markey Report that deals with advanced reactor designs. Nor does the Markey Report contain any explicit discussion of the AP1000 design. Finally, the NRC noted that the NTTF reviewed the Markey Report before it issued its July 12, 2011, Report (ADAMS Accession No. ML111861807). The Fukushima NTTF Report noted that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. The NTTF expressed support for completing those design certification rulemaking activities without delay (see NTTF Report, pages 71-72). In light of the above, the NRC does not believe that the Markey Report provides any safety basis for believing there is any safety issue with either the AP1000 design or the proposed amendment.

The NRC also disagrees with the Markey Report's unsupported claims with respect to the NRC's "acquiescence" to the nuclear power industry's request for a weakening of safety standards. With regard to DGs, the AP1000 safety analysis is based on systems that rely only on battery power. The design has two "standby" nonsafety-related DGs that start automatically and supply house (plant) loads during loss of ac power. There are also two ancillary DGs

installed to provide power starting 72 hours after an accident. The two ancillary DGs are provided for power for Class 1E post-accident monitoring, control room lighting and ventilation, instrumentation and control (I&C) room ventilation, and power to refill the PCCS water storage tank and SFP if no other sources of ac power are available. These ancillary DGs (with a tank holding enough fuel to last 4 days) are in the annex building, next to the auxiliary building. The part of the annex building where this equipment is installed is designed to withstand earthquakes, high winds, and the missiles that high winds can generate.

With regard to hydrogen explosions, for severe accident hydrogen control, the AP1000 containment has 64 hydrogen igniters. The igniters are divided into two power groups, normally provided by offsite power. However, should offsite power be unavailable, each of the power groups is powered by one of the onsite nonessential diesels. Should the diesels fail to provide power, the non-Class 1E batteries for each group will support approximately 4 hours of igniter operation. The hydrogen ignition subsystem conforms to the requirements of 10 CFR 50.44 by providing reasonable assurance that uniformly distributed hydrogen concentrations generated from a 100% fuel clad coolant interaction inside containment will not exceed detonable levels, as concluded in NUREG-1793, Section 6.2.5.10. As such, the AP1000 is designed to mitigate hydrogen without detonation.

The Markey Report does not identify or describe any examples where the NRC has reduced safety at the behest of industry or that financial considerations are the determining basis for NRC decisions. However, because of the nature of the comment which alleges NRC wrongdoing; this comment is being referred to the NRC's Office of the Inspector General for its consideration.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The AP1000 DCD Chapter 17 states, "Effective March 16, 2007, NQA-1-1994 is the applicable revision of NQA-1 for work performed for the AP1000 project." When has the NRC endorsed the 1994 edition of NQA-1? According to RG 1.28, Revision 4, the NRC endorses NQA-1-2008 and NQA-1-2009 addenda. According to RG 1.28, Revision 3, the NRC endorses NQA-1-1983 and NQA-1a-1983 addenda. Where is it documented that NQA-1-1994 adequately meets the requirements of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants?" i.e. By implementing NQA-1-1994, does Westinghouse meet all the requirements of 10 CFR Part 50, Appendix B with respect to AP1000 Quality Assurance? (S3-1)

NRC Response: The NRC has not endorsed NQA-1-1994 in any RG. However, the NRC has accepted the use of NQA-1-1994, as an acceptable method to meet the requirements of Appendix B to 10 CFR Part 50, as documented in NRC SERs on application-specific requests for NRC approval of quality assurance programs. In the case of this design certification, the NRC issued an SER by letter, dated February 23, 1996, approving Revision 1 of the Westinghouse Quality Systems Manual (WQSM). Revision 1 of the WQSM is based upon the guidance in NQA-1-1994 and was found to meet all the requirements of Appendix B to 10 CFR Part 50. In addition, the NRC concluded in its FSER Section 17.3, that Revision 5 of the WQSM, as described in the AP1000 DCD, Revision 19, meets the criteria of Appendix B to 10 CFR Part 50 with respect to AP1000 quality assurance.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The passive safety measures and simpler design should make this a much safer reactor. (S14-2)

NRC Response: The AP1000 passive design contains fewer components and fewer possibilities for error. Operators have fewer decisions to make and tasks to perform. This leaves more time for operators to take prompt actions when necessary. The use of PRA during its design helped to make it safer still. To the extent that the comment favors NRC approval of the AP1000 design amendment, no further response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The Fukushima accident has demonstrated that a filtered hermetically sealed standby control room at some distance from the plant is needed in the event of a DBA. (S55-16)

NRC Response: The AP1000 control room is designed to protect reactor operators and the associated plant monitoring and control functions during normal operation, DBEs, and severe accidents. The control room is located on the plant site and is not hermetically sealed. During normal plant operation, the control room is supplied by filtered air and is overpressurized to ensure only filtered air escapes the room. During emergencies, clean air stored in pressurized cylinders is supplied to the control room and during that time, air that is recycled is filtered. Specific details of the review of the control room design and the NRC review may be found in the FSER Section 6.4, "Control Room Habitability Systems." The habitability of the control room was addressed in the certified design and the amendment to the certified design and found to be acceptable, and has determined that the AP1000 design meets its regulations, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

Other AP1000 Topics – Hydrogen Generation

Comment: The hydrogen explosions in the Fukushima accident show that zirconium-based fuel cladding should not be allowed. (S55-14)

NRC Response: The NRC disagrees with this comment. Zirconium-based cladding is widely used in the nuclear industry. NRC rules and regulations are designed to preclude the conditions, which would result in hydrogen generation and cladding failure.

The NRC created an NTTF to review the Fukushima event and conduct a methodical and systematic review of the NRC's processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy consideration. *See Tasking Memorandum – COMGJB-11-0002 – NRC Actions Following the Events in Japan* (March 23, 2011) (ADAMS Accession No. ML111861807); included as Appendix B to the NTTF Report). In its report, the NTTF noted that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing the AP1000 design certification rulemaking without delay (see NTTF Report, pages 71-72).

The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Other AP1000 Topics – Transparency

Comment: Two comments stated that to ensure transparency, please include this comment and all others in the formal review proceedings and post them in the NRC's online library so the public can see any expressed concerns. (S20-3, S29-13, S49-9)

NRC Response: The NRC agrees with the comment. All public comments have been placed in ADAMS. The accession numbers for all public comments received can be found in Appendices 1 through 3 of this document. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: NRC improperly approved three related requests to withhold information from public disclosure related to the AP1000 containment shield building. The withholding of this information is contrary to the interests of the public health and safety and an attempt to circumvent scrutiny by the affected public. (S58-14)

NRC Response: The NRC disagrees with this comment. The NRC has reviewed the withholding requests referenced in the comment and found that those documents were indeed proprietary, and properly withheld. The NRC assesses requests for the withholding of proprietary information and whether an applicant has properly documented its request. The proposed rule included provisions to access proprietary information for the purposes of commenting on the proposed rule. The NRC received no requests to exercise the provisions to access proprietary information provided in the proposed rulemaking. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Because the NRC granted a request to withhold information that was related to the on-going determination of safety measures at plant Vogtle, [the commenter's] procedural rights were impaired due to the improper withholding of proprietary information. (S58-15)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not the adjudicatory proceeding on the Vogtle COL application. However, the NRC disagrees with this comment. The NRC does not believe that it has improperly withheld any documents in this AP1000 DCA rulemaking. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: NRC improperly withheld relevant and necessary information on steel welding inspections and benchmarking, analysis, testing, design and audits for the reactor containment shield building, in the preparation for the licensing proceedings before the Atomic Safety and Licensing Board. (S58-16)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not the

adjudicatory proceeding on the Vogtle COL application. However, the NRC disagrees with this comment. The NRC does not believe that it has improperly withheld any documents in this AP1000 DCA rulemaking. No change was made to the rule, the DCD, or the EA as a result of this comment.

Other AP1000 Topics – Licensing/Rulemaking Processes

Comment: Several comments stated that the AP1000 DCA rulemaking should not be "fast-tracked." (S8-1, S9-1, S19-1, S36-1, S55-19).

NRC Response: The NRC agrees with the comment that the AP1000 rule should not be "fast-tracked." Protection of public health and safety is the foremost regulatory objective of the NRC, and the review of the AP1000 design has been conducted with that in mind. However, the NRC also recognizes that it must perform its regulatory responsibilities in an efficient and effective manner. The NRC has instituted many internal process rulemaking improvements in the AP1000 amendment rulemaking, cognizant of the fact that the design is being referenced in COL applications. The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that are the subject of this DCA, and has determined that the AP1000 design meets its regulations. NRC review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed a comprehensive review and evaluation of the subsequent revisions to the original AP1000 certified design and documented its evaluation in its FSER issued publicly on August 5, 2011, Supplement 2 (ADAMS Accession No. ML112061231). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: In light of the events at the Fukushima plant in Japan, place a hold on all license applications. (S31-3)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with this comment. The Commission established an NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to regulatory framework that should be conducted by the NRC. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011, and noted that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing those design certification rulemaking activities without delay (see NTTF Report, pages 71-72). Consistent with this recommendation, the NRC believes that the AP1000 final rulemaking can and should proceed without delay because: (i) the NRC has determined that the AP1000 DCA meets current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations; and (iv) if the NRC imposes additional requirements on the AP1000 design,

existing regulations already define the process for doing so under 10 CFR 52.63. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should stop the construction of AP1000 in the U.S. NRC should reject the license application. (S53-1)

NRC Response: The AP1000 design certification or this DCA is not an authorization of construction. The NRC has found the AP1000 design, as amended, to comply with its regulations and provide adequate protection of public safety, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: There was no final NRC review of the proposed changes to the AP1000 design, the NRC stated that it did not review Revision 18 to the AP1000 DCD, as evidenced in the statement of considerations for the proposed rule (citing generally to 76 FR 10269; February 24, 2011). (S58-3)

NRC Response: The NRC disagrees with this comment. As discussed in the proposed rule, the nature of the changes to Revision 18 of the DCD was limited to the applicant's commitments for changes to be included in that revision, which the NRC reviewed and accepted as confirmatory items in its FSER, as the technical evaluation for these changes had already been performed. The NRC has reviewed Revision 18 (and the resultant set of limited changes submitted in Revision 19) for both remaining confirmatory items and for issues identified after publication of the proposed rule. These matters are documented in the FSER, NUREG-1793, Supplement 2. For an expanded discussion of changes made to the DCD from issuance of the proposed rule, please see Enclosure 4 to the final rulemaking package (ADAMS Accession No. ML112590317). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A comment attached a document, dated July 5, 2005, by Dr. S. G. Sterrett that raises three issues: that the AP1000 does not meet 10 CFR Part 52; that the process to develop AP1000 from the AP600 was not sufficient; and the accelerated AP1000 review led to cutting regulatory corners. The comment indicated that Dr. Sterrett's document had been submitted in an earlier rulemaking arguing that the issues raised are relevant to the current AP1000 rulemaking and therefore should be reconsidered. A similar comment referred to Dr. Sterrett's concerns raised to the NRC and the ACRS during the initial certification of the AP1000 design and claimed that these safety and design concerns remain unaddressed. (S55-12, S60-1)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The concerns identified by Dr. Sterrett were previously addressed in the initial design certification final rule for the AP1000 design and can be viewed under ADAMS Accession No. ML053130350, on pages 3–7. The comment did not provide any information or other evidence, as to how the concerns that were raised under the initial AP1000 rulemaking in 2005, are applicable to the scope of this amendment to the AP1000 design. Aside from the amendment to the shield building as described in the following paragraph, the NRC does not believe that these general concerns about the AP1000 design – incomplete design, deriving the AP1000 design

from the AP600 design, and cutting regulatory corners – are applicable to the scope of this amendment to the AP1000 design.

The concerns identified by Dr. Sterrett that related to the influence on containment cooling of solar radiation on the shield building, as designed under Revision 15 of the DCD, were previously addressed in the initial design certification final rule for the AP1000. However, the shield building design was revised under Revision 19 of the DCD. Thermal effects were considered in the analysis of the revised shield building design, and the NRC finds the revised shield building design to be acceptable. Dr. Sterrett presented additional concerns about the effects of solar radiation during the August 2011, meeting of the ACRS subcommittee for the AP1000 design, and all of the concerns about solar radiation were specifically considered by the full ACRS committee during its September 2011, meeting. The ACRS letter regarding Revision 19 of the DCD (ADAMS Accession No. ML11256A180) concludes that none of these issues alter the safety conclusion. The NRC agrees with this conclusion.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The 75-day comment period does not seem adequate to address safety concerns on the Westinghouse design. (S8-4)

NRC Response: The NRC disagrees with this comment. The scope of the proposed amendment is significantly less than that of the original AP1000 certification – for which a 75-day comment period was provided (70 FR 20062; April 18, 2005). The Westinghouse application for amendment of the AP1000 DCR was submitted to the NRC on May 26, 2007, and subsequently supplemented in a series of letters. The application and supplements were made available to the public shortly after they were received by the NRC and reviewed for non-public information. The NRC's notice of acceptance of the application was published in the *Federal Register* (73 FR 2946; January 28, 2008). Since the docketing of the AP1000 amendment application, the NRC has posted general information on the amendment on the NRC's Web site, and placed in ADAMS, all public documents received from the application, including the DCD – which describes the design as amended, as well as all publicly available NRC documents relating to the review of the AP1000 amendment. Given NRC's early notice of the docketing and the availability of the information on the AP1000 application and review, the comment did not explain why the 75-day comment period was inadequate. Accordingly, the NRC decided not to extend the public comment period. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Interim Staff Guidance (ISG) DC/COL-ISG-011, which clarifies the NRC staff position regarding applicants finalizing licensing-basis information at a point during the licensing review, a so called "freeze point," and control of licensing-basis information during and following initial review of applications for design certifications or COLs, should not be permitted. The effect is to freeze out the public's ability to bring new issues to the Commission. (S58-4, S58-5)

NRC Response: The NRC disagrees with this comment. The purpose of the ISG is to "finalize" the design certification applicant's proposed design descriptions, which are required by NRC regulations to be described in the DCD. The purpose of this ISG guidance is to facilitate the NRC's review of the design, including resource planning and scheduling of resources to be applied to the design certification review effort. However, the ISG does not prevent the

applicant from submitting changes to design descriptions after the ISG-described “freeze point,” as witnessed by Westinghouse’s own series of changes after the so-called ”freeze point.”

More importantly, the ISG neither prevents nor restricts a member of the public from using any of NRC’s existing procedures for bringing any issue, including an issue with the design certification rulemaking, to the NRC’s attention. To illustrate this, even if the design certification applicant “freezes” the design in accordance with DC/COL-ISG-011, a member of the public will always be able to submit comments in the public comment period on any issue regarding the proposed changes to the certified design, which are the subject of the amendment. If the matter of concern is a matter which is not relevant to any of the proposed changes requested by the applicant (*i.e*., “out of scope”), then a member of the public may submit a petition for rulemaking under 10 CFR 2.802. The rulemaking petition would request a change to the existing design certification to address the matter of concern. Finally, if the matter of concern relates to wrongdoing in connection with the design certification, then a member of the public may submit an allegation to the NRC under the NRC’s Allegation Program.

In summary, the guidance in the ISG does not have any effect on the capability of a member of the public to bring issues regarding a proposed new design certification, an existing design certification, or applicant-proposed amendment to an existing design certification. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A “longer term review” of the events at Fukushima, and engagement of stakeholders in that process, should be a part of the AP1000 design review. (S52-3)

NRC Response: The NRC agrees on the need to evaluate the Fukushima event, but disagrees on the need to complete a longer-term review of the accident at Fukushima prior to the issuance of this DCA.

The NRC created an NTTF to review the Fukushima event and conduct a methodical and systematic review of the NRC’s processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy consideration. *See Tasking Memorandum – COMGJB-11-0002 – NRC Actions Following the Events in Japan* (March 23, 2011) (ADAMS Accession No. ML111861807); included as Appendix B to the NTTF Report). In its report, the NTTF found that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing those design certification rulemaking activities without delay (see NTTF Report, pages 71-72).

The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety. Therefore, the NRC believes that is not necessary to delay this rulemaking.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The applicant opposes any suspension of pending licensing decisions and related rulemaking. The "Emergency Petition" [i.e., Petition to Suspend All Pending Licensing Decisions and Related Rulemaking Decisions Pending Investigation of Lessons Learned from Fukushima Daiichi Nuclear Power Station Accident] provides no legitimate factual or legal basis for the Commission to take such an extraordinary step. (S41-1)

NRC Response: The NRC agrees that suspension of this AP1000 DCA rulemaking is unwarranted. The Commission denied several requests (in the form of "petitions") for delay (e.g., "suspension") of the AP1000 amendment rulemaking, including the Emergency Petition, see *Memorandum and Order*, CLI-11-05, September 9, 2011 (ADAMS Accession No. ML112521039), and nothing in the comments on the proposed amendment to the AP1000 design has led the NRC to conclude that a delay in the rulemaking is warranted. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should not suspend, or delay the AP1000 design certification rulemaking. (S54-1)

NRC Response: The NRC agrees that delay ("suspension") of this AP1000 DCA rulemaking is unwarranted. The Commission denied several requests (in the form of "petitions") for delay (e.g., "suspension") of the AP1000 amendment rulemaking, including the Emergency Petition, see *Memorandum and Order*, CLI-11-05, September 9, 2011 (ADAMS Accession No. ML112521039), and nothing in the comments on the proposed amendment to the AP1000 design has led the NRC to conclude that a delay in the rulemaking is warranted. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The applicant commented that the April 6, 2011, petition, in relying upon the actions taken by the NRC after the TMI Unit 1 accident as precedent for suspending the AP1000 rulemaking, demonstrates a misunderstanding of the nature of the NRC's actions. (S56-1)

NRC Response: This comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The applicant supports the current Commission approach to continue ongoing licensing proceedings and design certification reviews while conducting, in parallel, a comprehensive review of the Fukushima events in Japan. (S56-2)

NRC Response: The NRC agrees on the need to evaluate the Fukushima event, and that this DCA rulemaking need not be delayed. The NRC created an NTTF to review the Fukushima event and conduct a methodical and systematic review of the NRC's processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy consideration. *See Tasking Memorandum – COMGJB-11-0002 – NRC Actions Following the Events in Japan* (March 23, 2011) (ADAMS Accession No. ML111861807); included as Appendix B to the NTTF Report). The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011, and recommended no changes to the AP1000 design, and that the rulemaking should proceed without delay. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The "Emergency Petitions" to suspend AP1000 rulemaking provide no new information and raise no legitimate factual or legal basis for the Commission to take the extraordinary step of suspending or extending the rulemaking. Further, there is no emergency that requires such action by the Commission. (S56-3)

NRC Response: This comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should approve the AP1000 design certification rulemaking. (S59-1)

NRC Response: This comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The comment supports the proper processes that would allow the final rulemaking to proceed. (S61-1)

NRC Response: This comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The AP1000 design should be built as soon as possible. (S5-1)

NRC Response: The NRC takes no position on this comment. The NRC is a regulatory agency under the Atomic Energy Act (AEA) and other statutes. It does not build NPPs nor is it responsible for the promotion of nuclear energy generation. To the extent that the comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns

This subject area includes comments which are *not related to the AP1000 design* and are not addressed under other subject areas. These comments address topics such as the general safety of nuclear power, the cost of nuclear power, and whether or not the NRC should license new NPPs, allow new plants to be constructed, or shutdown existing NPPs.

General Concerns – Opposition to Nuclear Power

Comment: A number of comments stated that no new NPPs should be built. (S1-1, S23-3, S25-1, S31-2, S32-1, S34-1, S37-1, S38-2, S38-3, S47-3, S53-2, S65-4, S66-2).

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not whether NPPs ought to be built in the U.S. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The AP1000 design certification or this DCA is not an authorization of construction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Because there are alternatives to nuclear power, it only makes sense to stop and solve the problems of high-level waste. (S47-4)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not whether NPPs ought to be built in the U.S., or on ultimate treatment of high-level waste. The AP1000 design certification or this DCA is not an authorization of construction. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The NRC has found the AP1000 design, as amended, to comply with its regulations and provide adequate protection of public safety, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A number of comments stated that existing NPPs should be closed. (S17-3, S23-1, S31-6, S34-3)

NRC Response: The NRC interprets these comments to mean that in light of the Fukushima Daiichi accident or the general risks of nuclear power, that all NPPs should be shutdown permanently. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not related to operation of existing NPPs. However, the Commission established an NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to regulatory framework that should be conducted by the NRC. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011, and recommended no changes to the AP1000 design, and that the rulemaking should proceed without delay. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Alternative Energy Sources

Comment: A number of comments stated that other sources of energy should be developed and implemented instead of new nuclear power. (S1-4, S7-1, S10-2, S26-2, S27-1, S29-4, S31-5, S34-2, S35-2, S44-2, S45-1)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC takes no position on these comments. The NRC does not advocate for any particular project or type of energy development. The NRC regulates the safe and secure use of nuclear materials, including NPPs. Solar and wind energy are not regulated by the NRC. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: I support the proposed rule to shift the mix of power generation away from carbon fuels. (S14-1)

NRC Response: The NRC takes no position on this comment. The NRC is a regulatory agency under the AEA and other statutes. It does not build NPPs nor is it responsible for the promotion

of nuclear energy generation. To the extent that the comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: As business leaders and citizens, in light of the accident at Fukushima, we cannot emphasize strongly enough the need to ensure that solutions to our nation's energy needs are safe for the long-term. (S48-5)

NRC Response: The NRC interprets this comment as being concerned with the safety and sustainability of energy generation. The NRC does not advocate for any particular project or type of energy development. The NRC regulates the safe and secure use of nuclear materials, including NPPs. The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Transparency

Comment: In light of the Fukushima disaster, the NRC should release undisclosed information and tell the truth. Stop hiding computer codes, financial and commercial data, proprietary and sensitive unclassified non-safeguards information (SUNSI) information. (S58-2)

NRC Response: The NRC interprets this comment to mean that in light of the Fukushima accident, that the NRC should make public SUNSI and proprietary information. The NRC disagrees with this comment. The NRC governing statute and regulations prohibit the release of sensitive information, such as proprietary, SUNSI, or SGI information, as required by 10 CFR 2.390 the AEA of 1946 as amended by the AEA of 1954, and Executive Orders 12958 as amended by Executive Order 13292. The NRC has posted general information on the AP1000 DCA on its Web site, including the DCD itself. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Cost

Comment: A number of comments stated that nuclear power is too expensive. (S11-3, S17-4, S17-5, S21-2, S27-2)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC takes no position on these comments. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The cost of designing, building, or operating a NPP is not a matter that the NRC regulates. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The Department of Energy (DOE) has approved an application for a loan guarantee of $8.3 billion to Georgia Southern for two proposed AP1000 reactors, conditional on NRC approving the AP1000. Taxpayer dollars should not be spent on unsafe reactors. (S66-2)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The cost of designing, building, or operating a NPP is not a matter that the NRC regulates. The NRC makes no judgment on NPPs' costs.

The AP1000 design was found to meet NRC requirements, as documented in NUREG-1793 (ADAMS Accession No. ML043570339), the NRC's evaluation of the AP1000 application. This AP1000 DCA was found to likewise meet NRC requirements, as documented in the FSER, published as NUREG-1793, Supplement 2 (ADAMS Accession No. ML112061231). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: No more subsidies to a technology that should be self supporting by now. (S21-4)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The cost of designing, building, or operating a NPP is not a matter that the NRC regulates. The NRC makes no judgment on NPPs' costs. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Nuclear energy is proven to be cheap, efficient, safe, and necessary. By all means, build the AP1000 and more such plants. (S22-1)

NRC Response: The NRC is a regulatory agency under the AEA and other statutes. It does not build NPPs nor is it responsible for the promotion of nuclear energy generation. To the extent that the comment favors NRC approval of the AP1000 design amendment, no response is necessary. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Safety

Comment: A number of comments stated that nuclear power, in general, is unsafe. (S11-1, S16-1, S23-2, S26-1, S27-3, S29-3, S31-4, S35-1)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. These comments provide no rationale as to why nuclear power is perceived to be dangerous. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The AP1000 design certification or this DCA is not an authorization of construction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Nuclear accidents are not on the same scale as coal mine collapses or oil well explosions. Instead of a limited number of workers killed in the case of coal or oil accidents, nuclear accidents affect local residents, the food and water supply, and wildlife for years and years to come resulting in increased cancer risk, contaminated food and toxic clouds. (S44-3)

NRC Response: The NRC understands this comment as expressing concern about the possible severity of nuclear accidents. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety. Neither the AP1000 design certification nor this DCA is an authorization of construction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Several comments stated safety considerations should be the primary issue in Commission decision making. (S29-6, S31-8, S40-6, S48-7, S49-10, S53-3)

NRC Response: The NRC agrees that safety is a primary concern. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: In light of the events at Fukushima, Nuclear R&D institutions must consider alternatives to zirconium-based and zircaloy cladding so that chemical reactions that generate hydrogen is prevented, assuming that light-water continues to be the nuclear coolant, moderator, and reflector. (S52-1a)

NRC Response: Zirconium-based cladding is widely used in the nuclear industry. NRC rules and regulations are intended to preclude the conditions, which would result in hydrogen generation and cladding failure. The NRC is evaluating the recommendations resulting from its review of the Fukushima accident and has not taken steps to modify its rules and regulations. Since the AP1000 design has demonstrated compliance with existing rules and regulations, including those applicable to fuel and cladding, zirconium-based fuel cladding is permitted and considered acceptable. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: In light of the accident at the Fukushima plant, the co-location of nuclear units on one site needs a critical review of its post-accident response and management. We must consider that energetic events at one unit exacerbating the shutdown of the other unit(s). (S52-1b)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. Neither the AP1000 design certification nor this DCA is an authorization of construction. Multiunit effects are considered in applicable licensing actions.

Following the events in Japan, the Commission established an NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to regulatory framework that should be conducted by the NRC. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011, and with respect to the AP1000 design amendment, noted that it should proceed without delay.

The NTTF recommended that the Commission direct the NRC staff to initiate these important rulemaking activities, including concurrent development of associated guidance.

(1) Initiate rulemaking to implement a risk-informed, defense-in-depth framework consistent with the above recommended Commission policy statement [Section 3 of the NTTF Report – detailed Recommendation 1.2]

(2) Initiate rulemaking to require licensees to confirm seismic hazards and flooding hazards every 10 years and address any new and significant information. If necessary, update the design-basis for SSCs important to safety to protect against the updated hazards. [Section 4.1.1 of the NTTF Report – detailed Recommendation 2.2]

(3) Initiate rulemaking to revise 10 CFR 50.63 to require each operating and anew reactor licensee to (1) establish a minimum coping time of 8 hours for a loss of all ac power, (2) establish the equipment, procedures, and training necessary to implement and "extended loss of all ac" coping time of 72 hours for core and SFP cooling and for reactor coolant system and primary containment integrity as needed, and (3) preplan and pre-stage offsite resources to support uninterrupted core and SFP cooling, and reactor coolant system and containment integrity as needed, including the ability to deliver the equipment to the site in the time period allowed for extended coping, under conditions involving significant degradation of offsite transportation infrastructure associated with significant natural disasters. [Section 4.2.1 of the NTTF Report – detailed Recommendation 4.1]

(4) Initiate rulemaking or licensing activities or both to require the actions related to the SFP described in detailed recommendations (7.1-7.4) [Section 4.2.5 – detailed Recommendation 7.5]

(5) Initiate rulemaking to require more realistic, hands-on training and exercises on severe accident management guidelines and extensive damage mitigation guidelines for all staff expected to implement the strategies and those licensee staff expected to make decisions during emergencies, including emergency coordinators and emergency directors. [Section 4.2.6 of the NTTF Report – detailed Recommendation 8.4]

(6) Initiate rulemaking to require emergency preparedness (EP) enhancements for multiunit events in the following areas: personnel and staffing, dose assessment capability, training and exercises, and equipment and facilities. [Section 4.3.1 of the NTTF Report - Recommendation 9.1]

(7) Initiate rulemaking to require EP enhancements for prolonged SBO in the following areas: communications capability, ERDS capability, training and exercises, and

equipment and facilities {Section 4.3.1of the NTTF Report – detailed Recommendation 9.2].

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: An international alliance of nuclear accident first responders and crisis managers is needed. (S52-1l)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The certification of standard reactor designs in the U.S. is conducted in accordance with the requirements in 10 CFR Parts 50 and 52, and is neither related to nor dependent on the existence of international alliances.

The NRC will not issue a design certification that does not comply with NRC requirements. The NRC has concluded from its evaluation that the AP1000 design meets the NRC's regulations and adequately addresses the emergency planning design-related features. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: We should have international agreements on regulated levels of radiation and exposure to the general public and for emergency and extended recovery phases. (S52-1m)

NRC Response: The NRC requirements for radiation are set forth in 10 CFR Part 20, *"Standards for Protection Against Radiation."* The NRC has concluded from its evaluation that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public health and safety. For extended recovery, the Environmental Protection Agency (EPA) has published a "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," EPA-400-R-92-001. This manual discusses the applicable requirements and the EPA recommendations for emergency responders to nuclear incidents. In addition, the NRC monitors and participates in activities of national and international standards setting organizations and incorporates relevant recommendations in its regulations and guidance. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: For better emergency response and crisis management, wider access roads are needed to and from NPPs. The access roads should be free of debris and able to accommodate large trucks. In addition the plant should have a means of access by water. (S52-1n)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not reactor plant site issues. The width, condition, and capability of access roads to commercial NPPs have no relationship to the AP1000 standard reactor design, and are therefore not relevant to the NRC's design certification evaluation. Emergency response is largely programmatic in nature, rather than a reactor design characteristic, and is addressed pursuant to the requirements in 10 CFR Parts 50 and 52. With respect to access roads, there are no specific EP requirements, other than the need for the applicant for a new reactor to develop an evacuation time estimate (ETE). The ETE examines the 10-mile radius area surrounding a nuclear plant - referred to as the 10-mile emergency planning zone - and determines estimated times for evacuating the affected population under various conditions (e.g., during the day,

night, or during a snow storm). There are no minimum or maximum time requirements associated with evacuation. The estimated evacuation times are used by the offsite State and local governmental agencies to determine whether evacuation or sheltering is the appropriate protective action in response to an incident at the nuclear facility. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: In light of the accident at Fukushima, it is immoral to ask local populations to accept the financial and medical liabilities of a nuclear reactor while receiving inadequate or no compensation. The NRC must stop the development or licensing of nuclear facilities that cause harm to the families living near them (even when there are no "accidents") through low levels of radioactive substances released as part of normal operations. (S65-1, S65-2)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The NRC sets requirements for normal operations at nuclear power facilities. The NRC requirements for radiation are set forth in 10 CFR Part 20, *"Standards for Protection Against Radiation."* Any releases from a NPP must comply with the terms of its license, and the Commission will not license a facility that does not provide reasonable assurance of adequate protection of public health and safety. The AP1000 design certification or this DCA is not an authorization of construction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC must refuse to license nuclear facilities that are unable to protect populations from radiation exposure when there are earthquakes (6.0 and higher on Richter scale) or power outages lasting more than 12 hours. (S65-6)

NRC Response: The NRC understands this comment to refer to the severe external environmental conditions experienced at Fukushima and the resultant accidents from long-term loss of ac power. The AP1000 design can withstand severe external environmental hazards such as fires, flooding, tsunamis, high winds, hurricanes, tornadoes, snow and ice, impacts, and seismic events that are considered credible in the U.S. and which can be similar to those experienced at Fukushima. The AP1000 design was previously analyzed for these severe environmental conditions as part of the initial design certification. Westinghouse has shown and the NRC review has concluded that the AP1000 design can keep the reactor properly cooled under these severe environmental conditions, thus providing reasonable assurance that the public is protected. The AP1000 earthquake design-basis is for 0.3 g peak ground acceleration and is designed to cope for 72 hours without ac power. Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," GDC 2, requires that SSCs important to safety be designed to withstand the effects of natural phenomena without the loss of capability to function, and that these SSCs be designed to withstand accident conditions in combination with the effects of natural phenomena. The NRC has concluded from its evaluation (FSER Section 3.8.7 for Category I structures) that the AP1000 design meets the Commission's regulations and provides reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Licensing/Rulemaking Processes

Comment: Two comments stated that license extensions should no longer be approved. (S21-3, S25-2)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: Do not rush into new plants without every question answered truthfully. (S9-1)

NRC Response: The NRC interprets this comment to mean that the NRC should not license new NPPs without performing a thorough review. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC has found the AP1000 design, as amended, to comply with its regulations and provide adequate protection of public safety, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. The AP1000 design certification or this DCA is not an authorization of construction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Form Letter Comments and NRC Responses

Fukushima-related

This subject area includes comments requesting specific action (hold, suspend, terminate, extend comment period) based upon the Fukushima Daiichi NPP accident. This subject area includes AP1000-specific comments, as well as more general comments (e.g., close all plants) as a result of Fukushima. Other Fukushima-related topics covered under this subject area include tsunami/earthquake, core cooling, SBO, and the need for a second control room. This subject area excludes comments relating to another AP1000-specific subject area (e.g., shield building).

FORM LETTER COMMENTS

Fukushima – Put Application on Hold to Consider Fukushima Lessons Learned

Comment: The NRC should grant the petition filed by the twelve environmental organizations of the AP1000 Oversight Group and the DCA rule should be put on hold until the lessons learned from the Fukushima event in Japan have been taken into consideration. (FL-3, FL-4)

NRC Response: The NRC agrees on the need to evaluate the Fukushima event. The Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The public comment period for the proposed rule on the AP1000 DCA closed on May 10, 2011, and the NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The NTTF considered the AP1000 DCA in its report.

The NTTF noted that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing those design certification rulemaking activities without delay (see NTTF Report, pages 71-72).

The Commission directed the NRC staff, via SRM, to request public input on the NTTF recommendations for the purpose of providing the Commission with fully-informed options and recommendations (SRM-SECY-11-0093, dated August 19, 2011 (ADAMS Accession No. ML112310021), and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011). To the extent that the Commission might approve any NRC staff recommendations to impose additional requirements on the AP1000 design, the NRC can amend the AP1000 DCR to reflect those requirements. Any Commission-imposed changes would be subject to the issue finality provisions of 10 CFR 52.63(a)(1) and would have to meet one or more of the change criteria of that paragraph.

The NRC believes that the AP1000 final rulemaking can and should proceed without delay because: (i) the NRC has determined that the AP1000 DCA meets current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iv) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so under 10 CFR 52.63.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – 75-Day Public Comment Period

Comment: Especially considering the ongoing crisis in Japan and the review which will take place when the situation is brought under control, the current 75-day public comment period on the AP1000 Rule should be extended. (FL-2, FL-3)

NRC Response: The NRC disagrees with this comment, and believes that the 75-day public comment period, which is consistent with most other NRC technical rulemakings, is adequate. The Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The public comment period for the proposed rule on the AP1000 DCA closed on May 10, 2011, and the NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The NTTF considered the AP1000 DCA in its report. The NTTF Report noted that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing those design certification rulemaking activities without delay (see NTTF Report, pages 71-72).

The Commission directed the NRC staff, via SRM, to request public input on the NTTF recommendations for the purpose of providing the Commission with fully-informed options and

recommendations (SRM-SECY-11-0093, dated August 19, 2011 (ADAMS Accession No. ML112310021), and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011).

To the extent that the Commission might approve any NRC staff recommendations to impose additional requirements on the AP1000 design, the NRC can amend the AP1000 DCR to reflect those requirements. Any Commission-imposed changes would be subject to the issue finality provisions of 10 CFR 52.63(a)(1) and would have to meet one or more of the change criteria of that paragraph.

The NRC believes that the AP1000 final rulemaking can and should proceed without extending the public comment period because: (i) the NRC has determined that the AP1000 DCA meets current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iv) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so under 10 CFR 52.63.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Cooling Capabilities

Comment: Westinghouse has not proven that the reactor could be properly cooled in conditions similar to those at Fukushima. (FL-8)

NRC Response: The NRC understands these comments to refer to the severe external environmental conditions experienced at Fukushima and the resultant accident. The AP1000 design can withstand severe external environmental hazards such as fires, flooding, tsunamis, high winds, hurricanes, tornadoes, snow and ice, impacts, and seismic events that are considered credible in the U.S. The AP1000 design was previously analyzed for these severe environmental conditions as part of the initial design certification and the AP1000 design, as amended, continues to meet NRC requirements. Westinghouse has shown and the NRC has concluded in its review as documented in the FSER (NUREG-1793, Supplement 2) that the AP1000 design can keep the reactor properly cooled under these severe environmental conditions, thus providing reasonable assurance that the public is protected.

The Fukushima accident occurred, in part, because of the loss of ac power (also known as SBO), which was necessary to maintain core cooling. The AP1000 design has a passive safety system (natural circulation) and inherent 72-hour coping capability for core, containment, and SFP cooling – even if an LOCA has occurred.

After 3 days with no ac power, only a small “ancillary” generator is needed. This generator is used to power a small pump that refills the tank that supplies water to the outside surface of the containment. The AP1000 design provides two such generators that are installed in a seismically qualified structure (along with their fuel and supporting equipment). The AP1000 design includes provisions to support emergency operating protocols such that after 1 week without ac power, the containment can be cooled indefinitely by replenishing fuel supplies for at least one ancillary generator and replenishing water in the water tank above the shield building. The NRC has reviewed these AP1000 design features and operational provisions and

concluded that they meet NRC requirements. These features of the AP1000 design demonstrate that the reactor can be properly cooled during accident conditions.

No change was made to the rule, the DCD, or the EA as a result of this comment.

ADDITIONAL FORM LETTER COMMENTS

Fukushima – Do Not Build Any More Reactors

Comment: Because of the recent events at the Fukushima NPP in Japan, and other historical nuclear events such as Chernobyl, nuclear reactors should no longer be built. (F*431-1,* F*1283-1,* F*3227-1, F6951-2, F6987-1, F7547-1, F8250-1, F8250-2, F9115-5, F9413-2, F9413-3, F9413-4, F9413-8, F9413-9, F9413-10, F9461-1, F9786-2, F9786-3, F9786-4, F9786-8, F9786-9, F9786-10, F9480-1)*

NRC Response: Several comments expressed concern about the use of nuclear power in light of the events at the Fukushima facility in Japan, as well as other historical events, such as Chernobyl (Russia) and TMI (U.S.). These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a licensing decision on whether to build new reactors. The NRC regulates the safe and secure use of nuclear materials, including NPPs. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements and guidelines. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Nuclear Power is Dangerous, Unsafe, and Unclean

Comment: The recent accident at the Fukushima NPP in Japan has shown that nuclear power is dangerous, unsafe, and unclean. (F431-2, F5591-1, F5591-2, F5591-3, F6167-1, F6951-1, F9413-5, F9616-2, F9786-5, F11876-1)

NRC Response: Several comments expressed general concern about the safety of nuclear power in light of the events at the Fukushima facility in Japan, as well as other historical events, such as Chernobyl (Russia) and TMI (U.S.). These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC's regulations provide reasonable assurance of adequate protection of public health and safety. The NRC reviewed the AP1000 design, as amended, and determined in its FSER that the design complies with all of the applicable regulations. Further, all U.S. NPPs are designed with multiple layers of protection, or "defense-in-depth," with SSCs that are designed to prevent an accident or, should an accident occur, minimize the consequences of an accident. The NRC continues to believe that the current regulations that apply to the AP1000 design, as amended, are adequate and that the AP1000 design is acceptable as described in the FSER.

The NRC interprets the comments regarding nuclear power being unclean to mean there are concerns with the long-term impact of spent fuel on the environment. The AP1000 design includes a SFP where spent fuel rods will be stored. In the Commission's Waste Confidence Decision and Rule (10 CFR 51.23(a)) (75 FR 81032), the Commission has made the generic

determination that "if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations."

The transfer of spent fuel to a permanent repository or other facility is also out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101, et seq.) mandates that high-level wastes (such as spent fuel) are to be buried at a deep geologic repository.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Review All U.S. Nuclear Power Plants for Capability to Withstand Natural Disasters

Comment: As a result of the event at Fukushima, closely examine all present NPPs to absolutely determine if they are capable of full containment in case of an accident or natural disaster. (F3894-5)

NRC Response: Several comments expressed concern about the safety of all currently operating U.S. nuclear plants in light of the events at the Fukushima facility in Japan. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. As previously noted, NRC requirements for all NPPs are being re-evaluated in light of the Fukushima accident. Further, all U.S. NPPs are designed with multiple layers of protection, or "defense-in-depth," with SSCs, including the containment, that are designed to prevent an accident or, should an accident occur, minimize the consequences of an accident. The SSCs that are important to safety are designed to withstand the effects of the most severe natural phenomena (including earthquakes, tornadoes, floods, hurricanes, and tsunamis) that have historically been reported for the site and surrounding area, with margin to account for uncertainty in the historical data, such that these SSCs will be available to perform their safety functions. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Put Application on Hold to Consider Fukushima Lessons Learned

Comment: The approval of the AP1000 DCA should not be fast-tracked, and should be put on hold until the lessons learned from the Fukushima accident in Japan have been taken into consideration. (F1715-4, F2626-1, F4632-1, F5060-1, F5132-1, F5249-1, F5597-1, F5833-2, F6978-1, F6987-4, F8829-1, F9103-1, F9616-1, F9724-1, F10008-1, F11500-1, F12756-1, F12929-1, F13174-3, F13174-4)

NRC Response: The NRC agrees that this rulemaking should not be fast-tracked, but disagrees that the rule should be put on hold. Protection of public health and safety is the foremost regulatory objective of the NRC, and the review of the AP1000 design has been conducted with that in mind. The NRC also recognizes that it must perform its regulatory responsibilities in an efficient and effective manner. The NRC has not ignored any safety issues in order to speed up the regulatory review process or for any other reason. The NRC has

followed all applicable procedures and processes in its safety review and has found that the AP1000 DCA meets all NRC requirements.

The Commission established an NTTF to perform a review of the Fukushima Daiichi accident. The NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to regulatory framework that should be conducted by the NRC. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011, recommending that the AP1000 rulemaking process proceed without delay. Consistent with this recommendation, the NRC believes that the AP1000 final rulemaking can and should proceed without delay (see NTTF Report, pages 71-72) because: (i) the NRC has determined that the AP1000 DCA meets current regulations; (ii) the AP1000 design features already address many of the design concerns and recommendations raised by the NTTF; (iii) the NRC will provide an opportunity for the public to provide input on NTTF recommendations, and (iv) if the NRC imposes additional requirements on the AP1000 design, existing regulations already define the process for doing so under 10 CFR 52.63. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Concern Regarding Earthquakes and Tsunamis in the U.S.

Comment: Based on the accident at the Fukushima Daiichi nuclear plant, several comments expressed a concern over the occurrence of major earthquakes of increasing frequency and magnitude and resultant tsunamis. Specific concerns were related to fault lines that could impact U.S. plants and the design for west coast nuclear plants. (F8104-1, F9413-1, F9413-7, F9786-1, F9786-7)

NRC Response: These comments are out of scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. Although it may seem that more earthquakes are occurring, earthquakes of magnitude 7.0 or greater have remained fairly constant throughout this century. The National Earthquake Information Center locates about 12,000 to 14,000 worldwide earthquakes each year or approximately 50 per day. According to long-term records (since about 1900), there are about 18 major earthquakes (7.0-7.9) and one great earthquake (8.0 or above) in any given year. However, the NRC believes that current operating reactors have adequate design bases for seismic events.

All U.S. nuclear plants are built to withstand natural hazards, including earthquakes. Even those nuclear plants that are located within areas of potentially higher seismic activity are designed to withstand such a natural disaster. The NRC requires that applicants consider the most severe natural phenomena reported for a site and the surrounding area, with sufficient margin for limitations in the data, in designing safety-significant SSCs. In addition to the design of the plants, significant effort goes into emergency response planning and accident management. This approach is called defense-in-depth. Each NPP is designed to a ground-shaking level that is appropriate for its location, given the possible earthquake sources that may affect the site and its tectonic environment. Ground shaking is a function of both the magnitude of the earthquake and the distance from the fault plane to the site. The existing plants were designed on a “deterministic” or “scenario earthquake” basis that accounted for the largest earthquake expected in the area around the plant. The design-basis earthquake for the San Onofre (SONGS) NPP is a magnitude 7.0 earthquake located near the site (5 miles (8 km)) with

a ground acceleration of 0.67g. The design-basis earthquake for the Diablo Canyon NPP is a magnitude 7.5 earthquake located on the Hosgri fault at a distance of 3 miles (5 km) from the site with a ground acceleration of 0.75g.

In more seismically active regions, such as the Western U.S., faults are often well mapped and characterized. However, there are very few mapped active faults in the Central and Eastern U.S. (CEUS). In general, earthquakes in the CEUS are not attributable to a known fault and earthquake occurrence in this part of the country is not as well understood. Due to the lack of clearly defined active faults, the seismicity in the CEUS is often defined in terms of "seismic zones." The major seismic zones in the CEUS are the New Madrid and Charleston zones. The New Madrid seismic zone, located in the southern and Midwestern U.S., is responsible for the 1811-12 New Madrid sequence of earthquakes with estimated magnitudes between 7 and 8. The Charleston seismic zone, related to the 1886 Charleston earthquake in South Carolina, has an estimated magnitude between 6.6 and 7.2. NPPs in the CEUS are predominantly located in areas of low seismic activity, away from these active seismic zones.

Earthquakes with very large magnitudes, such as the March 2011 magnitude 9 Tohoku earthquake off the northeast coast of Japan, occur within subduction zones. Subduction zones are locations where one of the earth's tectonic plates is subducting beneath another. The only subduction zone that is capable of directly impacting the continental U.S. is the Cascadia subduction zone, which lies off of the coast of northern California, Oregon, and Washington. The only operating NPP in that area is Columbia, in Benton County, Washington. It is far from the coast and the subduction zone.

Tsunamis can occur as a result of earthquakes. Nuclear plants are designed to withstand flooding from not only tsunamis, but also hurricanes and storm surges; therefore, there is often significant margin against tsunami flooding. However, it should be noted that the Fukushima accident has shown that drawdown, recession of water prior to the onset of a wave, can be a significant problem. Drawdown is considered in NRC's current regulatory guidance and had been since 2007.

Those plants that might face a threat from tsunami are required to withstand large waves and the maximum wave height at the intake structure. Tsunami flooding has been considered in the design of U.S. nuclear plants since the publication of RG 1.59 in 1977, which has conservative analysis methods that the NRC continues to utilize.

The level of tsunami flooding that each plant is designed for is site-specific and is appropriate for what may occur at each location. Japan is located in the "Ring of Fire" and is subject to significant seismic, tsunami and volcanic hazards. Only 35 out of 104 operating U.S. nuclear plants are located in coastal locations subject to potential tsunami or storm surge flooding. None are located near volcanic activity. Nine of the 35 nuclear plants are located on the Great Lakes. The remaining 26 operating plants are located on the Pacific, Atlantic, and Gulf Coast.

Tsunami flooding on the Gulf and Atlantic Coasts occurs, but is very rare. Generally, the flooding anticipated from hurricane storm surge exceeds the flooding expected from a tsunami for plants on the Atlantic and Gulf Coasts. For the Great Lakes, there is no record of seismic generated (earthquake) tsunami waves. As in the case of the Atlantic and Gulf Coast nuclear plants, storm surge is most often the design-basis flood. The 1958 Lituya Bay (Alaska) tsunami

of 1,720 feet (524 m) at the head of the Bay was caused primarily by an enormous rockfall into Gilbert Inlet. No operating U.S. nuclear plant is located in an environment similar to Lituya Bay.

Diablo Canyon and SONGS are two nuclear plant sites that have potential for tsunami hazard (Pacific Coast). The SONGS and Diablo Canyon main plants are located above the flood level associated with tsunami.

Even though the NRC has determined that existing plants provide reasonable assurance of adequate protection of public health and safety, the NRC is fully engaged in national international tsunami hazard mitigation programs, and is conducting active research to refine the tsunami sources in the Atlantic, Gulf, and Pacific Coasts areas. Currently, the NRC has a tsunami research program that is focused on developing modern hazard assessment techniques and additional guidance through cooperation with the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS). This has already led to several technical reports and an update to NRC's safety review guidance. The NOAA and USGS are also assisting with ongoing reviews of tsunami hazard. In addition, the NRC is developing a new RG on tsunami hazard assessment, which is expected to be available in draft form in 2012.

In summary, each U.S. NPP is designed against conditions appropriate for its location on a site-specific basis. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Untested Reactors & Safety in the Event of a Natural Disaster

Comment: In light of the events at Fukushima, several comments expressed concern over the safety of new reactor designs and their lack of demonstration testing. Specific concerns included how the new AP1000 design would react in a natural disaster and whether a reactor accident, natural disaster, or terrorist attack could result in greater, longer term consequences. These comments also suggested that people living in the service area of a new design should be asked if they are willing to be the at-risk population during testing of the new design, a decade long moratorium against the use of the design at other sites during this testing phase. Alternative sources of power are also suggested. (F1009-1, F1952-1, F5761-1, F5833-1, F7547-5)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, substantial testing was done of new technology employed in the AP1000 design, as documented in Chapter 21 of NUREG-1793, Supplement 2. Other testing will be performed to verify proper construction and operation of plants employing this design.

The NRC conducted a technical review of the DCD and associated information and prepared a FSER that documents the results of its review. In its FSER, the NRC found that the AP1000 design meets NRC requirements. The FSER for the DCD amendment can be found under ADAMS Accession No. ML112061231.

The AP1000 design can withstand severe external environmental hazards such as fires, flooding, tsunamis, high winds, hurricanes, tornadoes, snow and ice, impacts, and seismic events that are considered credible in the U.S. The AP1000 design was previously analyzed for

these severe environmental conditions as part of the initial design certification and the AP1000 design, as amended, continues to meet NRC requirements. Westinghouse has shown and the NRC has concluded in its review as documented in the FSER (NUREG-1793, Supplement 2) that the AP1000 design can keep the reactor properly cooled under these severe environmental conditions, thus providing reasonable assurance that the public is protected.

The Fukushima accident occurred, in part, because of the loss of ac power (also known as SBO), which was necessary to maintain core cooling. The AP1000 design has a passive safety system (natural circulation) and inherent 72-hour coping capability for core, containment, and SFP cooling – even if an LOCA has occurred.

After 3 days with no ac power, during which time only battery power is used, only a small "ancillary" generator is needed. This generator is used to power a small pump that refills the tank that supplies water to the outside surface of the containment. The AP1000 design provides two such generators that are installed in a seismically qualified structure (along with their fuel and supporting equipment). The AP1000 design includes provisions to support emergency operating protocols such that after 1 week without ac power, the containment can be cooled indefinitely by replenishing fuel supplies for at least one ancillary generator and replenishing water in the water tank above the shield building.

The AP1000's passive design offers several important safety benefits. Safety systems of the AP1000 reactor are designed to provide adequate core cooling even without ac electrical power from offsite or the onsite nonsafety-related DGs. Rather, the safety systems rely on power from the safety-related batteries for core cooling. The reliability of core cooling is not limited by the availability of offsite power or onsite nonsafety-related DGs. This is a fundamental strength of passive designs. The AP1000 design will prevent core damage even when ac power is lost. The NRC has reviewed these AP1000 design features and operational provisions and concluded that they meet NRC requirements.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Tsunami and the Fukushima Plant Design

Comment: The water (tsunami) walls at the Fukushima Daiichi nuclear plant failed to do what they were designed for. (F8104-3)

NRC Response: This comment is out of scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the March 2011 magnitude 9 Tohoku earthquake off the northeast coast of Japan occurred within a subduction zone, defined as a location where one of the earth's tectonic plates is subducting beneath another. Large offshore earthquakes have historically occurred in the same subduction zone (in 1611, 1896, and 1933), all of which produced significant tsunami waves. The magnitudes of these previous large earthquakes have been estimated to be between 7.6 and 8.6.

All U.S. nuclear plants are built to withstand natural hazards, including earthquakes. Those plants that might face a threat from tsunami resulting from an earthquake are required to withstand large waves and the maximum wave height at the intake structure. Tsunami flooding

has been considered in the design of U.S. nuclear plants since the publication of RG 1.59 in 1977, which has conservative analysis methods that the NRC continues to utilize.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Station Blackout Concerns

Comment: We need to be prepared for extended power outages. The crisis in Japan was created not just by the tsunami, but by the power outage. (F1715-2)

NRC Response: This comment is out of scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The Fukushima accident occurred, in part, because of a total loss of ac power as a result of complete failure of both offsite and onsite ac power sources, (also known as SBO), which was necessary to maintain core cooling. The AP1000 design has a passive safety system (natural circulation) and inherent 72-hour coping capability for core, containment, and SFP cooling – even if an LOCA has occurred.

After 3 days with no ac power, only a small “ancillary” generator is needed. This generator is used to power a small pump that refills the tank that supplies water to the outside surface of the containment. The AP1000 design provides two such generators that are installed in a seismically qualified structure (along with their fuel and supporting equipment). The AP1000 design includes provisions to support emergency operating protocols such that after 1 week without ac power, the containment can be cooled indefinitely by replenishing fuel supplies for at least one ancillary generator and replenishing water in the water tank above the shield building. The NRC has reviewed these AP1000 design features and operational provisions and concluded that they meet NRC requirements. These features of the AP1000 design demonstrate that the reactor can be properly cooled during accident conditions. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – NRC’S Focus Should be on Safety

Comment: Several comments have expressed concern that the NRC’s primary concern should be on safety rather than expedience or satisfying the industry. (F6978-2, F6984-1)

NRC Response: The NRC agrees with this comment. The NRC’s mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. Protection of public health and safety is the foremost regulatory objective of the NRC, and the review of the AP1000 design has been conducted with that in mind. The NRC also recognizes that it must perform its regulatory responsibilities in an efficient and effective manner. The NRC has not ignored any safety issues in order to speed up the regulatory review process or for any other reason. The NRC has followed all applicable procedures and processes in its safety review and has found that the AP1000 DCA meets all NRC requirements.

The NRC will not license any facility nor will it issue a design certification that does not comply with NRC requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Fukushima – Decommission, Replace, or Upgrade Current Plants

Comment: In light of the accident at the Fukushima Daiichi plant, the NRC's priority now should be to figure out how to decommission and replace, or upgrade the currently operating plants of inferior design in the U.S. and worldwide because hundreds of plants pose the exact same risks as Fukushima (i.e. flaws leading to criticalities and spent fuel rod permanent storage and disposal). (F1773-1)

NRC Response: This comment is out of scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a review of decommissioning, replacing, or upgrading currently operating NPPs. However, the Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The NTTF's recommendations considered improving the safety of both operating reactors and new reactor designs. The Commission directed the NRC staff, via SRM, to request public input on the NTTF recommendations for the purpose of providing the Commission with fully-informed options and recommendations (SRM-SECY-11-0093, dated August 19, 2011 (ADAMS Accession No. ML112310021), and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011). The NRC believes that current operating reactors provide reasonable assurance of adequate protection of public health and safety and continue to meet NRC requirements. If the NRC imposes additional requirements on new or currently operating reactors, existing regulations already exist defining the process for doing so under 10 CFR 52.63. No change was made to the rule, the DCD, or the EA as a result of this comment.

Shield Building

This subject area includes comments relating to the AP1000 shield building design.

FORM LETTER COMMENTS

Comment: NRC engineer John S. Ma's nonconcurrence with the review of the reactor raised the possibility that the AP1000's shield building could shatter "like a glass cup." It would be indefensible for the NRC to move forward without further addressing that weakness. (FL-7)

NRC Response: The NRC disagrees with this comment. Professional opinions can vary, and the NRC has in place mechanisms for making differing views known. NRC employees can choose to exercise the nonconcurrence process as a way of communicating their views and ensuring their opinions are heard by NRC management. NRC engineer Dr. John S. Ma used this open process to express concerns regarding the safety of the AP1000 shield building design. The specific concerns and NRC staff response to the nonconcurrence are publically available under ADAMS Accession No. ML103370648.

The AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never previously reviewed by the NRC. The NRC staff conducted a careful review of the design of the shield building to ensure that under design-basis loads, including the SSE, the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC analyzed the shield building design against the

applicable regulatory requirements, including Appendix S to 10 CFR Part 50, “Earthquake Engineering Criteria” and Appendix A to 10 CFR Part 50, “General Design Criteria for Nuclear Power Plant Structures.” The NRC staff utilized the implementation guidance in NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)” and independent review by seismic design experts to ensure that the shield building met the applicable regulatory requirements. The bases for the NRC’s acceptance of the design are documented in its SER and include the following:

(a) The calculation of design-basis seismic demands was consistent with NUREG-0800 and followed industry standard analysis methods.

(b) Testing of composite SC elements validated the applicability of ACI-349 code design equations to the SC shield building structure.

(c) Under design-basis loading, the analyses results showed that the shield building stresses, strains, and displacements would be small and that there are sufficient margins with respect to ACI-349 code provisions.

(d) Seismic loads induce small out-of-plane shear forces, which are substantially less than the provided capacity.

(e) The structural response under the Review Level Earthquake (1.67 SSE) shows that although yield would start in a few locations, the strains would still be small.

(f) Under design-basis impulse loads such as tornado-generated missiles, the calculated out-of-plane shear stresses are well below those necessary to induce inelastic deformation.

(g) The AIA performed by the applicant in accordance with 10 CFR 50.150 showed that there would be no perforation of the shield building due to impacts in the non-ductile region (i.e., areas in the cylindrical portion of the shield building away from the basemat, below the air inlet region, and away from connections with other structures).

(h) Collectively, the design-basis and beyond-design-basis analyses conducted by the applicant demonstrated that the out-of-plane shear is not a concern for design-basis loads in the non-ductile region of the shield building, and that there is substantial margin in the design above design-basis loads.

The NRC, therefore, concluded from its evaluation that the AP1000 shield building design meets the Commission’s regulations and provides reasonable assurance that the shield building will remain functional under design-basis loads.

No change was made to the rule, the DCD, or the EA as a result of this comment.

ADDITIONAL FORM LETTER COMMENTS

None

Containment

This subject area includes comments concerning the AP1000 containment design, including the "chimney effect," corrosion, hydrogen, severe accident performance, and sump performance.

FORM LETTER COMMENTS

Comment: Westinghouse has not satisfactorily proved that the thin steel containment shell over the reactor would be effective during severe accidents. (FL-8)

NRC Response: The NRC understands this comment as referring to plant events or accidents that may occur as a result of severe external environmental hazards such as fires, flooding, tsunamis, high winds, hurricanes, tornadoes, snow and ice, impacts, and seismic events. The proposed amendment to the AP1000 design does not propose any modification to the steel containment vessel design. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with this comment. The NRC considers a single metal containment vessel to be acceptable if it meets the requirements of the ASME B&PV Code, Section III, Subsection NE. This part of the ASME Code contains requirements for the material, design, fabrication, examination, inspection, testing, and overpressure protection of metal containment vessels. Many such containment vessels are in use at operating NPPs. The AP1000 containment is designed to meet ASME requirements for a pressure of 6.9 kPa (59 psi) and a temperature of 149 degrees C (300 degrees F). Its thickness includes an allowance for corrosion that may occur over the 60-year design life of the plant.

The AP1000 steel containment building has an additional function: transferring heat from the steel containment vessel to the atmosphere. The NRC has reviewed the applicant's analysis and analysis methodology, which shows that the steel containment vessel and the shield building working as a system would transfer heat to the atmosphere during severe accidents as well as DBEs. The purpose of the shield building is to provide protection from severe external environmental hazards such as fires, flooding, tsunamis, high winds, hurricanes, tornadoes, snow and ice, impacts, and seismic events that are considered credible in the U.S.

In addition, the NRC reviewed the results of tests that were conducted by the applicant to demonstrate that these predictions are based upon physical phenomena that, once initiated, can be relied upon to work even when there is no ac power. The NRC concluded that Westinghouse has demonstrated that the shield building is robust and will perform its safety functions effectively if a severe accident occurs at an AP1000 plant. The AP1000 containment vessel, in concert with the shield building design, is found to be effective during severe environmental conditions considered credible for the U.S.

No change was made to the rule, the DCD, or the EA as a result of this comment.

ADDITIONAL FORM LETTER COMMENTS

None

SAMDA

This subject area includes comments on the SAMDAs and related analysis for the AP1000 design.

FORM LETTER COMMENTS

None

ADDITIONAL FORM LETTER COMMENTS

None

Spent Fuel

This subject area includes comments on onsite SFP storage and long-term storage/disposal of spent fuel, whether related to the AP1000 design or in general.

FORM LETTER COMMENTS

None

ADDITIONAL FORM LETTER COMMENTS

Comment: One comment expressed a more specific concern that the accident at the Fukushima Daiichi nuclear plant in Japan highlighted safety concerns regarding the storage and continued safety of spent nuclear fuel. (F9724-1)

NRC Response: The NRC interprets this comment to provide a general opinion on nuclear power and a more specific opinion that storage of spent nuclear fuel is not safe. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

However, with respect to storage of spent nuclear fuel, current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101, et seq.) mandates that high-level wastes (such as spent fuel) are to be buried at a deep geologic repository. In addition, in the Commission's Waste Confidence Decision and Rule (10 CFR 51.23(a)) (75 FR 81032), the Commission has made the generic determination that if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Numerous comments raised the lack of a disposal solution for nuclear waste (spent fuel rods) as a reason to oppose nuclear power. Many spoke about the long-term issue of "toxicity." One suggested that hardened on-site storage be used and one expressed opposition to underground storage. (F1682-1, F8215-1, F1581-2, F7873-1, F6971-1, F3894-2, F5602-1, F10621-2, F1483-1, F11202-2, F1715-1, F5597-2, F2598-1, F2404-1, F9724-1, F11768-1, F7153-1, F1541-1, F2695-1, F8955-1, F11500-1, F10725-2, F10725-4, F10795-3, F1773-1, F6947-1, F7547-2, F2626-1, F6987-2, F6987-3, F8104-2, F13363-3)

NRC Response: The AP1000 design includes an SFP where spent fuel rods will be stored for several years. The onsite storage of spent fuel other than in the SFP and transfer of spent fuel to a permanent repository or other facility are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

However, current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101, et seq.) mandates that high-level wastes (such as spent fuel) are to be buried at a deep geologic repository. In addition, in the Commission's Waste Confidence Decision and Rule (10 CFR 51.23(a)) (75 FR 81032), the Commission has made the generic determination that if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations.

Further, NRC regulations provide requirements for temporary storage of spent fuel, such as in dry casks, in 10 CFR Part 72. Sections 72.104 and 72.106 establish the guidelines for radiological releases from normal operations and accidents, respectively. No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental

This subject area includes comments on environmental concerns, whether related to the AP1000 design or in general.

FORM LETTER COMMENTS

None

ADDITIONAL FORM LETTER COMMENTS

Environmental – Water Quality

Comment: Some comments expressed concern about AP1000 plant operation and its effects on water quality and ensuring that radioactively contaminated water is prevented from leaking into the water, including the impacts of long-term water usage on designated water sources. (F1715-3, F1820-1, F9640-4)

NRC Response: The NRC interprets this comment to be concerned with impacts on water quality associated with operation of the AP1000. This comment is out of scope for this

rulemaking process, which rulemaking concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a licensing decision on whether to build new reactors nor a decision on an applicant's compliance with NRC regulations given a decision to build the AP1000 at a specific location. However, the NRC reviews radiological releases in relation to water quality. The control of radiological releases is governed by the NRC's regulations at 10 CFR Part 20, 10 CFR Part 50, Appendix I, and 10 CFR Part 50, Appendix A, GDC 60 and GDC 61, and GDC 64. Potential impacts to water quality are considered in the review of a specific site intended to host a nuclear reactor. Further, all NPPs have systems that may result in routine effluent discharges from liquid waste processing systems to surface waters in the vicinity of the station. Discharges from other systems include, but are not limited to the service water system, cooling water systems, and sanitary waste discharge, but these systems do not release radioactivity.

Under 10 CFR Part 20 and 10 CFR Part 50, Appendix I, all licensed reactors are responsible for the development of operational programs to control radioactive effluent releases and monitor radiation exposures and doses to members of the public living near NPPs. Specifically, 10 CFR Part 20 requires that the resulting doses and effluent concentrations not exceed limits established to ensure protection of health and that doses and releases are as low as is reasonably achievable (ALARA). Under the requirements of 10 CFR Part 50 and its Appendix I, all licensed reactors are responsible for developing programs and procedures to treat and process liquid and gaseous effluents before discharge, to control and monitor such releases to the environment using radiation detection instrumentation, to collect and analyze samples at each discharge point, and to conduct routine environmental sampling and analysis of water, air, soil, and food products (milk, meat, fish, vegetables, fruits, etc.) in the vicinity of operating plants. The results of the radiological environmental monitoring program (REMP) are published annually, and evaluated by the NRC. These public annual reports are also made available locally to members of the public for review.

For the AP1000 design, the NRC reviewed the projected doses and effluents that would be expected during operation. Demonstration of compliance with 10 CFR Part 50, Appendix I requirements is the responsibility of COL applicants using site specific information. These requirements are identified in DCD FSAR Revision 19, Sections 11.2 (liquid effluent discharges) and 11.3 (gaseous effluent discharges) and as COL information items in DCD Revision 19, FSAR Table 1.8-2. The NRC's evaluation of expected doses and effluents can be found in its FSER, Chapter 11.

All discharges from the station to surface waters are regulated by the EPA under Section 402 of the Clean Water Act to be permitted under the National Pollutant Discharge Elimination System and meet State water quality standards. These standards are designed to preserve water quality in surface waters.

Because the water source and the amount of water needed to operate a NPP are highly specific to the location and design of the proposed facility, a generic assessment of the impact of water use for a specific certified design would be of limited value. Instead, the NRC conducts a site-specific assessment of the impacts associated with station water use at the time an applicant submits an application for a license to build and operate a new facility (e.g., COL application). Such issues as water availability, amount withdrawn, consumed, and discharged as well as the effects of these activities on the aquatic environment and other water users is closely examined during the extensive environmental review in that licensing process. The NRC staff's findings

are documented in the individual environmental impact statement (EIS) published for each new application. Further, the process leading to publishing the site-specific EIS provides for numerous opportunities for public involvement.

No change was made to the rule, DCD, or EA as a result of this comment.

Environmental – Effects on Public Living

Comment: One comment expressed concern about whether operation of the AP1000 will have any effects on the general public living in the area where it is built and, in particular, what are the effects on the human population, especially women of child bearing age or their children's children? (F9640-5)

NRC Response: The NRC interprets this comment as a general concern about the environmental impact of operation of the AP1000. This comment is out of scope for this rulemaking process, which This rulemaking concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a licensing decision on whether to build new reactors or to build the AP1000 in any particular location. All radiation exposures and releases of radioactive materials in liquid and gaseous effluents discharged into the environment are regulated and inspected by the NRC. Under 10 CFR Part 20 and 10 CFR Part 50, Appendix I, all licensed reactors are responsible for the development of operational programs to control radioactive effluent releases and monitor radiation exposures and doses to members of the public living near NPPs. Specifically, 10 CFR Part 20 requires that the resulting doses and effluent concentrations not exceed limits established to ensure protection of health and that doses and releases are ALARA. Under the requirements of 10 CFR Part 50 and its Appendix I, all licensed reactors are responsible for developing programs and procedures to treat and process liquid and gaseous effluents before discharge, to control and monitor such releases to the environment using radiation detection instrumentation, to collect and analyze samples at each discharge point, and to conduct routine environmental sampling and analysis of water, air, soil, and food products (milk, meat, fish, vegetables, fruits, etc.) in the vicinity of operating plants. The results of the REMP are published annually, and evaluated by the NRC. These public annual reports are also made available locally to members of the public for review. Under the requirements of 10 CFR Part 20, dose limits are defined for any member of the public, which means any individual regardless of age group or gender. The requirements under Part 50, Appendix I are different and require the operator to project doses to the maximally exposed individual and confirm that releases of radioactive materials are ALARA and within the Part 20 dose limits. The regulations and regulatory guidance on methods used to project doses focus on actual exposures through the application of appropriate exposure pathways using the results of a land-use census for the area. The dose projections are evaluated for the infant, child, teen, and adult, with no distinction being made as to gender. In assessing compliance with the ALARA principle of Part 50, Appendix I, the operator compares dose projections against dose criteria that are a small fraction of the dose limits specified in 10 CFR Part 20.

For the AP1000 design, the NRC reviewed the projected doses and effluents that would be expected during operation. Demonstration of compliance with Part 50, Appendix I requirements is the responsibility of COL applicants using site specific information. These requirements are identified in DCD FSAR Revision 19, Sections 11.2 and 11.3 and as COL information items in DCD Revision 19, FSAR Table 1.8-2. The NRC staff's evaluation of expected doses and effluents can be found in its FSER, Chapter 11.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental – Unsafe, Unclean, or Efficient

Comment: Several comments expressed opinions about nuclear power not being safe, clean, or efficient because of nuclear waste, deadly radiation leaks, and nuclear accidents causing long-term damage to life forms and the environment, high costs associated with environmental cleanup, governmental loan guarantees and production tax credits and that nuclear power, including building AP1000 plants, should not be used anywhere on earth, should be stopped, and phased-out, and that time and money would be better spent on pursuing alternative means of clean, green, safe, renewable power generation such as wind power, solar energy, tidal/wave energy, biomass, geo-thermal and hydrogen power instead, including conservation. One comment suggested that coal and oil-burning plants be converted to natural gas, that only natural gas be used while pollution-free renewable power generation is established as the primary energy source and thereafter only as a backup source. One of the comments expressed the opinion that it is clear to all who have no vested interest in nuclear power that nuclear plants pose too great a risk to all life and the environment. Finally, one comment suggested that changes to the predominant human focus on material possessions, money, comfort, convenience and progress would reduce demand for nuclear energy. (F321-1, F1581-1, F1581-2, F3273-1, F3894-3, F3894-4, F6165-1, F6552-1, F6972-1, F6995-1, F7125-1, F7823-1, F8004-1, F8253-1, F8334-1, F8469-1, F8829-2, F9115-4, F9411-1, F9413-6, F9461-2, F9786-6, F10725-4, F10975-1, F10975-2, F11202-1, F12760-1, F12929-2, F13174-2, F13363-2, and F13365-2)

NRC Response: The NRC interprets these comments to object to the use of nuclear power in the U.S. and to reflect concern about the harmful effects of radiation. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

However, with respect to the comment against the use of nuclear power, the NRC takes no position on this comment or on the use of alternative energies. The NRC has no opinion on whether nuclear power should or should not be utilized in the U.S., whether or not the building of new NPPs should be pursued, and whether or not the U.S. government should have any financial involvement. Those decisions are policy and legal matters that are outside the jurisdiction of the NRC. The NRC's mission is to ensure that any applicants and licensees that choose to build and operate NPPs do so in accordance with NRC regulations so that the health and safety of the public and the environment are protected. The AP1000 design certification or this DCA is not an authorization of construction. No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental – Radiation Toxicity and Safe Disposal

Comment: Some comments expressed concerns that were focused mainly on risks associated with radiation toxicity, long-lasting generational effects of radioactive releases and contamination of the environment, continued production of nuclear waste with no safe disposal technologies or facilities, and resultant radiation exposures from leaks, accidents, and contamination not outweighing any benefits from nuclear power. One comment questioned whether the NRC was aware the radiation from Fukushima is reaching dangerous levels in the

Pacific U.S. and when the agency would share this information with the rest of the U.S. and the world. (F1483-1, F1952-2, F10725-1, F10725-3, F10795-4, F13174-1, and F13363-3)

NRC Response: The NRC interprets this comment to provide a general opinion on nuclear power and a more specific opinion that storage of spent nuclear fuel is not safe rather than providing a specific comment on the scope of the AP1000 DCA rulemaking. The NRC finds this comment to be out of scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D.

However, with respect to storage of spent nuclear fuel, current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101, et seq.) mandates that high-level wastes (such as spent fuel) are to be buried at a deep geologic repository. In addition, in the Commission's Waste Confidence Decision and Rule (10 CFR 51.23(a)) (75 FR 81032), the Commission has made the generic determination that if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations.

With respect to radiation from the Fukushima Daiichi accident reaching the Pacific U.S., a number of U.S. agencies are involved in monitoring and assessing radiation, including the EPA, DOE, and NRC. The best source of additional information is the EPA. The NRC understands that the EPA is utilizing its existing nationwide radiation monitoring system, RadNet, to continuously monitor the nation's air and regularly monitors drinking water, milk and precipitation for environmental radiation. The EPA has publicly stated its agreement with the NRC's assessment that we do not expect to see radiation at harmful levels reaching the U.S. from damaged Japanese NPPs. Nevertheless, the EPA has stated that it plans to work with its Federal partners to deploy additional monitoring capabilities to parts of the western U.S. and U.S. territories. For further information on NRC actions related to the Fukushima Daiichi accident, go to http://www.nrc.gov/japan/japan-info.html.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental – Safety and Less Expensive Sources

Comment: One comment suggested that if the NRC cannot perform assessments that show absolute safety then the country should turn to safe, and less expensive, sources of power such as sun, wind, water and geothermal instead of nuclear. (F10750-3)

NRC Response: The NRC interprets this comment to provide a general opinion on the NRC's application review process and alternative power rather than providing a specific comment on the scope of the AP1000 DCA rulemaking. The NRC finds this comment to be out of scope for the AP1000 DCA rulemaking, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a licensing decision on whether to build new reactors.

However, the NRC provided the following guidance on NPP safety in the Commission's Policy Statement on Safety Goals for the Operation of Nuclear Power Plants, which appeared in the *Federal Register* in August 1986 (51 FR 30028).

The Policy Statement on Safety Goals sets forth two qualitative safety goals, which are supported by two quantitative supporting objectives. The following are the qualitative safety goals:

> Individual members of the public should be provided a level of protection from the consequences of NPP operation such that individuals bear no significant additional risk to life and health.
>
> Societal risks to life and health from nuclear power plant operation should be comparable to or less than the risks of generating electricity by viable competing technologies and should not be a significant addition to other societal risks.

The quantitative supporting objectives are as follows:

> The risk to an average individual in the vicinity of a NPP of prompt fatalities that might result from reactor accidents should not exceed one-tenth of one percent (0.1 percent) of the sum of prompt fatality risks resulting from other accidents to which members of the U.S. population are generally exposed.
>
> The risk to the population in the area near a NPP of cancer fatalities that might result from NPP operation should not exceed one-tenth of one percent (0.1 percent) of the sum of cancer fatality risks resulting from all other causes.

In the Policy Statement on Safety Goals, the Commission emphasized the importance of features such as containment, siting, and emergency planning as "integral parts of the defense-in-depth concept associated with its accident prevention and mitigation philosophy."

With respect to the portion of the comment advocating for less expensive alternative sources of energy, the NRC takes no position on the use of alternative energies. The NRC has no opinion on whether nuclear power should or should not be utilized in the U.S. or whether or not the building of new NPPs should be pursued. Those decisions are policy and legal matters that are outside the jurisdiction of the NRC. The NRC mission is to ensure that any applicants and licensees that choose to build and operate NPPs do so in accordance with NRC regulations so that the health and safety of the public and the environment are protected.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental – Levels of Strontium-90

Comment: One comment expressed a belief that every NPP in the U.S. emits carcinogenic levels of Strontium 90 during normal operation and that until there is certainty that the AP1000 will not similarly emit highly toxic levels (i.e. it can't be allowed to emit more Strontium 90 over a 29-year cycle than would prove to be a toxic amount for a human to be exposed to – 29 years being the half life of Strontium 90) permission to build it should be denied, otherwise there would be an immediate and present danger to the public health. (F1820-1)

NRC Response: This rulemaking comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not a licensing decision on whether to build new reactors nor a decision on an applicant's compliance with NRC regulations given a decision to build the AP1000 at a specific location. However, the NRC disagrees with this comment. The contribution of Strontium-90 radioactivity projected to be released from the AP1000 is very small. The control of radioactive effluents from NPPs is governed by the NRC's regulations, operational programs, and NRC oversight, which is protective of public health and safety. The emission of Strontium-90 and other radionuclides released during plant operation is regulated under 10 CFR Part 20, "Standards For Protection Against Radiation," and 10 CFR Part 50, Appendix I, "Numerical Guides For Design Objectives and Limiting Conditions For Operation to Meet the Criterion 'As Low As Is Reasonably Achievable' For Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents." In both instances, the resulting doses are in compliance with the requirements of 10 CFR Part 20 for members of the public and 10 CFR Part 50, Appendix I design objectives and ALARA provisions.
In addition, radioactive effluents released during operations are treated and controlled by plant systems and include instrumentation to monitor and sample releases of radioactive effluents and wastes. The operational program that is used to control all effluent releases and assess doses to members of the public is called the Offsite Dose Calculation Manual (ODCM). An ODCM is developed for each plant for the purpose of controlling and monitoring liquid and gaseous effluent releases. The ODCM is reviewed by the NRC before the plant starts operating to ensure that the ODCM incorporates site-specific conditions in assessing doses to members of the public and compliance with NRC regulations for all radioactive liquid and gaseous effluent releases.

The ODCM is used to demonstrate compliance with the requirements of 10 CFR Part 20, Appendix B, Table 2, Columns 1 and 2; dose limits for members of the public in 10 CFR 20.1301 and 10 CFR 20.1302; 10 CFR 20.1301(e) in meeting the U.S. EPA environmental radiation protection standards of 40 CFR Part 190 for nuclear fuel cycle facilities, including nuclear power reactors; and design objectives and ALARA requirements of 10 CFR Part 50, Appendix I, Sections II.A, II.B, II.C, and II.D for liquid and gaseous effluents.

The ODCM also includes the implementation of a site specific REMP. As part of the REMP, the plant operator is required to collect soils, water, milk, air, and biota samples around the plant and analyze such samples for the presence of radioactivity. The results of the REMP program are compiled and published yearly and submitted to the NRC. The NRC reviews the annual reports and conducts routine inspections on the implementation of these programs and results. The REMP report is also available locally for public inspection. As a result, these regulatory requirements and operational programs ensure that doses due to radioactive effluent releases are controlled, that doses to members of the public are minimized, and that the environment is protected from both liquid and gaseous effluent releases.

The NRC reviewed the AP1000 design and found that the contribution of Strontium-90 radioactivity projected to be released from the AP1000 is very small and complies with NRC regulations; therefore, the AP1000 design provides reasonable assurance of adequate protection to the public health and safety in this regard. The NRC documented the results of that review in its FSER.

No change was made to the rule, DCD, or EA as a result of this comment.

Other AP1000 Topics

This subject area includes comments which are *related to the AP1000 design*, but are not addressed under other subject areas. These comments address topics such as quality assurance, location of batteries, decommissioning, handling/redaction of information, nitrogen injection, the NRC's process for reviewing the AP1000 amendment and associated rulemaking, and general support for the AP1000 design.

FORM LETTER COMMENTS

Comment: The NRC should take all possible precautions before moving forward with the new Westinghouse AP1000 reactor design. (FL-1)

NRC Response: The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that are the subject of this DCA, and has determined that the AP1000 design meets its regulations. The NRC's review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed a comprehensive review and evaluation of the subsequent revisions to the original AP1000 certified design and documented its evaluation in its FSER issued publicly on August 5, 2011 (ADAMS Accession No. ML112061231). The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: The NRC should provide transparency in the viewing of all comments in the formal review proceedings. They should be posted on the NRC's online library for public viewing. (FL-5)

NRC Response: The NRC agrees with the comment. All public comments have been placed in ADAMS. The accession numbers for all public comments received can be found or referenced in Appendices 1 through 3 of this document. No change was made to the rule, the DCD, or the EA as a result of this comment.

ADDITIONAL FORM LETTER COMMENTS

Other AP1000 Topics – AP1000 Safety

Comment: Is there independent information from non-government sources that state the safety and long-term of plants using this technology? (F9640-1)

NRC Response: The NRC is an independent government agency whose mission is to protect public, health, safety, and the environment. The NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and

will provide reasonable assurance of adequate protection of public health and safety. The NRC has posted general information on the amendment on the NRC's Web site, and placed in ADAMS all public documents received from the application, including the DCD – which describes the design as amended, as well as all publicly-available NRC documents relating to the review of the AP1000 amendment. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Not only should there be no reactors built at all, why are you letting something untested be built? Why do we even bother to have any regulatory agencies anymore? *(F9918-1, F13364-1)*

NRC Response: The NRC disagrees that the reactor design is untested. There was substantial testing of new technology employed in the AP1000 design, as documented in Chapter 21 of NUREG–1793. Other testing will be performed to verify proper construction and operation of any AP1000 plant. The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. The AP1000 design certification or this DCA is not an authorization of construction. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: Since nuclear energy is really a new technology and we all remember Chernobyl in Russia when the nuclear plant went down, how do you know if this new untested nuclear device is any safer? (F9640-6, F9640-7)

NRC Response: The NRC has concluded that the AP1000 design meets its requirements, and provides reasonable assurance of adequate protection of public health and safety, as documented in its FSER, NUREG-1793, Supplement 2. The AP1000's passive design offers several important safety benefits. Safety systems of the AP1000 reactor are designed to provide adequate core cooling even without ac electrical power from offsite or the onsite nonsafety-related DGs. Rather, the safety systems rely on power from the safety-related batteries for core cooling. The reliability of core cooling is not limited by the availability of offsite power or onsite nonsafety-related DGs. This is a fundamental strength of passive designs. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: Is there any question to their [AP1000 plant] safety in the short-term or long-term of their usage [operation]? (F9640-2)

NRC Response: In its FSER, the NRC found that the AP1000 design meets NRC requirements and has been approved by the Commission. The design was found to meet NRC regulatory requirements, and to provide reasonable assurance of adequate protection of public safety, as documented in NUREG-1793, Supplement 2 (ADAMS Accession No. ML112061231), the NRC's evaluation of the AP1000 application. No change was made to the rule, the DCD, or the EA as a result of this comment.

Other AP1000 Topics – Licensing/Rulemaking Processes

Comment: We must not proceed to build any more facilities until it is conclusively and publicly demonstrated that all of their claims are true. (F8215-2)

NRC Response: The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that are the subject of this DCA, and has determined that the AP1000 design meets its regulations. NRC review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed a comprehensive review and evaluation of the subsequent revisions to the original AP1000 certified design and documented its evaluation in its FSER issued publicly on August 5, 2011 (ADAMS Accession No. ML112061231). This review included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: In light of the events at Fukushima, please suspend this rulemaking until all risks are carefully considered. (F8829-1)

NRC Response: The NRC interprets the comment to request that the NRC suspend or delay the NRC decision to approve the final rule amending the AP1000 design certification until the NRC evaluates the Fukushima Daiichi events. The Commission declines to suspend or postpone the AP10000 rulemaking. See *Memorandum and Order*, CLI-11-05 (September 9, 2011; ADAMS Accession No. ML112521039). The reasons for the Commission action are set forth in CLI-11-05.

The Commission has taken and is continuing to take a series of actions to evaluate the Fukushima Daiichi Plant accident, identify possible regulatory actions, obtain stakeholder input, determine what actions should be adopted, and implement the Commission's determinations. In brief, the Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The Commission held a public meeting on July 28, 2011 to discuss the results of the NTTF Report with members of the public and other interested stakeholders. Thereafter, the Commission issued SRM on the NTTF recommendations (reference SRM-SECY-11-0093, dated August 19, 2011, and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011). These SRM directed the NRC staff to take several actions, notably to engage with stakeholders to review and assess the NTTF recommendations, provide the Commission with a draft charter for the NRC's longer term review of the NTTF recommendations, and to provide the Commission with papers recommending prioritization of the recommendations and which recommendations should be implemented, in part or in whole, without unnecessary delay.

The pendency of these NRC actions; however, does not counsel any delay in the AP1000 rulemaking. The NRC noted that the NTTF did not recommend any changes to the AP1000 design certification (see NTTF Report, pages 71-72). Therefore, delay in the AP1000

rulemaking process is not needed to ensure that the AP1000 reflects the recommendations of the Fukushima NTTF. Moreover, even if the Commission concludes that some additional action is needed for the AP1000, the NRC has ample opportunity and legal authority to modify the AP1000 DCR to implement NRC-required design changes, as well as to take any necessary action to ensure that COLs which reference the AP1000 also make the necessary design changes. Such actions would follow rulemaking processes allowing for public comment. For these reasons, a delay in the AP1000 rulemaking is not necessary.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Several comments received stated that the AP1000 DCA rulemaking should not be "fast-tracked." (F3894-1, F4622-1, F4632-1, F4723-1, F4852-1, F7547-4, F9103-1)

NRC Response: The NRC agrees with the comment. Protection of public health and safety is the foremost regulatory objective of the NRC, and the review of the AP1000 design has been conducted with that in mind. However, the NRC also recognizes that it must perform its regulatory responsibilities in an efficient and effective manner. The NRC has instituted many internal process rulemaking improvements in the AP1000 amendment rulemaking, cognizant of the fact that the design is being referenced in COL applications.

The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that are the subject of this DCA, and has determined that the AP1000 design meets its regulations. NRC review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Other AP1000 Topics – Transparency

Comment: To ensure transparency, please include this comment and all others in the formal review proceedings and post them in the NRC's online library so the public can see any expressed concerns. Open communication is essential to any issue that potentially affects so many PEOPLE. How many lives have been lost, or compromised, as a result of the problems that surfaced in Fukushima? (F5761-4)

NRC Response: The NRC agrees that open communication is an essential element of this rulemaking process. All public comments have been placed in ADAMS. The accession numbers for all public comments received can be found in Appendices 1 through 3 of this document. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Is plant safety information public and if it is where can I find it to see for myself the safety reports? (F9640-3)

NRC Response: The NRC has found the AP1000 design, as amended, to comply with its regulations and provide adequate protection of public safety, as documented in its FSER, which has been published as NUREG-1793, Supplement 2, available under ADAMS Accession No. ML112061231. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns

This subject area includes comments which are *not related to the AP1000 design* and are not addressed under other subject areas. These comments address topics such as the general safety of nuclear power, the cost of nuclear power, and whether or not the NRC should license new NPPs, allow new plants to be constructed, or shutdown existing NPPs.

FORM LETTER COMMENTS

Comment: Safety concerns should be the NRC's primary concern, not satisfying the industry. (FL-6)

NRC Response: The NRC agrees that safety is a primary concern. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. The NRC has completed its review of the AP1000 DCA and determined that it meets applicable regulatory requirements and will provide reasonable assurance of adequate protection of public health and safety. No change was made to the rule, the DCD, or the EA as a result of this comment.

ADDITIONAL FORM LETTER COMMENTS

General Concerns – Opposition to Nuclear Power

Comment: A number of comments received expressed general opposition to nuclear power. (F1581-1, F2695-1, F5062-1, F5255-1, F5588-1, F6212-1, F7873-1, F9115-2, F13363-1)

NRC Response: The NRC interprets these comments as expressing a general opinion against the use of nuclear power in the U.S. These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The AP1000 design certification or this DCA is not an authorization of construction. The NRC has no opinion on whether nuclear power should or should not be utilized in the U.S., or whether or not the building of new NPPs should be pursued. Those decisions are outside the jurisdiction of the NRC. The NRC mission is to ensure that any applicants and licensees that choose to build and operate NPPs do so in accordance with NRC regulations so that the health and safety of the public and the environment are protected.

The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of

construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of its review, the NRC concluded that the changes to the AP1000 certified design included in the current DCA meet NRC regulations. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – General Safety

Comment: A number of comments expressed concerns that nuclear power is risky or dangerous. (F400-1, F1244-1, F1581-1, F1968-1, F2611-1, F2695-1, F3894-1, F4531-1, F4855-1, F5062-1, F5264-2, F6167-2, F6984-1, F7509-1, F7873-1, F8022-1, F8334-1, F9115-3, F10005-1, F10621-1, F10750-2, F10795-1)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. . The NRC has performed a comprehensive and thorough review and evaluation of the AP1000 design, including changes to the original certified design that are the subject of this DCA, and has determined that the AP1000 design meets its regulations. NRC review of the AP1000 design was originally completed in September 2004 and is documented in its three-volume FSER published as NUREG-1793. On January 27, 2006, the NRC issued the final DCR for the AP1000 design in the *Federal Register* (71 FR 4464). The NRC performed a comprehensive review and evaluation of the subsequent revisions to the original AP1000 certified design and documented its evaluation in its FSER issued publicly on August 5, 2011 (ADAMS Accession No. ML112061231). The NRC performed an extensive technical evaluation of the AP1000 design changes that included detailed design reviews, analysis methodology and calculation reviews, reviews of construction methodology, reviews of testing results to support the design, and confirmatory analyses. As a result of this review, the NRC concluded that the changes to the AP1000 certified design included in the DCA meet NRC regulations. No change was made to the rule, the DCD or the EA as a result of this comment.

Comment: Have we improved our reactors or made them safer since TMI? (F13365-1)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the problems identified from a careful analysis of the TMI event led to permanent and sweeping changes in how the NRC regulates its licensees – which, in turn, has reduced the risk to public health and safety. Some of the major changes which have occurred since the TMI event include:

- Upgrading and strengthening of plant design and equipment requirements. This includes fire protection, piping systems, auxiliary feedwater systems, containment building isolation, reliability of individual components (pressure relief valves and electrical circuit breakers), and the ability of plants to shutdown automatically;

- Identifying human performance as a critical part of plant safety, revamping operator training and staffing requirements, followed by improved I&Cs for operating the plant, and establishment of fitness-for-duty programs for plant workers to guard against alcohol or drug abuse;

- Improved operator instruction to avoid confusing signals that plagued operations during the accident;

- Enhancement of EP to include immediate NRC notification requirements for plant events and an NRC operations center that is staffed 24 hours a day. Drills and response plans are now tested by licensees several times a year, and state and local agencies participate in drills with the Federal Emergency Management Agency and NRC;

- Establishment of a program to integrate NRC observations, findings, and conclusions about licensee performance and management effectiveness into a periodic, public report;
- Regular analysis of plant performance by senior NRC managers who identify those plants needing additional regulatory attention;

- Expansion of NRC's resident inspector program – first authorized in 1977 – whereby at least two inspectors live nearby and work exclusively at each plant in the U.S. to provide daily surveillance of licensee adherence to NRC regulations;

- Expansion of performance-oriented as well as safety-oriented inspections, and the use of risk assessment to identify vulnerabilities of any plant to severe accidents;

- Strengthening and reorganization of enforcement as a separate office within the NRC;

- Expansion of NRC's international activities to share enhanced knowledge of nuclear safety with other countries in a number of important technical areas.

These TMI lessons-learned are part of the NRC's process for reviewing new plant designs and amendments to those designs, including the AP1000 DCA.

No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Nuclear Fuel Cycle

Comment: A number of comments were received stating concern regarding the costs and impacts of the nuclear fuel cycle, including generation of high-level waste, particularly spent fuel. (F2695-1, F7153-1, F8215-1, F10005-1, F12602-1)

NRC Response: The NRC interprets this comment as expressing concerns about the longevity, toxicity and disposal of products in the nuclear fuel cycle, and the environmental impacts of the nuclear fuel cycle. This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, appropriate consideration of the environmental impacts of this rulemaking can be found in the rule's EA. Appropriate consideration of the impacts of the nuclear fuel cycle is considered in individual licensing actions. The AP1000 design certification or this DCA is not an authorization of construction.

In addition, the NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The NRC has found the AP1000 design, as amended, to comply with its

regulations and provide adequate protection of public safety, as documented in its FSER, which has been published as NUREG-1793, Supplement 2.

No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – NRC Role

Comment: Several comments were received stating that the primary role of the NRC should be to keep the public safe, not to facilitate industry goals. (F800-1, F5602-2, F5761-2, F5761-3, F6167-2, F7547-3, F9824-1, F10750-1)

NRC Response: The NRC agrees that safety is a primary concern. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The NRC will not license a facility nor will it issue a design certification that does not comply with NRC requirements. The NRC has found the AP1000 design, as amended, complies with its regulations and to provide reasonable assurance of adequate protection of public health and safety, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: It seems that NRC is performing less like a regulatory body than a promoter of the reactor industry. My judgment is based upon my 2010 review of reactor incidents and the NRC actions (often slow to investigate and respond to concerns by knowledgeable persons and groups and when it does, NRC levies minimal sanctions against repetitive company behaviors that could endanger lives). I note NRC and industry failures to examine recent European reactor problems and to enact better equipment design, modifications, and operator training and operating procedures. (F10015-1)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC disagrees with this comment. The NRC is an independent regulatory agency whose mission is not the promotion of the nuclear industry, but to protect public health, safety, and the environment.

The NRC OEP provides a means to collect and review information related to operational issues from various sources including Event Notifications, Licensee Event Reports, Preliminary Notifications, 10 CFR Part 21 Reports, International Reports (INES and IRS reports), ISI Summary Reports of Inspection Findings, as well as daily information collected from the four NRC regions. This information is tracked through an NRC Operating Experience Issues Tracking Database, which is used in conjunction with the Operating Experience sources referenced above to retrieve the information for further review of licensee conduct.

The NRC's Enforcement Program consists of a range of actions the NRC can take if violations of NRC requirements are found. The basic enforcement action is issuing a notice of violation, which requires the licensee to correct the problem and take steps to keep it from happening again. Serious and/or deliberate violations can result in fines or even criminal sanctions. If there are serious questions about the safety of NRC-licensed activities, the NRC requires the activities be stopped. The NRC may modify, suspend, or revoke a license at any time. If the NRC stops licensed activities, they cannot begin again until the problems are fixed, and the

NRC concludes that the corrective actions taken to resolve the problem is adequate and it is appropriate for the activities to resume.

The NRC will not issue a design certification that does not comply with NRC requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Operating plants

Comment: Several comments were received concerning the licensing and operation of currently operating plants. (F5264-1, F5602-1, F5602-2, F6175-1, F6962-1, F6983-1, F9115-1)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D, not whether NPPs ought to be built in the U.S., or existing plants should continue to operate. The NRC does not determine whether reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The AP1000 design certification or this DCA is not an authorization of construction, and no operating plants employ the certified or amended design. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Virginia has two power plants in Surry built in the late 1960s that were supposed to be decommissioned after 30 years; they're still operating. (F5264-3)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The AEA and NRC regulations limit commercial power reactor licenses to an initial 40 years, but also permit such licenses to be renewed. This original 40-year term for reactor licenses was based on economic and antitrust considerations, not on limitations of technology. Due to this selected period; however, some structures and components may have been engineered on the basis of an expected 40-year service life.

The NRC has established a license renewal process, which is codified in 10 CFR Part 51 and 10 CFR Part 54. The NRC issued license renewals for Surry Power Station, Units 1 and 2, on March 30, 2003, following an extensive safety review; the NRC staff's safety evaluation can be found at ADAMS Accession No. ML030160853. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Alternative Energy Sources

Comment: The NRC received comments advocating for different forms of energy production. (F4859-1)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC takes no position on this comment. The NRC does not advocate for any particular project or type of energy development. The NRC regulates the safe and secure use of nuclear materials, including NPPs. Other kinds of energy production are not regulated by the NRC. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: We should be designing thorium reactors, and never build another uranium or plutonium reactor again. If the AP1000 is indeed designed to utilize this abundant element bravo. If not, send Westinghouse back to the drawing board. Please consider this: a ton of thorium can produce as much energy as 200 tons of uranium, or 3,500,000 tons of coal; reduces the storage of nuclear waste by up to 50 percent; no possibility of a meltdown; helps sever the link between nuclear power generation and nuclear weapons; produces 10 to 10,000 times less long-lived radioactive waste; comes out other ground as a 100% pure, usable isotope, which does not require enrichment, and there is enough thorium in the United Sates alone to power the country at its current energy level for over 1,000 years. (F5132-2)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC does not advocate for any particular project or type of energy development, nor does the NRC determine whether or what kinds of reactors are to be built in the U.S.; rather, its mission is to ensure that if reactors are to be built in the U.S. that they comply with NRC requirements. The NRC has found that the proposed amendment to the AP1000 design complies with existing rules and regulations, as documented in its FSER, which has been published as NUREG-1793, Supplement 2. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns – Cost

Comment: A number of comments were received expressing concern about the cost of nuclear power. (F1581-3, F2695-1, F8250-1, F8334-1, F10283-1, F10795-2, F11500-1)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. However, the NRC takes no position on this comment. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The cost of designing, building, or operating a NPP is not a matter that the NRC regulates. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A number of comments expressed concern about government funding of nuclear energy development. (F4632-2, F4861-1, F7547-3, F8829-3)

NRC Response: These comments are out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The NRC takes no position on these comments. The NRC's mission is to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. The NRC's role in financial matters is contained in, for example, 10 CFR 50.33(f) (financial qualifications to obtain funds for construction and operation), 10 CFR 50.54(w); 10 CFR Part 140 (financial protection and indemnity); and 10 CFR 50.75 (decommissioning funding). These requirements stem from our statutory authority and responsibilities largely dealing with assuring appropriate applicant and licensee financing. Other matters concerning how the U.S. government directly or indirectly financially supports nuclear power are not within the NRC's regulatory scope. No change was made to the rule, the DCD, or the EA as a result of this comment.

Petition Comments and NRC Responses

Fukushima-related

This subject area includes comments requesting specific action (hold, suspend, terminate, extend comment period) based upon the Fukushima Daiichi NPP accident. This subject area includes AP1000-specific comments as well as more general comments (e.g., close all plants) as a result of Fukushima. Other Fukushima-related topics covered under this subject area include tsunami/earthquake, core cooling, SBO, and the need for a second control room. This subject area excludes comments relating to another AP1000-specific subject area (e.g., shield building).

Comment: The NRC should suspend (or postpone) the AP1000 rulemaking because of the Fukushima Daiichi NPP accident, which is not well understood and may have serious implications for the NRC's regulatory program and the NRC's assessment of environmental risk under National Environmental Policy Act (NEPA). The NRC should, under the Commission's supervisory powers, direct an investigation of the Fukushima Daiichi Plant accident, and incorporate the "lessons learned" into the AP1000 design with appropriate opportunities for public participation, before completing the rulemaking amending the AP1000 DCR. (P1-1a, P1-1b, P1-2a, P1-2b, P1-2c, P1-2d, P1-2e, P1-2i, P3-1, P4-4)

NRC Response: The Commission declines to suspend or postpone the AP10000 rulemaking. See *Memorandum and Order*, CLI-11-05, September 9, 2011 (ADAMS Accession No. ML112521039). The reasons for the Commission action are set forth in CLI-11-05.

The Commission has taken and is continuing to take a series of actions to evaluate the Fukushima Daiichi Plant accident, identify possible regulatory actions, obtain stakeholder input, determine what actions should be adopted, and implement the Commission's determinations. In brief, the Commission established an NTTF to review relevant NRC regulatory requirements, programs, and processes, and their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. The NTTF issued its report (ADAMS Accession No. ML111861807) on July 12, 2011. The Commission held a public meeting on July 28, 2011 to discuss the results of the NTTF Report with members of the public and other interested stakeholders. Thereafter, the Commission issued SRM on the NTTF recommendations (reference SRM-SECY-11-0093, dated August 19, 2011, and SRM-COMWDM-11-0001/COMWCO-11-0001, dated August 22, 2011). These SRM directed the NRC staff to take several actions, notably to engage with stakeholders to review and assess the NTTF recommendations, provide the Commission with a draft charter for the NRC's longer term review of the NTTF recommendations, and to provide the Commission with papers recommending prioritization of the recommendations and which recommendations should be implemented, in part or in whole, without unnecessary delay. While these NRC actions were not instigated by the comments contained in the petitions, these actions are consistent with the comments' suggestions and provide appropriate opportunities for public participation.

The pendency of these NRC actions; however, does not counsel any delay in the AP1000 rulemaking. The NRC noted that the NTTF did not recommend any changes to the AP1000 design certification (see NTTF Report, pages 71-72). Therefore, delay in the AP1000 rulemaking process is not needed to ensure that the AP1000 reflects the recommendations of the Fukushima NTTF. Moreover, even if the Commission concludes that some additional action

is needed for the AP1000, the NRC has ample opportunity and legal authority to modify the AP1000 DCR to implement NRC-required design changes, as well as to take any necessary action to ensure that COLs which reference the AP1000 also make the necessary design changes. Such actions would follow rulemaking processes allowing for public comment. For these reasons, a delay in the AP1000 rulemaking is not necessary.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Suspending the AP1000 design certification rulemaking will be beneficial for the stability of the regulatory process, inasmuch as the AP1000 design will have to be modified after assessment of the Fukushima Daiichi Plant accident. Allowing the AP1000 rulemaking to proceed, and then issuing COLs for plants with incomplete designs and operating procedures, is inconsistent with the long-standing NRC policy to "design once, build many times." (P1-1b, P1-1c)

NRC Response: The NRC disagrees with the comment's unsupported assertion that the AP1000 design, as amended, is "incomplete," or with the implicit assumption that the AP1000 will have to be modified as a result of the NRC's regulatory activities, which were undertaken as a result of the Fukushima Daiichi Plant accident. With respect to the second assertion, the NRC noted that the Fukushima NTTF Report stated that the AP1000 design certification, currently in the rulemaking process, has passive safety systems. By nature of its passive design and inherent 72-hour coping capability for core, containment, and SFP cooling, the AP1000 design has many of the design features and attributes necessary to address the NTTF recommendations. Therefore, the NTTF expressed support for completing those design certification rulemaking activities without delay (see NTTF Report, pages 71-72).

The NRC also disagrees with the comment's implicit suggestion that the (unattributed) phrase, "design once, build many times," means that the NRC prohibits either changes to DCRs, or plant-specific "departures" from a referenced DCR. Section 10 CFR 52.63(a) allows amendments to design certifications, while 10 CFR 52.63(b) establishes a process for obtaining NRC approval of a COL's "departure" from a referenced DCR. No change was made to the rule, the DCD, or the EA as a result of these comments.

Comment: The NRC's study of the lessons learned from the Fukushima Daiichi Plant accident should contain the elements of the Lessons Learned study conducted by the NRC after the TMI, Unit 2 accident. (P1-2j)

NRC Response: The comment, suggesting the appropriate elements of the NRC's review of the Fukushima NTTF, addresses a matter which is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The scope of the NTTF review has already been established in the Tasking Memorandum COMGJB-11-0002 – NRC Actions Following the Events in Japan (March 23, 2011; ADAMS Accession No. ML111861807) and the EDO Memorandum establishing a Charter for the NTTF (March 30, 2011; ADAMS Accession No. ML11089A030). No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: After the NRC has determined lessons learned from the Fukushima accident, a new assessment should be conducted on the shield building integrity because questions remain regarding the shield building's ability to withstand similar pressures and stresses placed on the Fukushima reactor. (*P1-2f and P1-2h*)

NRC Response: The NRC does not agree with the comments. The NRC created an NTTF to review the Fukushima event and conduct a methodical and systematic review of the NRC's processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy consideration. *See Tasking Memorandum – COMGJB-11-0002 – NRC Actions Following the Events in Japan* (March 23, 2011; ADAMS Accession No. ML111861807); included as Appendix B to the NTTF Report). The NTTF has issued its report (ADAMS Accession No. ML111861807). The NTTF did not recommend any changes to the AP1000 design, and indicated that the current AP1000 amendment rulemaking should proceed (see NTTF Report, pages 71-72). None of the NTTF's recommendations are relevant to the AP1000 shield building's ability to withstand accident pressures and stresses. Accordingly, based upon the NTTF's report, at this time there does not appear to be a basis for the NRC to require Westinghouse to reassess the shield building's structural integrity. However, as the NRC continues to gain more information about the Fukushima earthquake and the accident at Fukushima Daiichi, the NRC will continue to assess whether such information may warrant additional NRC action with respect to the AP1000 DCR. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The Fukushima accident raises further concerns about water recirculation cooling system failures. Early images from Fukushima show large amounts of structural debris from high heights in the building can fall toward the floor, potentially clogging recirculation filters. This could be a problem for the AP1000, because the AP1000 DBA is predicated on control of filter-clogging debris originating below the containment flood line. (P1-9a and P1-9b)

NRC Response: The NRC disagrees with this comment. Images of the Fukushima plant are outside of containment. It is not clear how the collapse of buildings outside of containment would impede emergency water recirculation inside containment. Recirculation is a function credited for response to LOCAs, not for safe-shutdown after an earthquake. Measures such as debris screens and protection plates over-hanging the entrance to the containment to minimize debris blockage are part of the AP1000 design. In addition, the NRC's Fukushima NTTF evaluated all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to regulatory framework that should be conducted by the NRC." The Fukushima NTTF Report (ADAMS Accession No. ML111861807) did not identify debris-generated recirculation issues as a concern for the AP1000 design. Accordingly, the comment has not shown that the events at the Fukushima Daiichi Plant raise a concern about recirculation system performance due to debris. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The Fukushima Daiichi plant suffered an SBO, in which offsite power and onsite emergency ac power was lost. The SBO was caused by an earthquake and resulting tsunami. Under the [NRC's] current plan to issue the Vogtle COL immediately upon issuance of the final AP1000 DCR amendment, the result would be to begin construction without resolving applying the lessons learned from the Fukushima event to the AP1000 design. (P1-8a)

NRC Response: The AP1000 plant is designed to protect the core during and after all kinds of disasters. This includes each natural disaster that could occur at a chosen site (e.g., hurricane, earthquake, tsunami). Adequate cooling of the reactor during and after all DBEs is provided by the safety-related cooling system of the AP1000. This system does not require ac electrical power (onsite or offsite) to operate.

A heat exchanger is submerged in the IRWST. The bottom of this tank is several feet higher than the top of the core. Hot water rises and cold water sinks; this makes the water circulate naturally in a loop between the reactor coolant system and this heat exchanger, transferring heat from the core to the IRWST. Water in the IRWST boils; the resulting steam is vented from the tank to mix with air in the containment building, where it circulates. The solid steel wall of the containment structure is cooler than the air-steam mixture inside, so water vapor in the air condenses on it. (The water droplets that form will drip down the wall to collect in a gutter, which channels the condensate back into the IRWST. This keeps the tank full.) On the containment's outside surface, a film of water is created by slowly draining a tank at the top of the shield building. The steel wall of the containment conducts heat from water condensing on the inside to warm the water evaporating on the outside. As it evaporates, its heat is transferred into the air flowing between the shield building and containment. The heated air rises, flowing through a chimney and taking the heat into the environment. Even if the core is damaged, the same physical principles will remove heat from the containment while keeping all radioactive material inside without the need for external power.

These features of the design were certified in the initial design certification rulemaking. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The 75-day comment period is inadequate. It is widely reported that Japan's manufacturing infrastructure has been seriously disrupted by the earthquake, tsunami and the evacuation from the region surrounding the Fukushima Daiichi Plant. There may be production train uncertainties for the multiple components and technical expertise involved in the nuclear design and construction in several countries. Since China is currently building the AP1000, U.S. orders for services and equipment may not [have a high] priorit[y] as Toshiba resumes ordinary operations. (P1-12d)

NRC Response: The NRC takes no position as to whether the comment's representations in this regard are true. However, even if true, the NRC does not see – and the comment does not explain – why these situations support the comment's assertion that 75 days is insufficient to provide comment on the proposed amendment of the AP1000 design certification. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The 75-day comment period is inadequate, inasmuch as many nuclear power experts have been deluged with news reports and requests for information on the Fukushima Daiichi Plant accident, and have had little opportunity to review the 173 documents comprising thousands of pages in the DCD Revision 18, and then compare them to earlier versions of the AP1000 design. (*P1-12b*)

NRC Response: The NRC takes no position as to whether the comment's representations in this regard are true. However, even if true, the comment does not explain whether such individual "experts" intended to submit comments on the proposed AP1000 amendment. In addition, the comment did not actually represent that the commenter was unable to provide

comments on DCD revision 18 because of the commenter's inability to retain knowledgeable experts. Thus, the NRC disagrees with this comment. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A 75-day comment period is not sufficient for the proposed rule to amend the AP1000 design certification. The proposed rule specifies that the NRC staff will complete its review of public comments within the extraordinary short period of 30 days. The NRC has directed significant resources to the Fukushima situation and has placed a renewed focus on safety issues at existing plants. It is not clear how this will impact the staff's 30-day review of public comments. (P1-12c)

NRC Response: The NRC disagrees with this comment's implicit argument that a 30-day period for review of public comments is, *per se*, unreasonable for the purpose of rulemaking schedule planning. The NRC noted that, in two of the rulemakings representing the NRC's initial approval of four design certifications, no significant public comments were received. Thus, it was not unreasonable to assume, for planning purposes, a 30-day period for NRC staff review and resolution of any public comments received. In any event, the length of time need for the NRC to resolve public comments does not bear on the adequacy of the 75-day comment period. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC is legally required to address new information, such as the Fukushima Daiichi Plant accident, before proceeding with a rulemaking that will establish a significant part of the basis for licensing new reactors with the AP1000 design. (P1-1b and P1-2c)

NRC Response: The NRC agrees that new information which reasonably bears on the adequacy of the amendments to the AP1000 design certification must be addressed by the NRC if it approves a final rule amending the AP1000 design certification. However, the NRC disagrees with the comment's implicit assertion that the *only manner* in which the NRC may address such information is in the current rulemaking amending the AP1000 design certification. There are a number of other regulatory approaches for addressing the information (*e.g.*, subsequent rulemaking, issuance of orders to COL applicants referencing the AP1000 DCR), all of which are consistent with the AEA and APA, and assure opportunities for public involvement.

In any event, the NRC's NTTF addressed the potential impact of the Fukushima Daiichi accident on the AP1000 design, and concluded that no delay in the completion of the rulemaking on the AP1000 design amendment was necessary (see NTTF Report, pages 71-72). Although the NRC has yet to make a final determination on the recommendations in the NTTF Report, as discussed elsewhere – most notably in the Commission's decision on the Emergency Petition, *Memorandum and Order*, CLI-11-05, September 9, 2011 – there is ample opportunity and legal authority for the NRC to ensure that any NRC-determined changes to the AP1000 DCR are adopted and made applicable to COL applicants and licensees referencing the AP1000 DCR.

Comment: The AEA and NEPA preclude the NRC from approving standardized plants designs until it has completed the investigation of the Fukushima accident and considered the safety and environmental implications of the accident with respect to its regulatory program. (P3-2a)

NRC Response: The NRC disagrees with this comment. The comment did not explain what particular provision of either the AEA or NEPA precludes the NRC from issuing a standard DCR. No change was made to the rule, the DCD, or the EA as a result of this comment.

Shield Building

This subject area includes comments relating to the AP1000 shield building design.

Comment: There are significant unresolved issues on the shield building, despite Westinghouse-Toshiba's compliance with the AIA rule, because the NRC has not satisfactorily addressed the design concerns raised by NRC staff individual Dr. John Ma in his nonconcurrence. Dr. Ma, a senior structural engineer, provided several reasons for his conclusion that the shield building had not been demonstrated to be adequate to address NRC requirements: (i) the shield building is comprised 60% of a material that failed critical physical tests and demonstrated it to be too brittle to withstand a nature or manmade impact (…shatter like a glass cup); (ii) Westinghouse used "reconstituted computer simulations" to demonstrate the shield building's robustness rather than appropriate physical tests; (iii) Westinghouse used a "mathematical concept that underestimates earthquake forces, with the result that the design would be shown to be "grossly inadequate" if the correct and actual earthquake analyses are used; and (iv) the shield building design fails to meet ACI standards that are otherwise endorsed by the NRC. (P1-4a, P1-4b, P1-4c, P1-4d, P1-6a)

NRC Response: The NRC disagrees with this comment. Professional opinions can vary, and the NRC has in place mechanisms for making differing views known. NRC employees can choose to exercise the nonconcurrence process as a way of communicating their views and ensuring their opinions are heard by NRC management. NRC engineer Dr. John S. Ma used this open process to express concerns regarding the safety of the AP1000 shield building design. The specific concerns and NRC staff response to the nonconcurrence are publically available under ADAMS Accession No. ML103370648.

The AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never previously reviewed by the NRC. The NRC staff conducted a careful review of the design of the shield building to ensure that under design-basis loads, including the SSE, the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC analyzed the shield building design against the applicable regulatory requirements, including Appendix S to 10 CFR Part 50, "Earthquake Engineering Criteria" and Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plant Structures." The NRC staff utilized the implementation guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)" and independent review by seismic design experts to ensure that the shield building met the applicable regulatory requirements. The bases for the NRC's acceptance of the design are documented in its SER and include the following:

(a) The calculation of design-basis seismic demands was consistent with NUREG-0800 and followed industry standard analysis methods.

(b) Testing of composite SC elements validated the applicability of ACI-349 code design equations to the SC shield building structure.

(c) Under design-basis loading, the analyses results showed that the shield building stresses, strains, and displacements would be small and that there are sufficient margins with respect to ACI-349 code provisions.

(d) Seismic loads induce small out-of-plane shear forces, which are substantially less than the provided capacity.

(e) The structural response under the Review Level Earthquake (1.67 SSE) shows that although yield would start in a few locations, the strains would still be small.

(f) Under design-basis impulse loads such as tornado-generated missiles, the calculated out-of-plane shear stresses are well below those necessary to induce inelastic deformation.

(g) The AIA performed by the applicant in accordance with 10 CFR 50.150 showed that there would be no perforation of the shield building due to impacts in the non-ductile region (i.e., areas in the cylindrical portion of the shield building away from the basemat, below the air inlet region, and away from connections with other structures).

(h) Collectively, the design-basis and beyond-design-basis analyses conducted by the applicant demonstrated that the out-of-plane shear is not a concern for design-basis loads in the non-ductile region of the shield building, and that there is substantial margin in the design above design-basis loads.

The NRC, therefore, concluded from its evaluation that the AP1000 shield building design meets the Commission's regulations and provides reasonable assurance that the shield building will remain functional under design-basis loads.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC's aircraft impact rule exempts the AP1000 from the risk of an airliner crash into the shield building. Further, the rule requires Westinghouse to conduct an in-house assessment, but does not require Westinghouse to submit the assessment to the NRC for public scrutiny. (P1-6d)

NRC Response: The NRC disagrees that the AIA rule, 10 CFR 50.150, "exempts the AP1000 from the risk of an airliner crash into the shield building." The AP1000 design is effectively subject to the AIA rule under either 10 CFR 50.150(a)(iii) or (a)(v)(B). Under the regulation, the AP1000 must comply with the AIA rule by no later than the first renewal of the AP1000 DCR, but if any COL applicant references an AP1000 DCR, which has not been amended to comply with the AIA rule, then the COL applicant referencing the AP1000 DCR must demonstrate compliance for its plant. Westinghouse, the applicant for the AP1000 DCA, decided to comply with AIA requirements in this amendment. The Commission's aircraft impact rule requires applicants to describe design features relied upon to maintain core cooling and SFP cooling. However, under 10 CFR 50.150, applicants are not required to submit the assessment to the NRC. The NRC conducted an inspection of the Westinghouse AIA (ADAMS Accession Nos. ML102980583 and ML103260447). The results of the assessment were shared with the ACRS, who wrote a letter to the Commission agreeing that the AP1000 satisfied the AIA rule requirements. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: There are unresolved issues pertaining to the shield building due to the stress from earthquakes and winds. (P1-6a, P1-6b)

NRC Response: The NRC disagrees with this comment. The NRC addressed the adequacy of the shield building with respect to seismic events and tornadoes in the FSER, and concluded that the shield building design meets the NRC's requirements with respect to seismic capability and tornadoes. The comment does not identify any problems with the NRC's FSER in this regard, nor does the comment present new information showing that the shield building's design is inadequate with respect to seismic capability or ability to withstand tornadoes. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The water tank on the top of the proposed AP1000 reactor [shield building] could be lost or water recirculation pumps hindered by severe earthquakes, tornadoes, plane crash, or terrorist attacks. (P1-6a, P1-6b, P1-8b)

NRC Response: The NRC disagrees with this comment. The comment did not specifically describe or explain how either the water tank or any recirculation pumps would lose their function (be "lost" or "hindered") in the event of a design-basis earthquake, SSE, plane crash or an undescribed 'terrorist attack." First, no recirculation pumps are credited in the safety analyses for safe-shutdown following any of these events. The passive containment cooling storage tank is designed for SSE loads and protected by thick walls from the design-basis tornado and other external events. The water tank has also been determined to be able to withstand an aircraft impact in accordance with the AIA rule under 10 CFR 50.150.

The NRC interprets "terrorist attacks" to mean threats similar to the design-basis threat (DBT) under 10 CFR Part 73. The NRC's regulations do not require design certification to address "terrorist threats" similar to the DBT. Instead, 10 CFR 73.1 and 10 CFR 73.55 require the DBT to be reviewed in a COL application. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: There are significant unresolved technical issues with respect to: (a) the tensile strength of the shield building; (b) the design of the PCCS tank; and (c) the effects of seismic impacts and peak pressure calculations. The NRC has not fully disclosed its analysis of these weaknesses, and the existence of such weaknesses is evidenced by the concerns identified by Dr. Susan Sterrett, Mr. Arnie Gundersen of Fairewinds Associates, and Dr. John Ma. (P4-1, P4-2)

NRC Response: The NRC disagrees with this comment.

Regarding comment (a) on tensile strength of the shield building, the NRC interprets this comment to refer to the nonconcurrence submitted by Dr. John Ma regarding the shield building design. Similar concerns are addressed under the Shield Building category in the "Unique Comment Submission" section of this document.

The AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never previously reviewed by the NRC. The NRC conducted a careful review of the design of the shield building to ensure that under design-basis loads, including the SSE, the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC analyzed the shield building design against the

applicable regulatory requirements, including Appendix S to 10 CFR Part 50, "Earthquake Engineering Criteria" and Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plant Structures." The NRC utilized the implementation guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)" and independent review by seismic design experts to ensure that the shield building met the applicable regulatory requirements. The bases for the NRC's acceptance of the design are documented in its FSER and include the following:

(a) The calculation of design-basis seismic demands was consistent with NUREG-0800 and followed industry standard analysis methods.

(b) Testing of composite SC elements validated the applicability of ACI-349 code design equations to the SC shield building structure.

(c) Under design-basis loading, the analyses results showed that the shield building stresses, strains, and displacements would be small and that there are sufficient margins with respect to ACI-349 code provisions.

(d) Seismic loads induce small out-of-plane shear forces, which are substantially less than the provided capacity.

(e) The structural response under the Review Level Earthquake (1.67 SSE) shows that although yield would start in a few locations, the strains would still be small.

(f) Under design-basis impulse loads such as tornado-generated missiles, the calculated out-of-plane shear stresses are well below those necessary to induce inelastic deformation.

(g) The AIA performed by the applicant in accordance with 10 CFR 50.150 showed that there would be no perforation of the shield building due to impacts in the non-ductile region (i.e., areas in the cylindrical portion of the shield building away from the basemat, below the air inlet region, and away from connections with other structures).

(h) Collectively, the design-basis and beyond-design-basis analyses conducted by the applicant demonstrated that the out-of-plane shear is not a concern for design-basis loads in the non-ductile region of the shield building, and that there is substantial margin in the design above design-basis loads.

The NRC, therefore, concluded from its evaluation that the AP1000 shield building design meets the Commission's regulations and provides reasonable assurance that the shield building will remain functional under design-basis loads.

The NRC interprets parts (b) and (c) of this comment as referring to two technical issues that were identified during spring 2011. They relate to combinations of seismic and thermal demands for the shield building and the method used to analyze the water storage tank for seismic events. The NRC staff conclusions about these matters are summarized below and in

the FSER. Based on this information, the NRC disagrees that the calculations of structural integrity are inadequate and do not meet applicable requirements.

In the AFSER Section 3.8.4.1.1.3.1,"Design Methodology and Process for the Shield Building Design" and in NUREG-1793, Section 3.8.4.3, "Loads and Load Combinations," the NRC staff accepted ACI-349 load combinations as part of Westinghouse's design criteria for the shield building. AFSER Section 3.8.4.1.1.3.4 summarizes the basis for accepting the seismic demands on the shield building. Thermal analysis criteria and approach were accepted by the staff in AFSER Section 3.8.4.1.1.3.10, "Daily Temperature and Thermal Effects" and NUREG-1793, Section 3.8.3.4.3, "Thermal Analysis." The staff's review of DCD Revision 19 and supporting calculations indicates that Westinghouse has addressed the impact of the combined thermal and seismic loads on the shield building design utilizing methods and procedures consistent with DCD Revision 18 commitments.

In reference to the staff's acceptance of the shield building design, demand-to-capacity ratios were relevant factors in the staff's acceptance of the use of composite SC modules. Revised analysis results indicate that demand-to-capacity ratios for the shield building have increased slightly as a result of combining both thermal and seismic effects. Even with these increases, ample margin remains in the design relative to the ACI-349 code allowable capacity limits. Therefore, the staff's position on the acceptability of the composite SC modules remains unchanged.

DCD Revision 18 did not reflect the implementation of the seismic analysis method for the PCCS tank as committed to by Westinghouse in the shielding building report. To address this issue, Westinghouse revised the DCD to reflect the implementation of the methodology committed to in the shield building report and updated an analysis input parameter in the calculation of the seismic demands. No design changes resulted. Revision 19 of the DCD includes an updated description of the method used to perform the seismic analysis of the tank and updated design summary tables of analysis results for the tank wall. The values of required concrete reinforcement increased, but the provided wall reinforcement, representing the actual design, did not change and continues to provide ample margin in the design. The input parameter change relates to removing intentional amplification of seismic demands applicable to other areas of the shield building that had been used previously in the analysis for the tank. In DCD Revision 19, Westinghouse states that they are using the equivalent static method for calculating the seismic demands on the PCCS tank walls. This method was identified and described in DCD revision 18 to justify the adequacy of portions of the shield building as also reflected in the shield building report dated September 30, 2010. In the AFSER Section 3.8.4.1.1.3.4, "Seismic Demand and Analysis Method," the staff accepted Westinghouse's use of the equivalent static method for the analysis of the shield building roof, including the PCCS tank, consistent with the commitment in the shield building report. The revised analysis approach in DCD Revision 19 is consistent with the previously reviewed and accepted approach. Accordingly, the NRC does not agree that there are unresolved technical issues.

The NRC interprets the reference to Fairewinds Associates as meaning concerns about containment integrity that are discussed in detail elsewhere in this document. Please refer to the Containment category in the "Unique Comment Submission" section.

The concerns identified by Dr. Sterrett, including one that related to the influence on containment cooling of solar radiation on the shield building, as designed under Revision 15 of the DCD, were previously addressed in the initial design certification final rule for the AP1000 design and can be viewed under ADAMS Accession No. ML053130350, on pages 3–7. The shield building design was revised under Revision 19 of the DCD. Thermal effects were considered in the analysis of the revised shield building design, and the NRC finds the revised shield building design to be acceptable. Dr. Sterrett presented additional concerns about the effects of solar radiation during the August 2011, meeting of the ACRS subcommittee for the AP1000 design, and all of the concerns about solar radiation were specifically considered by the full ACRS committee during its September 2011, meeting. The ACRS letter regarding Revision 19 of the DCD (ADAMS Accession No. ML11256A180) concludes that none of these issues alter the safety conclusion. The NRC agrees with this conclusion.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: A letter written by Representative Edward J. Markey to Chairman Jaczko sets forth information showing that the NRC approved the AP1000 design without having resolved several fundamental contradictions between the NRC's position and safety standard, as raised by Dr. Ma in his nonconcurrence. The letter concludes that the NRC staff appeared to have acknowledged that addressing Dr. Ma's concerns would improve the shield building design, but then "chose to abdicate responsibility." (P1-7a, P1-7b)

NRC Response: The NRC disagrees with the claims made in Representative Markey's letter, which is the subject of this comment. In an August 15, 2011, letter (ADAMS Accession No. ML112450407), the NRC responded to Representative Markey's letter (ADAMS Accession No. ML112450398). As indicated in the NRC's response to Representative Markey's letter, the AP1000 shield building design is first-of-a-kind. It relies on SC composite construction in a safety-critical application to an extent never previously reviewed by the NRC. The NRC staff conducted a careful review of the design of the shield building to ensure that under design-basis loads, including the SSE, the shield building possesses sufficient strength, stiffness, and ductility to remain functional. The NRC analyzed the shield building design against the applicable regulatory requirements, including Appendix S to 10 CFR Part 50, "Earthquake Engineering Criteria" and Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plant Structures." The NRC staff utilized the implementation guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (SRP)" and independent review by seismic design experts to ensure that the shield building met the applicable regulatory requirements. The bases for the NRC's acceptance of the design are documented in its SER and include the following:

(a) The calculation of design-basis seismic demands was consistent with NUREG-0800 and followed industry standard analysis methods.

(b) Testing of composite SC elements validated the applicability of ACI-349 code design equations to the SC shield building structure.

(c) Under design-basis loading, the analyses results showed that the shield building stresses, strains, and displacements would be small and that there are sufficient margins with respect to ACI-349 code provisions.

(d) Seismic loads induce small out-of-plane shear forces, which are substantially less than the provided capacity.

(e) The structural response under the Review Level Earthquake (1.67 SSE) shows that although yield would start in a few locations, the strains would still be small.

(f) Under design-basis impulse loads such as tornado-generated missiles, the calculated out-of-plane shear stresses are well below those necessary to induce inelastic deformation.

(g) The AIA performed by the applicant in accordance with 10 CFR 50.150 showed that there would be no perforation of the shield building due to impacts in the non-ductile region (i.e., areas in the cylindrical portion of the shield building away from the basemat, below the air inlet region, and away from connections with other structures).

(h) Collectively, the design-basis and beyond-design-basis analyses conducted by the applicant demonstrated that the out-of-plane shear is not a concern for design-basis loads in the non-ductile region of the shield building, and that there is substantial margin in the design above design-basis loads.

The NRC, therefore, concluded from its evaluation that the AP1000 shield building design meets the Commission's regulations and provides reasonable assurance that the shield building will remain functional under design-basis loads.

The NRC recognizes that professional opinions can vary, and the NRC has in place mechanisms for making differing views known. NRC employees can choose to exercise the nonconcurrence process as a way of communicating their views and ensuring their opinions are heard by NRC management. NRC engineer Dr. John S. Ma used this open process to express concerns regarding the safety of the AP1000 shield building design. Thus, the existence of a differing professional view, by itself, does not mean that the NRC failed to consider and adequately address the safety concerns raised by Dr. Ma. In fact, the NRC responded to the technical issues raised by Dr. Ma in a careful and technically-justified manner. The specific concerns and NRC staff response to the nonconcurrence are publically available under ADAMS Accession No. ML103370648. Thus, the NRC does not agree with Representative Markey's assertion that the NRC "chose to abdicate responsibility."

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should release the unredacted version of the nonconcurrence prepared by Dr. John Ma (redacted version of the nonconcurrence is ML103370648). (P4-3)

NRC Response: The NRC disagrees that the unredacted version of the nonconcurrence should have been released. The NRC publicly released the redacted version of the nonconcurrence before the start of the public comment period for the proposed amendment to the AP1000 design certification. The comment did not explain why the redacted version of the nonconcurrence was insufficient to provide the commenter with a meaningful basis to develop comments on the adequacy of the proposed AP1000 design changes, which were the subject of the nonconcurrence. No change was made to the rule, the DCD, or the EA as a result of this comment.

Containment

This subject area includes comments concerning the AP1000 containment design, including the "chimney effect," corrosion, hydrogen, severe accident performance, and sump performance.

Comment: The structural integrity of the AP1000 containment is inferior to current operating nuclear reactor fleets due to the staff's acceptance of a containment that lacks hydrogen igniters, safety grade equipment throughout the reactor, and robustness. (P1-11b)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The AP1000 containment design, as described in Revision 15 of the DCD, was approved as part of the initial certification of the AP1000 design. The comment did not point to any changes in the scope of the current amendment that affect the previous conclusions or support the comment's position that the containment design is inferior.

However, the NRC notes that the comment incorrectly states that the AP1000 design does not include hydrogen igniters. In fact, the AP1000 design includes battery-powered hydrogen igniters. The NRC interprets the comment's assertion that the AP1000 containment "lacks…safety grade equipment throughout the reactor," as an assertion that the containment is not designated as a "safety-related" SSC. This assertion is also incorrect; the containment is designated as a safety-related SSC in the AP1000 DCD. Finally, the NRC notes that the comment presented no basis for the assertion that the containment "lacks…robustness."

No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The AP1000 containment system has design flaws, as discussed in two reports authored by Fairewinds Associates and presented to the ACRS by the AP1000 Oversight Group. According to the two reports, there are instances where the AP1000 containment system may have cracks or through holes in containment structure would allow excessive amounts of radiation to be released during loss of cooling accidents, as pressurized steam would be forced through the hole and then vented directly into the atmosphere without any filtering. (P1-11c)

NRC Response: This comment is out of the scope for this rulemaking process, which concerns an amendment to the rule certifying the AP1000 design in 10 CFR Part 52, Appendix D. The AP1000 containment design, as described in Revision 15 of the DCD, was approved as part of the initial certification of the AP1000 design (71 FR 4464) and is not being changed in the amendment. The comment did not point to any changes in the scope of the current amendment which relate to the existing containment design.

The NRC also notes that its responses to comments from Unique Comment Submissions that address corrosion leading to cracks or holes are discussed in this document under the Containment category of the "Unique Comment Submissions" section. No change was made to the rule, the DCD, or the EA as a result of this comment.

SAMDA

This subject area includes comments on the SAMDAs and related analysis for the AP1000 design.

None

Spent Fuel

This subject area includes comments on onsite SFP storage and long-term storage/disposal of spent fuel, whether related to the AP1000 design or in general.

Comment: The spent fuel rack capacity increased from 619 fuel assemblies in Revision 15 of the DCD to 884 assemblies in Revision 18, an increase of 42.8%. The higher density fuel pools require boron shields between stored assemblies to reduce the risk of criticality. Such re-racking introduces potential partial loss of cooling water, possible fire of spent fuel assemblies, and release of large inventories of cesium-137 and other radionuclides. (P1-10a)

NRC Response: The NRC agrees that, under the proposed amendment of the AP1000 DCR, the capacity of the SFP racks would be increased from 619 to 889 (rather than 884 as asserted by the comment) fuel assemblies, and that the amendment credits the use of boron shields to prevent criticality in connection with the increased density of fuel assemblies being stored in the SFP.

However, the NRC disagrees with the comment's assertion that the increased capacity and density would introduce potential lost of cooling water, resulting in a possible fire of spent fuel assemblies and large releases of radionuclides. The comment did not explain how increased fuel capacity and concomitant increase in density of the SFP would "introduce" potential loss of cooling water as compared with the capacity and density described in DCD Revision 15. The NRC does not believe that the increased capacity and density leads to a new (previously un-described or unconsidered) way of losing SFP cooling water. The NRC evaluated the proposed increase in fuel assembly capacity and density, and the effectiveness of the Westinghouse-proposed boron shields to prevent criticality of the spent fuel stored in the SFP. The AP1000 DCD Revision 18 SFP criticality analysis was reviewed following the guidance found in NUREG-0800 Section 9.1.1, Revision 3, "Criticality Safety of Fresh and Spent Fuel Storage and Handling," to ensure that the applicant is in compliance with the applicable regulations (GDC 62, "Prevention of Criticality in Fuel Storage and Handling," and 10 CFR 50.68, "Criticality Accident Requirements"). These requirements are generally performance-based with limitations on the reactivity values, and as such, there are no specific physical design requirements such as minimum geometric spacing which must be met. The AP1000 SFP criticality analysis demonstrates that, with the proposed storage arrangement of the SFP, the reactivity requirements are met, and no regulations are violated. Therefore, the NRC determined that that the AP1000 SFP storage arrangement is acceptable.

No change was made to the rule, the DCD, or the EA as a result of this comment.

Environmental

This subject area includes comments on environmental concerns, whether related to the AP1000 design or in general.

None

Other AP1000 Topics

This subject area includes comments which are *related to the AP1000 design*, but are not addressed under other subject areas. These comments address topics such as quality assurance, location of batteries, decommissioning, handling/redaction of information, nitrogen injection, the NRC's process for reviewing the AP1000 amendment and associated rulemaking, and general support for the AP1000 design.

Comment: At the time of the January 2006 rulemaking approval a significant number of major Tier 1 items had not been completed by Westinghouse or reviewed by the NRC staff. The proposed amendment of the AP1000 rule would approve Revision 18 of the DCD, but there have been significant changes in design and design calculations leading to a revision of the AP1000 reactor design and operational procedures. This has lead to both a lack of resolution of those issues, and consequently a "meaningful and transparent" process which allows the public ample time to review design changes and comment on the final design and procedures. (P1-3a, P4-1, P4-5)

NRC Response: The NRC interprets these comments as claiming that the public did not have a reasonable opportunity to comment on the "final design and procedures," because Revision 18 was the version of the DCD available during the public comment period and Revision 19 of the DCD contains "significant changes" from the design and operational procedures in Revision 18. The NRC disagrees with these comments. The changes in the DCD between Revisions 18 and 19 were to implement previous DCD commitments, to correct a small number of errors, and otherwise provide clarity and consistency. As noted in SECY-11-0002 issued on January 3, 2011, "*Proposed Rule: AP1000 Design Certification Amendment,"* the NRC evaluated the changes that were proposed for inclusion in Revision 18 of the DCD, and concluded that they are acceptable. The NRC's bases for approval of these changes are set forth in the final SER for the AP1000 amendment. The ACRS reviewed the changes in Revision 19 of the DCD and wrote a letter (ADAMS Accession No. ML11256A180) at their September 2011, meeting stating that the changes proposed in the AP1000 DCD amendment, including those made in Revision 19, maintain the robustness of the previous certified design and concluded that there is reasonable assurance that the revised design can be built and operated without undue risk to the health and safety of the public. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: In the ACRS "Report on the Safety Aspects of the Southern Nuclear Operating Company (SNOC) COL Application for Vogtle Electric Generating Plant, Units 3 and 4", the ACRS noted that the staff should "review with [ACRS] the changes and commitments which deviate significantly from those presented during [ACRS] review." Hence the ACRS believes the DCD was not ready for review. (P1-3b)

NRC Response: The NRC disagrees with this comment. The version of the DCD at the time of this ACRS review was Revision 17, with responses to open items in other correspondence from the applicant. The ACRS noted that Revision 18 had been recently submitted to close the confirmatory items. They recognized that further revisions were possible prior to completion of the design certification rulemaking. This was the reason for the statement in the letter. The NRC does not believe that the commitments in Revision 19 deviate significantly from those presented to the ACRS. Nevertheless, the NRC staff did provide Revision 19 and the final SER to ACRS. The ACRS reviewed the changes in Revision 19 of the DCD and wrote a letter (ADAMS Accession No. ML11256A180) at their September 2011, meeting stating that the changes proposed in the AP1000 DCD amendment, including those made in Revision 19, maintain the robustness of the previous certified design and concluded that there is reasonable assurance that the revised design can be built and operated without undue risk to the health and safety of the public. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC originally planned a 1-year period for public comment in an earlier version of its schedule for new reactor licensing. This was reduced to 75 days. (*P1-5a*)

NRC Response: The NRC disagrees with this comment. The NRC never intended to provide a 1-year period for the public to submit comments on the proposed rule to amend the AP1000 design certification. The NRC typically provides a 75-day comment period for most substantive technical rules. For example, the proposed rule for the initial AP1000 DCR provided a 75-day comment period (70 FR 20062, 20063; April 18, 2005). The NRC did provide a 75-day comment period for the AP1000 amendment proposed rule.

The comment did not reference the document or information source, which forms the basis for the comment's assertion that the NRC intended to provide a 1-year period for the public to submit comments on the proposed rule amending the AP1000, and subsequently reduced this to 75 days. Therefore, the NRC is unable to respond in greater detail to the comment. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The AP1000 design does not adequately address concerns raised by the ACRS with respect to the gravity head available in the AP1000 water recirculation cooling systems as a result of debris collection on screens. (P1-8c)

NRC Response: The NRC disagrees with this comment. The adequacy of the AP1000 design with respect to post-LOCA debris generation, potential blockage of screens and fuel assemblies from debris was fully considered by both the NRC and the ACRS. The lower gravity driving head than for designs with pumped flow was specifically evaluated through design-specific testing. Further, the assumptions about debris underlying the analysis and testing are designated as Tier 2* information, so any design or licensing changes affecting these parameters would require prior NRC approval. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The 75-day comment period is not a sufficient amount of time to comment on the AP1000 DCD because there are several unresolved design and operational issues that remain and have not been given an adequate review and safety resolution. (P1-12a)

NRC Response: NRC disagrees with the comment. DCD Revision 18 was submitted in December 2010. The 75-day comment period that began on February 24, 2011, after the receipt of Revision 18 and after the NRC staff completed its advanced FSER. The Commission provided sufficient time to comment on the amendment. As noted elsewhere, any impacts of Fukushima will be considered separately. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: Westinghouse has not defined a "Freeze point" consistent with the Final ISG on finalizing Licensing Basis Information, DC/COL-ISG-011 (ADAMS Accession Nos. ML092890577 and ML092890623). This resulted in the NRC publishing a proposed rule for comment based upon Revision 18 of the DCD, even as Westinghouse intended to submit Revision 19 to the DCD. Thus, the public was not afforded an opportunity to comment on the final AP1000 design as amended. (P4-6)

NRC Response: The NRC disagrees with this comment. A "freeze point" under DC/COL-ISG-011 is an NRC administrative tool used to maximize the timeliness of the NRC's safety review. In essence, the COL and DCR applicants are put on notice that applicant-requested changes submitted after the freeze point may result in changes to the NRC's review schedule. Thus, the applicant is not prohibited from submitting changes after the NRC-designated freeze point, but the applicant is on notice that there may be a delay in the NRC's review schedule if changes are submitted after the freeze point.

The freeze point also does not affect the scope of matters on which the public may comment. The matters on which the public may comment in a DCA rulemaking are determined by applicable law, including the Administrative Procedures Act (APA) and the AEA.

With respect to changes from Revision 18 to Revision 19 of the DCD, the NRC has concluded that the changes do not require renoticing. The bases for this determination are set forth in more detail in the statement of consideration for the final rule amending the AP1000 DCR. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC should terminate and "declare null and void" the rulemaking amending the AP1000 DCR. (P4-7)

NRC Response: The NRC interprets the comment as requesting that the NRC withdraw the proposed rule to amend the AP1000 DCR and terminate the rulemaking for the AP1000 amendment rulemaking, for specified technical and procedural bases. The NRC disagrees with this comment's proposal. Even if one or more of the petition's technical and procedural reasons (discussed in Comment P4-5) are accepted as valid, there is nothing in the APA that requires the NRC to withdraw the proposed rule and terminate the AP1000 amendment rulemaking. There are other procedural options for the NRC to obtain additional public comment on the AP1000 DCR. Because the NRC has concluded that the technical issues raised above do not require additional public comment, NRC will not exercise any of these options. No change was made to the rule, the DCD, or the EA as a result of this comment.

Comment: The NRC is allowing new reactors to be built without operating licenses and without a final design and operating procedures that are fully reviewed and all issues resolved. The building of new reactors without an operating license is evidenced by, among other things, construction at the Vogtle Plant site, the fabrication of modules by Shaw Modular systems, the receipt of steel plates at the V.C. Summer site. These activities are being undertaken without design finalization. (P4-8)

NRC Response: The NRC disagrees with the assertion that an applicant is building an AP1000 NPP design without an operating license. The COL process under Subpart C of 10 CFR Part 52 results in the issuance of a combined construction permit and operating license with conditions. One of the requirements for applying for a COL is that an applicant must have final design information and operating procedures for the NPP (see 10 CFR 52.79). In fact, under the COL process, all of the safety and environmental issues must be resolved before the applicant is allowed to proceed with construction. Additionally, the 10 CFR Part 52 process under 10 CFR 52.24(c), also allows for certain limited construction activities, before the COL is issued.

Regarding the Vogtle plant site, SNOC received an authorization from the NRC, under 10 CFR 52.24(c), allowing certain limited construction activities, which are currently nearing completion. With respect to fabrication of modules and receipt of components such as steel plates, these activities do not require a license or other authorization from the NRC (see 10 CFR 50.10(a)(2)). Therefore, the activities identified in the comment are being performed in compliance with the NRC's regulations. No change was made to the rule, the DCD, or the EA as a result of this comment.

General Concerns

This subject area includes comments which are *not related to the AP1000 design* and are not addressed under other subject areas. These comments address topics such as the general safety of nuclear power, the cost of nuclear power, and whether or not the NRC should license new NPPs, allow new plants to be constructed, or shutdown existing NPPs.

None

Appendix 1 – Unique Comment Submissions

Comment Submission ID	Name	Affiliation (if any)	ADAMS Accession No.
1	Susan Perez	Private Citizen	ML110740290
2	Anonymous	Private Citizen	ML11104A008
3	Anonymous	Private Citizen	ML11104A009
4	Andrew Stevenson	Private Citizen	ML11118A115
5	Keith VonBorstel	Private Citizen	ML11118A117
6	Patricia Richard-Amato	Private Citizen	ML11118A118
7	Gina Thomas	Private Citizen	ML11118A119
8	David Addison	Private Citizen	ML11118A120
9	A. C. Cantrell	Private Citizen	ML11118A122
10	Paul Fretheim	Private Citizen	ML11118A123
11	Lynne Mayo	Private Citizen	ML11118A155
12	David Strohm	Private Citizen	ML11118A132
13	J. Troy Burns	Private Citizen	ML11118A133
14	Matthew Grosso	Private Citizen	ML11118A134
15	Margaret Welke	Private Citizen	ML11118A135
16	Ineke Deruyter	Private Citizen	ML11118A136
17	Pete Marshall	Private Citizen	ML11118A137
18	August Cardea	Private Citizen	ML11118A138
19	Diana & Ken McCracken	Private Citizen	ML11118A139
20	John Edminster	Private Citizen	ML11118A140
21	Joan King	Private Citizen	ML11118A141
22	Tom Jackson	Private Citizen	ML11118A164
23	Leonard R. Jaffee	Private Citizen	ML11118A165
24	Christian Schwoerke	Private Citizen	ML11118A166
25	Carl Mcgarry	Private Citizen	ML11118A167
26	Michael Broughton	Private Citizen	ML11118A146
27	Paul Crouser	Private Citizen	ML11118A147
28	Gene Webb	Private Citizen	ML11118A148
29	Dylan Butler	Private Citizen	ML11118A149
30	Costa Chitouras	Private Citizen	ML11118A150
31	Eugene Craig	Private Citizen	ML11118A151
32	Richard Klotz	Private Citizen	ML11118A152
33	David Bitter	Private Citizen	ML11118A156
34	Tara Jankovic	Private Citizen	ML11118A157
35	John Gambardella	Private Citizen	ML11118A158
36	Hugh Smyser	Private Citizen	ML11118A159
37	Kasia Gadek	Private Citizen	ML11118A160
38	Kris Elletson	Private Citizen	ML11118A161
39	John Runkle	AP1000 Oversight Group	ML11122A081
40	Fran Teplitz/Alisa Gravitz	Green America	ML11124A104
41	R.F. Ziesing	Westinghouse	ML11124A105

Appendix 1 – Unique Comment Submissions

Comment Submission ID	Name	Affiliation (if any)	ADAMS Accession No.
42	Charlene Eblen	Private Citizen	ML11130A042
43	Philip Stoddard	Private Citizen	ML11130A044
44	Susan Stantejsky	Private Citizen	ML11130A045
45	Mighty Xee	Private Citizen	ML11130A046
46	Hal Hazen	Private Citizen	ML11130A047
47	Chris Crescioli	Private Citizen	ML11130A048
48	Scott Fenn/Richard Eidlin	Private Citizen	ML11130A049
49	Christopher Lish	Private Citizen	ML11130A114
50	Joseph Resnick	Private Citizen	ML11130A103
51	John D. Runkle	AP1000 Oversight Group	ML11131A059
52	Tom Clements	Friends of the Earth	ML11131A060
53	Danny Dyche	Private Citizen	ML11131A061
54	Russell J. Bell	NEI	ML11131A062
55	Tom Clements	Friends of the Earth	ML11131A063
56	R. F. Ziesing	Westinghouse	ML11131A064
57	John Runkle	AP1000 Oversight Group	ML11139A149
58	Louis Zeller	Blue Ridge Environmental Defense League	ML11132A011
59	Kenneth Schrader	Private Citizen	ML11132A012
60	Tom Clements	Friends of the Earth	ML11133A272
61	B. L. Ivey	Private Citizen	ML11133A273
62	Anonymous	Private Citizen	ML11188A056
63	John Runkle	AP1000 Oversight Group	ML11146A048
64	Tom Clements	Friends of the Earth	ML11158A087
65	Valery Keramaty	Private Citizen	ML11178A142
66	Edward J. Markey	Member of Congress	ML110680273

Appendix 2 - Form Comment Submissions Containing Additional Comments (*i.e.*, comments in addition to the eight common comments in the form comment submissions)

Note: The table provided below only shows those form letter comment submissions providing additional comments. A report of all form comment submissions and their associated IDs and ADAMS accession numbers can be found at ADAMS Accession No. ML11273A070.

Comment Submission ID	Name	Affiliation (if any)	ADAMS Accession Number
1682	Daphne T. Stevens	Private Citizen	ML11206A325
11876	David Holman	Private Citizen	ML11209D752
5255	David Walker	Private Citizen	ML11208A189
6951	Deborah Weinischke	Private Citizen	ML11208C004
6983	Dennis Kish	Private Citizen	ML11208C036
9640	Denise P.	Private Citizen	ML11209B067
8215	Donald and Deanna Barnett	Private Citizen	ML11208D393
6947	Dorothy Staby	Private Citizen	ML11208C000
1581	Dorothy Varellas	Private Citizen	ML11206A212
7873	Dr. Eng. Hassas Sadek & Mohamed Morsi Haikal	Private Citizen	ML11208D050
4859	Dr. William “Skip” Dykoski	Private Citizen	ML11207B623
6971	Duane Hunting	Private Citizen	ML11208C024
9103	Frank Karen	Private Citizen	ML11209A524
9413	Herschel Dosier	Private Citizen	ML11209A834
9786	Herschel Dosier	Private Citizen	ML11209B214
3894	James Kootz	Private Citizen	ML11207A633
1952	Jim Adams	Private Citizen	ML11206A655
7547	Joan Lawrence	Private Citizen	ML11208C688
8104	John Grillo	Private Citizen	ML11208D282
1357	John Legry	Private Citizen	ML11203B644
8469	Kate Marsh	Private Citizen	ML11208D647
9115	Kathleen Milano	Private Citizen	ML11209A536
10725	Katie O’Neil	Private Citizen	ML11209C443
6552	Katrina Barron	Private Citizen	ML11208B531
5602	Kenneth Gibson	Private Citizen	ML11208A536
10975	Kevin Smith	Private Citizen	ML11209C789
10750	Kit Crosby-Williams	Private Citizen	ML11209C473
13174	Leland D. Randall	Private Citizen	ML11210B182
10005	Lillian E. Goodman	Private Citizen	ML11209B500
321	Linda Lacelle	Private Citizen	ML11203A527
6165	Lori Mallams	Private Citizen	ML11208B101
8829	Madonna Starr	Private Citizen	ML11209A249

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Note: The table provided below only shows those form letter comment submissions providing additional comments. A report of all form comment submissions and their associated IDs and ADAMS accession numbers can be found at ADAMS Accession No. ML11273A070.

Comment Submission ID	Name	Affiliation (if any)	ADAMS Accession Number
431	Margaret Wilkinson	Private Citizen	ML11203A649
4622	Marian Schwarzenbach	Private Citizen	ML11207B386
8004	Mariann Kaye	Private Citizen	ML11208D181
10621	Marie Leven	Private Citizen	ML11209C307
1483	Marilynn Wadden	Private Citizen	ML11206A088
11202	Maris Arnold	Private Citizen	ML11209D061
8334	Mark Tolpin, MD, FAAP	Private Citizen	ML11208D512
6987	Marla Bottesch	Private Citizen	ML11208C040
2626	Martha Abell	Private Citizen	ML11206B500
1715	Mary Ferm	Private Citizen	ML11206A362
3227	Mary Madigan	Private Citizen	ML11206C101
8250	Mary McBride	Private Citizen	ML11208D428
4852	Michael Reich	Private Citizen	ML11207B616
9616	Michael Strawn	Private Citizen	ML11209B043
13365	Michele Church	Private Citizen	ML112630301
4861	Mike Little	Private Citizen	ML11207B625
8253	Milt Honel	Private Citizen	ML11208D431
6962	Morris Sandel	Private Citizen	ML11208C015
12602	Nicholas Vanderborgh	Private Citizen	ML11210A599
10008	Nina Lozano	Private Citizen	ML11209B504
9480	Quinn Montana	Private Citizen	ML11209A902
6212	Randall Gloege	Private Citizen	ML11208B148
7509	Rhonda Lawrence	Private Citizen	ML11208C644
1244	Richard Fisel	Private Citizen	ML11203B531
4855	Richard Keicher	Private Citizen	ML11207B619
10283	Richard Placone	Private Citizen	ML11209B867
1820	Rinaldo S. Brutocco	Private Citizen	ML11206A497
5597	Rita Gentry	Private Citizen	ML11208A531
6972	Robb Sauerhoff	Private Citizen	ML11208C025
4723	Robert Bauer	Private Citizen	ML11207B487
12760	Robert Means	Private Citizen	ML11210A768
5833	Robert Mihaly	Private Citizen	ML11208A768
5132	Robert Mueller	Private Citizen	ML11208A066
10015	Robert Poignant, Jr.	Private Citizen	ML11209B512

Appendix 2 - Form Comment Submissions Containing Additional Comments (*i.e.*, comments in addition to the eight common comments in the form comment submissions)

Note: The table provided below only shows those form letter comment submissions providing additional comments. A report of all form comment submissions and their associated IDs and ADAMS accession numbers can be found at ADAMS Accession No. ML11273A070.

Comment Submission ID	Name	Affiliation (if any)	ADAMS Accession Number
4632	Robert Robbind	Private Citizen	ML11207B396
2598	Robertmary Swain	Private Citizen	ML11206B471
7823	Robert San Socie	Private Citizen	ML11208D000
1009	Robert Singleton	Private Citizen	ML11203B296
5591	Rosemary Lerario	Private Citizen	ML11208A525
2404	Rudy Bacich	Private Citizen	ML11206B205
9724	Russell Grindle	Private Citizen	ML11209B152
6175	Russell Serra	Private Citizen	ML11208B111
400	Ruth Stambaugh	Private Citizen	ML11203A618
1283	Ryan Sdano	Private Citizen	ML11203B570
3273	S. Lawrence	Private Citizen	ML11206C147
11768	S. Lawrence Dingman	Private Citizen	ML11209D636
4531	Samuel Hathaway	Private Citizen	ML11207B295
1968	Sandrine Marten	Private Citizen	ML11206A671
13364	Sara Lourie	Private Citizen	ML112630291
5060	Sara Meric	Private Citizen	ML11207B824
9411	Sarah Brownrigg	Private Citizen	ML11209A832
7153	Scott Dulas	Private Citizen	ML11208C218
1541	Sean Murphy	Private Citizen	ML11206A149
800	Shelley Isom	Private Citizen	ML11203B164
5249	Shoshana Wechsler	Private Citizen	ML11208A183
12929	Stanley Baker	Private Citizen	ML11210A937
9918	Steve Howard	Private Citizen	ML11209B384
7125	Steven Campbell	Private Citizen	ML11208C183
6984	Susan Hathaway	Private Citizen	ML11208C037
2695	Susan Pomeroy	Private Citizen	ML11206B839
8955	Suzanne Schwartz	Private Citizen	ML11209A375
13363	Thera Jane Mercer	Private Citizen	ML112630283
11500	Toddy Perryman	Private Citizen	ML11209D365
12756	Toddy Perryman	Private Citizen	ML11210A764
8022	Virginia Johnson	Private Citizen	ML11208D199
10795	Virginia J. Miller	Private Citizen	ML11209C547
5761	Virginia Smedberg	Private Citizen	ML11208A695
6995	Wendy Watson	Private Citizen	ML11208C048

Appendix 2 - Form Comment Submissions Containing Additional Comments (*i.e.*, comments in addition to the eight common comments in the form comment submissions)

Note: The table provided below only shows those form letter comment submissions providing additional comments. A report of all form comment submissions and their associated IDs and ADAMS accession numbers can be found at ADAMS Accession No. ML11273A070.

Comment Submission ID	Name	Affiliation (if any)	ADAMS Accession Number
5264	Will Martin	Private Citizen	ML11208A198
1773	William Lewis	Private Citizen	ML11208D099
9461	Winston Mctague, Jr.	Private Citizen	ML11209A883
5588	Wolfgang Loera	Private Citizen	ML11208A522
5062	Richard Ralph Roehl	Private Citizen	ML11207B826
6978	Ronald Hildebrand	Private Citizen	ML11208C031
6167	Rev. Christian Colvin	Private Citizen	ML11208B103
9824	Sarah Sesek	Private Citizen	ML11209B259
2611	Yolanda Stern Broad, PhD	Private Citizen	ML11206B484

Appendix 3 – Petitions

Petition Submission ID	Date	Title	Affiliation (if any)	ADAMS Accession Number
1	April 6, 2011	Petition to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident Implications on Design and Operational Procedures and Request for Expedited Consideration	John D. Runkle et.al.	ML110970673
2	April 19, 2011	Petition to Suspend AP1000 Design Certification Rulemaking Pending Evaluation of Fukushima Accident Implications on Design and Operational Procedures and Request for Expedited Consideration (Resubmitted)	John D. Runkle et.al.	ML111110851
3	April 20, 2011	Emergency Petition to Suspend All Pending Reactor Licensing Decisions And Related Rulemaking Decisions Pending Investigation of Lessons Learned From Fukushima Daiichi Nuclear Power Station Accident (Emergency Petition)	Many named organizations	ML111110862
4	June 16, 2011	Petition to Terminate the Rulemaking on Design Certification of the AP1000 Reactor and Declare it Null and Void (Docket ID NRC-2010-0131) (Petition to Terminate)	John D. Runkle et.al.	ML11171A014

AP1000 Design Control Document Changes Since Revision 18 (October 7, 2011)

Introduction

This enclosure discusses changes that were made to the design control document (DCD) and the rule since submittal of Revision 18 and publication of the proposed rule for comment. The U.S. Nuclear Regulatory Commission (NRC) staff's review of Revision 18 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103260072),[1] identified a few areas where the DCD wording should be revised for clarity, to resolve internal inconsistencies, or to provide updated versions of referenced technical reports. In addition, three technical issues were noted: a load combination for the shield building, the method used to evaluate tank sloshing, and containment peak pressure analysis error correction. As a result of these activities, Westinghouse Electric, LLC (Westinghouse) submitted Revision 19 of the DCD on June 13, 2011 (ADAMS Accession No. ML11171A315), and Revision 19 is the version of the DCD that will be certified. The staff has determined that none of the changes from Revision 18 to Revision 19 of the DCD require an additional opportunity for public comment. These changes, which are organized into five subject areas, are discussed below.

In its review of Revision 19, the NRC also determined that three of the five subject areas should be identified as Tier 2* matters in the Section VIII, "Finding of No Significant Environmental Impact: Availability," in the statement of consideration of the final rule. The staff further determined that none of these three new Tier 2* designations in Section VIII.B.6 of the final rule language require an additional opportunity for public comment.

DCD Structural Design Information and Shield Building Tier 2* Information

Revision 18 of the DCD moved some design details about structures, including the shield building, from supporting Westinghouse documents into the DCD itself. Some of the details were marked as Tier 2*, based upon initial NRC staff comments. For example, information about penetrations was brought out of TR-9 into the DCD, and the shield building structural description was added to Section 3.8.4 in Revision 18.

The advanced final safety evaluation report (AFSER) included a confirmatory item to verify that the DCD appropriately reflected all necessary details about the structural design and shield building, and clearly showed which design details were to be Tier 2* (see AFSER Section 3.8.4 under ADAMS Accession No. ML103430502). The staff was able to close the confirmatory item after Westinghouse submitted Revision 19 of the DCD, by verifying the appropriate structural details were in the DCD and the design details were identified as Tier 2*. These DCD revisions enhanced the description of the design and were not a result of changes to the design itself. Westinghouse Report GLR-603, submitted on March 28, 2011 (ADAMS Accession No. ML110910541), was the nonproprietary version of the report that presented shield building information to be made Tier 2* (those aspects that were also proprietary), in addition to the DCD information added to Section 3.8 and Appendix 3H. The scope of the report was materials, connection details, and tie bar spacing.

[1] This is the ADAMS package number that collected all chapters. Chapters of the AFSER were individually issued as ADAMS documents. Chapter 3 is under ADAMS Accession No. ML103430502. The chapters are also posted on NRC's public Web site under Design Certifications, AP1000 Amendment.

Use of steel composite modules was the heart of the revised shield building design, including the the NRC determination that existing consensus standards are not technically applicable in all respects to analysis of the composite modules. This was a key factor in the NRC conclusion that design details about the shield building are Tier 2*, so that any future changes to that information by the combined license (COL) would receive prior staff review and approval. The staff considered the existing rule language as it relates to Tier 2* designation for structural information. For example, the existing rule includes use of ACI-349, definition of critical locations and thicknesses, nuclear island structural dimensions, and design summary of critical sections. Some of the critical sections are within the shield building, and ACI-349 was part of the design criteria. However, the staff concluded, during the course of final rule preparation, that the rule would be more clear if the use of steel composite module details that are designated in the DCD as Tier 2* was explicitly stated in the final rule (at Section VIII.B6(c)). As a result of the Tier 2* markings, a conforming change is being made to the final rule language to Section VIII.B.6(c) about the categories of Tier 2* information that would expire at fuel load.

The NRC does not believe that the DCD changes or the designation of this information as Tier 2* in the final rule require renoticing because the material was publicly available in referenced reports, the staff's intention was clear with the confirmatory item, and there were no comments regarding the extent of Tier 2* inclusion in Revision 18.

Implementation of Revision 18 Commitments for the Shield Building

Load Combinations for Shield Building

In the followup to an apparent editorial error in a table in the shield building report, the staff determined that Westinghouse had not documented in its calculations the numerical combination of the loads for external temperature conditions (minus 40 degrees F) and a safe-shutdown earthquake (SSE). On April 12, 2011, the NRC asked Westinghouse to document in the shield building report the numerical combination of loads for extreme ambient thermal loads and SSE loads as specified in DCD Table 3.8.4-1 for steel structures and Table 3.8.4-2 for concrete structure (see meeting summary dated May 17, 2011 (ADAMS Accession No. ML111440298)). By letter dated July 14, 2011, Westinghouse responded to this request (ADAMS Accession No. ML111950098), and concluded that the current design is acceptable when the load combinations are explicitly analyzed. The analysis results are discussed in detail in Revision 4 of the shield building report. Changes were made to the DCD to reflect the results of this load combination analysis, but the changes did not involve any changes to the methodology or the design of the shield building. The specific DCD changes were the addition of Section 3.8.4.5.5 to discuss the load combination analysis and updating of tables of results in Appendix 3H. No change to the language of the AP1000 design certification rule (DCR) in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Appendix D was made as a result of the DCD changes.

The staff does not believe these DCD changes require renoticing because Revision 18 of the DCD stated that the design would be verified using the required load combinations, and these load combinations had previously been approved by the NRC for use in AP1000 analyses similar to those for the shield building elements requiring reanalysis. There was no change to the methodology or the actual design of the shield building was needed, and there was no change to the language of the AP1000 DCR. The NRC notes that on the June 16, 2011, "petition" (filed by John Runkle) that requested the NRC terminate the rulemaking specifically

raised the three technical issues in Revision 19, including the load combination topic.

Passive Containment Cooling Water Storage Tank

During the analysis of the thermal plus earthquake load combination for the passive containment cooling water storage tank (located on top of the shield building). Westinghouse determined that they had not performed analysis of hydrodynamic loads using an equivalent static analysis as stated in Westinghouse's response (ADAMS Accession No. ML102650101) to an action item from the NRC's shield building report review (documented in AFSER Chapter 3 (ADAMS Accession No. ML103430502)). Instead, the analyses had been done by response spectrum analysis. Both the equivalent static method and the response spectrum method had previously been approved by the NRC for use in the AP1000 design for structural analyses as described in Revision 18 of the DCD. This issue was discussed in a May 17, 2011, public meeting (see meeting summary dated May 26, 2011 (ADAMS Accession No. ML111430775)). In response, Westinghouse performed the analysis with this method and presented the results in the revised shield building report and in DCD Revision 19 as follows. The use of the equivalent static method for the tank is discussed in Section 3.7 and Appendix 3G, and a table and figure were added to Appendix 3H. The revised shield building report included the results of the load combination for the containment cooling water storage tank using, the equivalent static analytical methods, which demonstrated that the design remained adequate when evaluated using the equivalent static analytical method. No change to the language of the AP1000 DCR in 10 CFR Part 52, Appendix D was made as a result of the DCD changes.

The staff does not believe these DCD changes require renoticing. Revision 18 of the DCD stated that the design would be verified through the use of the equivalent static method, and that method had been previously approved by the NRC for AP1000 analyses equivalent to that performed for the containment cooling water tank. No change to the actual design of the tank was needed and there was no change to the language of the AP1000 DCR.

The NRC also notes that one of the petitions (dated June 16, 2011), which the NRC is responding to in the comment response document (ADAMS Accession No. ML112212319), specifically raised this issue and the NRC has provided an answer similar to that described above.

Debris Limits

In its December 20, 2010, letter on long-term core cooling (ADAMS Accession No. ML103410348), the Advisory Committee on Reactor Safeguards (ACRS) concluded that the regulatory requirements for long-term core cooling for design-basis accidents have been adequately met, based on cleanliness requirements specified in the amendment. In particular, the amount of latent debris that might be present in the containment is an important parameter. The ACRS further stated that any future proposed relaxation of the cleanliness requirements will require substantial additional data and analysis. In their January 24, 2011, report on the Vogtle COL application (ADAMS Accession No. ML110170006), which references the AP1000 design, the ACRS recommended that the containment interior cleanliness limits on latent debris should be included in the Technical Specifications for the Vogtle plant.

In a letter dated February 23, 2011 (ADAMS Accession No. ML110590455), Westinghouse proposed DCD markups to designate information in Section 6.3 including debris sources such

as latent debris (and the amount of fiber) as Tier 2*. Revision 19 of the DCD included changes to mark selected information as Tier 2*.

The NRC made a conforming change to the final rule language to provide a new item as Section VIII.B.6(b)(7) entitled general screen design criteria for this new type of Tier 2* information. The NRC believes that inclusion of debris limits in the AP1000 DCD as Tier 2* information, rather than including such limits in each plant referencing the AP1000, represents a better regulatory approach for achieving the intent of the ACRS. Inclusion of debris limits in the AP1000 and its designation as Tier 2* would ensure that there is consistency across all referencing plants with repect to debris control, and ensures NRC regulatory control of any future relaxations of the limits, as discussed in the NRC staff's March 3, 2011, response to the ACRS (ADAMS Accession No. ML110350198).

The staff does not believe that this change to the DCD marking or to the final rule language requires renoticing because the ACRS letter, staff response, and Westinghouse letter were all publicly available during the comment period and the public had a fair opportunity to comment on this matter. In this regard, the staff notes that the April 6, 2011, "petition" (filed by John Runkle) that requested the NRC to suspend the AP1000 amendment rulemaking, included discussion about this topic with specific reference to the ACRS letter (ADAMS Accession No. ML11108A077). Numerous other comment submissions pointed to this petition as part of their comments. This lends support to the staff's view that the public had adequate notice and an opportunity to comment on this matter. In addition, the inclusion of debris limits as Tier 2* represents a new limitation, not present in the prior revisions of the AP1000 DCD, which will require a referencing COL holder to use debris limits as specified in the AP1000 DCD. Given that the designation of the debris limits as Tier 2* represents a new restriction agreed to by Westinghouse, a matter on which the NRC received public comment, the staff does not believe that an additional opportunity for public comment need be provided on the inclusion of debris limits in Revision 19 of the DCD and the designation of those limits as Tier 2*.

Heat Sinks and Containment Pressure Analysis

In its December 13, 2010, letter on the AP1000 design certification (ADAMS Accession No. ML103410351), the ACRS identified an error in the previously certified Revision 15 of the DCD, concerning the containment cooling analysis. The error affected the time at which steady-state film coverage is achieved on the exterior of the containment vessel. In a February 5, 2011, letter, the NRC staff agreed with the ACRS, and indicated that Westinghouse agreed that the error existed and should be corrected. The letter also indicated that the NRC staff would monitor Westinghouse's corrective actions and review any needed revisions to the DCD (ADAMS Accession No. ML103560411).

In the course of correcting the steady-state film coverage error, after the proposed rule was published, Westinghouse identified other errors and modeling updates in supporting analyses that affected the calculated post-accident peak containment pressure the highest peak pressure in the event of a large break loss-of-coolant accident). The net impact of correcting the steady-state film error and the subsequent Westinghouse identified errors and modeling updates was an increase in calculated peak containment pressure from 57.8 psig to 59.2 psig, which would have exceeded the 59 psig post-accident peak containment pressure acceptance criterion in the existing AP1000 DCR.

Therefore, as part of the revised analysis to account for all the identified errors, Westinghouse relied upon a limited number of existing structural elements (gratings) within the containment as heat sinks, in order to remain within the 59 psig post-accident containment pressure acceptance.

Westinghouse's revised analysis used the NRC-approved methodology in the existing AP1000 DCR containment pressure calculation, and the method for crediting heat sink capacity as described in Westinghouse documents WCAP-15846 (proprietary) and WCAP-15862 (non-proprietary) "WGOTHIC Application to AP600 and AP1000," Revision 1, March 2004, which are incorporated by reference in the previously certified Revision 15 of the DCD. In addition, the Westinghouse revised analysis used the NRC-approved 59 psig post-accident peak containment pressure acceptance criterion in the existing AP1000 DCD, Revision 15.

The staff safety evaluation of the Westinghouse revised analysis is included in Sections 23.X and 23.Y of the final safety evaluation report (ADAMS Accession No. ML112061231). Table 6.2.1.1-10 of Revision 19 of the DCD includes the credited elements. The ACRS reviewed the Westinghouse corrections, and agreed that Westighouse's revised analysis continues to demonstrate that the containment will be able to withstand the post-accident peak containment pressure (ADAMS Accession No. ML11256A180), and that the reevaluated pressure is based on a sufficiently conservative methodology. The final AP1000 rule language designates this "heat sink data for containment analysis" by adding it as a new Tier 2* item in Section VIII.B.6.b(8). The staff decided to control any future changes to the credited elements by designating the material as Tier 2* because the geometry and location of the heat sinks could impact their effectiveness.

The staff does not believe that the revisions to Table 6.2.1.1-10 of Revision 19 of the DCD require renoticing for several reasons. The gratings to be credited as heat sinks were already part of the approved AP1000 design and were not part of the proposed amendment to the AP1000 DCR described design. Thus, the actual DCD did not involve the addition of any new design elements. The use of heat sinks as part of the containment pressure calculation, and the method for crediting heat sink capacity were described in the DCD Revision 15. The criterion for evaluating the acceptability of the change continues to be the calculated post-accident peak containment pressure of 59 psig. Therefore, the revised Westinghouse analysis did not involve the use of any previously unapproved design methodologies or acceptance criteria; the methodology used and the acceptance criterion (59 psig post-accident peak containment pressure) is in the already-approved AP1000 DCR. Finally, crediting of the gratings as heat sinks in the revised analysis did not introduce any new safety issues not previously addressed. Therefore, the staff does not believe that opportunity for public comment need be provided on the Westinghouse revised analysis. The NRC does not believe that the designation of the heat sink as Tier 2* requires renoticing. As discussed above, the Tier 2* change is a direct result of the Westinghouse revised analysis, which does not warrant an additional opportunity for public comment. The designation of this information as Tier 2* adds a new limitation, not present in the prior revisions of the AP1000 DCD, which limits a referencing COL applicant/holder to alter the heat sink information for the grating and all other heat sinks credited in the containment peak pressure analysis. Given that the designation of the heat sink information as Tier 2* represents a new restriction agreed to by Westinghouse, the staff does not believe that opportunity for public comment need be provided on the Westinghouse revised analysis.