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Your ref: Project Number 740
Our ref: DCP/NRC1761

July 7, 2006

Subject: AP1000 COL Standard Approach for Reactor Design

In support of Combined License application pre-application activities Westinghouse is submitting AP1000 Standard Combined License Technical Reports addressing COL Information Items and a limited number of design changes impacting the Design Certification Document. These technical report submittals are intended to be incorporated into COL applications referencing the AP1000 Certified Design or incorporated into the design certification using supplemental rulemaking if 10 CFR 52 is revised to permit such changes.

The attachment to this letter provides a description of the approach, plan and technical report content that will be used by Westinghouse and NuStart to complete COL Information Items 4.2-1, 4.3-1, 4.4-1 and 4.4-2, and to identify design and DCD changes related to core design and fuel. The information in the attachment is provided to facilitate NRC understanding of the approach, and to allow planning and scheduling of resources to support NRC review of the technical report and associated design changes. The initial technical report (Technical Report Number 18) is scheduled for October 2006, as indicated in the May 26, 2006 NuStart letter.

This plan and the resulting technical report are generic and are expected to apply to all COL applications referencing the AP1000 Design Certification. This information is submitted as part of the NuStart Bellefonte COL Project (NRC Project 740).

The purpose for submittal of the attached plan and the subsequent technical report was explained in a March 8, 2006 letter from NuStart to the NRC.

Westinghouse is hereby requesting staff interaction to discuss the approach outlined in the attachment. The benefit of early interaction will result in clear understanding regarding the approach and the expected content of Technical Report 18.

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Please address any questions or requests for additional information related to the plan and schedule outlined in the attachment should be directed to Westinghouse. Please send copies of such questions or requests for additional information to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

D. F. Hutchings for

A. Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Attachment

1. "Planned Approach to Complete COL Information Items for AP1000 DCD Chapter 4, "Reactor"

cc:	S. Bloom	- U.S. NRC	1E	1A
	S. Coffin	- U.S. NRC	1E	1A
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DCP/NRC1761
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ATTACHMENT 1

**“Planned Approach to Complete COL Information Items
for AP1000 DCD Chapter 4, “Reactor””**

ATTACHMENT 1

Planned Approach to Complete AP1000 COL Information Items for Chapter 4 - "Reactor"

Purpose

The following provides information on the planned approach for closing out the COL information items in Chapter 4 of the AP1000 Design Control Document (DCD) Rev 15. It is also provided to facilitate the NRC's planning and scheduling of resources to support the review of Westinghouse's response to DCD COL Information Items for Chapter 4 - "Reactor" which will be included in a fuel technical report. The fuel technical report once reviewed and approved by the NRC will close the COL Information Items for Chapter 4.

Westinghouse is working with the NuStart Core & Fuel Design Review Committee (CFDC) to standardize the fuel technical report so that it can be utilized by members of an AP1000 design centered working group to achieve the "one issue-one review-one position" efficiency envisioned by both the NRC and the industry

Westinghouse will submit the fuel technical report covering closure of Chapter 4 COL information items in October of 2006.

COL Information Items 4.2-1, 4.3-1, and 4.4-1

Information item:

Combined License applicants referencing the AP1000 certified design will address changes to the reference design of the fuel, burnable absorber rods, rod cluster control assemblies, or initial core design from that presented in the DCD. (DCD Subsections 4.2.5, 4.3.4, 4.4.7) (FSER Action Item 4.2.8-1)

Planned COL information item closure:

The fuel technical report will include DCD markups to reflect the DCD core as a "reference (typical)" core. In identifying the core design as "reference" or "typical" the report will identify Tier 2* information to be designated Tier 2. The report will also describe necessary design changes to fuel and core components and make other miscellaneous core related DCD corrections. The following information is provided to clarify the intended changes.

AP1000 Baseline Fuel Design

The information provided in Chapter 4 of Revision 15 of the AP1000 Design Control Document (DCD) is based on the Westinghouse fuel and core design at the time it was written (prior to Sept, 04 and in some cases prior to 2000), and provides the baseline fuel design and safety analysis input for use in the U.S.NRC-approved process described in WCAP-9272, "Westinghouse Reload Safety Evaluation Methodology," and WCAP-12488-A, "Fuel Criteria Evaluation Process."

Fuel and core designs, and associated methodologies, are revised over time as new information, materials and analysis techniques become available to enhance fuel performance and safety. It should be recognized that the information in Chapter 4 is subject to change as newer fuel and core designs are implemented to take advantage of these improvements.

In fact, fuel and core designs described in Reference Safety Analysis Reports (RESARs) and plant-specific Final Safety Analysis Reports (FSARs) for operating plants typically change from the time of application until NRC approval; and could continue to change as the plant is operated and matures. The AP1000 DCD Chapter 4 information is expected to conform to this precedent.

The DCD mark-ups in the technical report will reflect that the values provided are for a “typical” or “reference” first core design that demonstrates the ability of the NRC-approved Westinghouse methodologies to accurately predict core performance with an NRC approved fuel design for the AP1000.

Core Design and Fuel Management

The specifics of the core design – including the number of fresh assemblies, enrichments, burnable absorber requirements, and loading pattern – are determined by the combination of the specific cycle core design requirements. These requirements include the current cycle energy output, target equilibrium cycle energy output and discharge burnup, reference safety analysis input requirements, and excess thermal margin requirements. Specific utility fuel management goals may vary while maintaining the applicability of the generic AP1000 safety analysis and core design limits.

An acceptable core design is achieved using the process described in “Westinghouse Reload Safety Evaluation Methodology,” WCAP-9272-P-A. The reference safety analysis inputs for the AP1000 Chapter 15 evaluations have been generated using insights developed by evaluating potential first and reload core designs and establishing bounding parameters based on these evaluations. Core design and fuel management will follow the NRC approved reload methodology. The fuel design, regulatory limits and generic fuel management approach will be prepared with flexibility to accommodate variance in fuel management goals within the established Chapter 15 safety limits.

The fuel rod, fuel assembly, and thermal hydraulic design described in DCD Chapter 4 are classified as Tier 2 information. The first core loading pattern, fuel enrichments, and associated neutronic parameters are designated as Tier 2* (see AP1000 DCD Tables 4.3-1, 4.3-2, and 4.3-3). This information will be re-designated as Tier 2 with a commitment to use NRC approved methods and fuel and core component designs. These changes will more accurately reflect the fact that the DCD core design is a “reference” core and permit parameters to vary within the allowed NRC approved analytical methodology. The clarifications and revisions to Chapter 4 will provide flexibility in both fuel and core design to incorporate operating experience and performance enhancements developed, between the time of COL licensing and initial operations, while maintaining the use of NRC approved fuel and methodologies.

Fuel and Component Design Changes

Changes to the fuel design and components have been developed since the time the fuel design description for the AP1000 DCD, Chapter 4, Rev. 15 was completed. The fuel technical report will describe and provide DCD text revisions to address these changes.

The following changes and clarifications are required to address the use of "Gray Rods" in the AP1000 design:

- Revise the description and associated tables and figures in Chapter 4 to reflect the design change of the gray rod assemblies from an alloy of silver-indium-cadmium (Ag-In-Cd) to pure silver (Ag).
- Ability to interchange fully inserted Gray rods with partially inserted gray rods at full power to avoid burnup shadowing.
- The need to use shutdown control rod bank(s) when activating the Rapid Power Reduction System (RPRS).
- Modifications to the Technical Specifications allowing the use of the full thermal margin and reactivity monitoring capability of the BEACON-DMM core monitoring system while operating under the MSHIM power control system with the RPRS enabled.

Miscellaneous Corrections

Other miscellaneous corrections to Chapter 4 fuel and core components, and core design are needed. These changes and clarifications, will not affect the input or conclusions of the plant safety analysis as described in Chapter 15 of the DCD or the PRA. Examples of necessary changes include:

1. Clarification of Mechanical SHIM power control system (MSHIM)
2. Clarification on the use of Zirconium Diboride IFBA - The current AP1000 DCD incorrectly states that the coating on the integral fuel burnable absorber (IFBA) is a boride coating. Specifically, this boride coating is zirconium diboride.
3. Drawings and figures are updated to represent more current designs.
4. Clarification on the first core discrete burnable absorber design; designation is not consistent between sections (pyrex and WABA absorber materials).
5. Changes or additional descriptions of fuel and core components, such as flow restriction devices (thimble plugs) or fuel assembly nozzles.

COL Information Item 4.4-2

Information item:

Following selection of the actual plant operating instrumentation and calculation of the instrumentation uncertainties of the operating plant parameters as discussed in subsection 7.1.6, Combined License applicants will calculate the design limit DNBR values using the RTDP with these instrumentation uncertainties and confirm that either the design limit DNBR values as described in Section 4.4, "Thermal and Hydraulic Design," remain valid, or that the safety analysis minimum DNBR bounds the new design limit DNBR values plus DNBR penalties, such as rod bow penalty. (DCD section 4.4.7 FSER Action Item 4.4-1 Items)

Plan to address information item:

The as-built aspect of this COL information item will require a change to the text in the DCD to defer completion until after COL application by the COL holder. DCD text changes will be addressed in the topical report for closure of the fuel COL information items in a manner similar to the report addressing other information items in "AP1000 As-Built COL Information Items", APP-GW-GLR-021.

Conclusion/Summary

It is Westinghouse's intention, working with our NuStart utility partners, to use the best available fuel approved for use in the AP1000. Westinghouse revises fuel and core designs, and associated methodologies, over time as new information, materials and analysis techniques become available to enhance fuel performance and reliability. Specific parameter information in Chapter 4 may be subject to change as newer fuel and core designs are implemented to take advantage of these improvements.

The proposed clarification and revision to Chapter 4 will provide flexibility in both fuel and core design to incorporate operating experience and performance enhancements developed, between the time of COL licensing and initial operations, while maintaining the use of NRC approved fuel and methodologies.