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Your ref: Project Number 740
Our ref: DCP/NRC1876

May 9, 2007

Subject: AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-055, Revision 0

In support of Combined License application pre-application activities, Westinghouse is submitting Revision 0 of AP1000 Standard Combined License Technical Report Number 11h. This report completes and documents, on a generic basis, activities required for partial closure of COL Information Item 3.9-2 in the AP1000 Design Control Document. Changes to the Design Control Document identified in Technical Report Number 11h are intended to be incorporated into FSARs referencing the AP1000 design certification or incorporated into the design certification when Part 52 is revised to permit amendment of the design certification. This report is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in this report is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

The purpose for submittal of this report was explained in a March 8, 2006 letter from NuStart to the U.S. Nuclear Regulatory Commission.

Pursuant to 10 CFR 50.30(b), APP-GW-GLR-055, Revision 0, "Reactor Vessel Design Specification and Design Report Summary," Technical Report Number 11h, is submitted as Enclosure 1 under the attached Oath of Affirmation.

It is expected that when the NRC review of Technical Report Number 11h is complete, COL Information Item 3.9-2 will be considered partially complete for COL applicants referencing the AP1000 Design Certification. The enclosed technical report is one of several reports that include modifications to COL Information Items 3.9-2. These reports include some that have been sent and a few that are scheduled to be sent. Attachment 2 provides a tabulation of the reports that impact the information item write-up and the report references. When the NRC review and audit of these reports and supporting analyses are complete, Westinghouse accepts that the activities required by the COL item, except for the as-built reconciliation, will be considered complete. Westinghouse will have the technical information supporting technical report 11h available for audit after June 15, 2007.

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Questions or requests for additional information related to the content and preparation of this report should be directed to Westinghouse. Please send copies of such questions or requests 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.

Westinghouse requests the NRC to provide a schedule for review of this Technical Report within two weeks of its submittal.

Very truly yours,

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

/Attachments

1. "Oath of Affirmation," dated May 9, 2007
2. Reports That Impact the COL Information Item 3.9-2 Write-Up

/Enclosure

1. APP-GW-GLR-055, Revision 0, "Reactor Vessel Design Specification and Design Report Summary," Technical Report Number 11h, dated April 2007.

cc:	S. Bloom	-	U.S. NRC	1E	1A
	S. Coffin	-	U.S. NRC	1E	1A
	G. Curtis	-	TVA	1E	1A
	P. Grendys	-	Westinghouse	1E	1A
	P. Hastings	-	Duke Power	1E	1A
	C. Ionescu	-	Progress Energy	1E	1A
	D. Lindgren	-	Westinghouse	1E	1A
	A. Monroe	-	SCANA	1E	1A
	M. Moran	-	Florida Power & Light	1E	1A
	C. Pierce	-	Southern Company	1E	1A
	E. Schmiech	-	Westinghouse	1E	1A
	G. Zinke	-	NuStart/Entergy	1E	1A

ATTACHMENT 1

"Oath of Affirmation"

ATTACHMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	)
NuStart Bellefonte COL Project	)
NRC Project Number 740	)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

W. E. Cummins, being duly sworn, states that he is Vice President, Regulatory Affairs & Standardization, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

W. E. Cummins
Vice President
Regulatory Affairs & Standardization

Subscribed and sworn to
before me this 9th day
of May 2007.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Debra McCarthy, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Aug. 31, 2009
Member, Pennsylvania Association of Notaries

Notary Public

ATTACHMENT 2

"Reports That Impact the COL Information Item 3.9-2 Write-Up"

Attachment 2
Reports That Impact the COL Information Item 3.9-2Write-Up

Document Number	DCD Reference Number	Report Title	TR #
APP-GW-GLR-013	32	Safety Class Piping Design Specifications and Design Reports Summary	13
APP-GW-GLR-021	33	AP1000 As-Built COL Information Items	6
APP-GW-GLR-035	21	Consistency of Reactor Vessel Core Support Materials Relative to Known Issues of Irradiation-Assisted Stress Corrosion Cracking or Void Swelling	12
APP-GW-GLR-048	23	Core Makeup Tank Design Specification and Design Report Summary	11a
APP-GW-GLR-049	22	Accumulator Design Specification and Design Report Summary	11b
APP-GW-GLR-050	27*	Reactor Internals Design Specification and Design Report Summary	11c
APP-GW-GLR-051	26	Pressurizer Design Specification and Design Reports Summary	11d
APP-GW-GLR-052	28	Reactor Coolant Pump Design Specification and Reports Summary	11e
APP-GW-GLR-053	29	Passive RHR Heat Exchanger Design Specification and Reports Summary	11f
APP-GW-GLR-054	25	In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary	11g
APP-GW-GLR-055	30	Reactor Vessel Design Specification and Design Report Summary	11h
APP-GW-GLR-056	31	Steam Generator Design Specification and Design Report Summary	11i
APP-GW-GLR-057	24	Control Rod Drive Mechanism Design Specification and Design Report Summary	11j

* Was identified as Reference 22 in Revision 0 of Report APP-GW-GLR-050

ENCLOSURE 1

APP-GW-GLR-055, Revision 0

Reactor Vessel Design Specification and Design Report Summary

Technical Report Number 11h

AP1000 DOCUMENT COVER SHEET

TDC: _____ Permanent File: _____ APY: _____

RFS#: _____ RFS ITEM #: _____

AP1000 DOCUMENT NO.	REVISION NO.		ASSIGNED TO
APP-GW-GLR-055	0	Page 1 of 6	W-Quinn

ALTERNATE DOCUMENT NUMBER: LTR-MRCDA-07-66 WORK BREAKDOWN #:

ORIGINATING ORGANIZATION: Westinghouse

TITLE: **Reactor Vessel Design Specification and Design Report Summary**

ATTACHMENTS:	DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION:
NONE	
CALCULATION/ANALYSIS REFERENCE: APP-MV01-Z0R-101	

ELECTRONIC FILENAME	ELECTRONIC FILE FORMAT	ELECTRONIC FILE DESCRIPTION
APP-GW-GLR-055.doc	MS Word	TEXT

☒ WESTINGHOUSE CLASS 3 (NON PROPRIETARY)

Class 3 Documents being transmitted to the NRC require the following two review signatures in lieu of a Form 36.

LEGAL REVIEW J. C. Spadacene J. C. VALENTINE	SIGNATURE/DATE J. C. Valentine 4/30/2007
PATENT REVIEW M. M. Corletti	SIGNATURE/DATE 4/30/07

☐ WESTINGHOUSE PROPRIETARY CLASS 2

ORIGINATOR S. L. Abbott	SIGNATURE/DATE S. L. Abbott 4-30-07	
REVIEWERS J. Fernandez	SIGNATURE/DATE J. J. Fernandez 4/30/07	
VERIFIER H. C. Jambusaria	SIGNATURE/DATE H. C. Jambusaria 4/30/07	VERIFICATION METHOD INDEPENDENT REVIEW
AP1000 RESPONSIBLE MANAGER K. Quinn	SIGNATURE* K. Quinn	APPROVAL DATE 4/30/2007

* Approval of the responsible manager signifies that document is complete, all required reviews are complete, electronic file is attached and document is released for use.

AP1000 Standard Combined License Technical Report

Reactor Vessel Design Specification and Design Report Summary

Revision 0

Westinghouse Electric Company LLC
Nuclear Power Plants
Post Office Box 355
Pittsburgh, PA 15230-0355

INTRODUCTION

This report provides partial closure of a Combined Operating License (COL) information item by completing the reactor vessel design specification and design report and making them available for audit.

The completion of the reactor vessel design specification and design report for audit is identified as COL information Item 3.9-2 in AP1000 Design Control Document (DCD) Subsection 3.9.8.2 to be completed by the Combined license applicant.

The COL item from the DCD reads:

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

Because there are several ASME Section III components, the design specifications and design reports are being made available for audit as they are completed for each individual component. This will facilitate the review process.

With the completion of the design specification (APP-MV01-Z0-101) and the design report (APP-MV01-Z0R-101), as outlined in this report, the United States Nuclear Regulatory Commission (NRC) should consider the COL item to make the design specifications and design reports for ASME Section III components available for audit to be closed relative to the reactor vessel.

TECHNICAL BACKGROUND

The reactor vessel (RV) is a safety-related component in the reactor system (RXS) that provides a high integrity pressure boundary to contain the reactor coolant, reactor core, and fuel fission products. The RV is also the central component in the reactor coolant system (RCS), and in conjunction with the reactor internals, it directs reactor coolant flow though core. The RV consists of a lower vessel body, which contains and supports the core and core support structure, and a closure head, which completes the pressure boundary above the core.

The closure head is bolted onto the lower vessel with forty-five (45) stud bolts that are designed to maintain the pressure boundary. Reactor vessel closure gaskets provide for zero leakage through the closure. The closure head can be unbolted and removed from the lower vessel to provide access to the reactor internals and the fuel assemblies.

The closure head provides sixty-nine (69) penetrations for control rod drive mechanisms (CRDMs) and forty-two (42) smaller penetrations for in-core instrumentation (ICI). An additional penetration is provided as a nozzle for the head vent system. The CRDMs, instrumentation tubing and head vent piping are all supported by the closure head along with the integrated head package (IHP).

During normal operation, reactor coolant enters the reactor vessel from the reactor coolant cold leg piping through four (4) inlet nozzles in the vessel shell above the core. The reactor coolant is directed down the downcomer annulus between the reactor internals core barrel and the vessel wall. The reactor coolant flow then turns in the lower head of the reactor vessel and is directed upward through the core, where it is heated to the core/vessel outlet temperature. The heated reactor coolant then flows out of the RV through two (2) outlet nozzles into the reactor coolant hot leg piping. The outlet nozzles are also located above the reactor core.

The reactor vessel, in conjunction with the reactor internals, also ensures that the reactor core remains in a coolable configuration. During faulted conditions, borated water is injected into the vessel through two (2) direct vessel injection (DVI) nozzles above the core. The borated water floods the vessel above the core and cools down the core.

The design requirements for the reactor vessel are contained in the design specification. The design pressure and design temperature for the reactor vessel are 2500 psia and 650°F, respectively.

The reactor vessel is an AP1000 Equipment Class A component which is designed to meet seismic Category I requirements and analyzed to meet the applicable criteria of the ASME Boiler and Pressure Vessel Code Section III, 1998 Edition with 2000 Addenda, except the 1989 Edition with the 1989 Addenda is used for Section III, NB-3200 and NB-3600. The criteria of Subsection NB are used for the reactor vessel pressure boundary verification and Subsection NF criteria are used for verification of the IHP supports.

Detailed stress analyses were completed for the closure head including stud bolts, CRDM penetrations, ICI and head vent penetrations, IHP supports and lifting lugs. Stress analyses have also been completed for the reactor vessel shell, inlet nozzles, outlet nozzles, DVI nozzles, core support blocks and flow skirt support lugs. The results of the analyses show compliance with the structural requirements of the design specification and the allowable stress intensities as given in the appropriate ASME Code subsection. The analytical work documented in the design report is sufficient to conclude that the final margins of safety comply with the applicable requirements of Section III of the ASME Boiler and Pressure Vessel Code, as well as the additional structural requirements of the design specification. Fracture evaluations in accordance with Appendix G of Section III have been performed for the ferritic pressure boundary parts of the reactor vessel, and these evaluations are also included in the design report.

The ASME Code design report will be made available to the NRC for audit as required by Tier 1 Inspections, Tests, Analyses, and Acceptance Criteria 2a in Table 2.2.3-4, after the fabrication of the reactor vessel is completed and the as-built dimensions are reconciled.

REGULATORY IMPACT

The completion of the ASME Section III component design specifications and design reports for audit is discussed in Subsection 3.9 of the NRC Final Safety Evaluation Report (FSER) for the AP1000. Making the reactor vessel design specification and design report available for audit is part of COL Action Item 3.9.2.4-1 as identified in the FSER. The completion of the reactor vessel design specification and design report for audit does not alter the conclusions in the FSER.

DCD MARK-UP

As a result of the completion of the reactor vessel design specification and design report for audit, the text in the DCD Tier 2, Subsection 3.9.8.2 is modified and Reference 30 is added to DCD Section 3.9.9. See below for changes to these two subsections.

3.9.8.2 Design Specifications and Reports

The Combined License information requested in this subsection has been addressed in several technical reports, and the applicable changes are incorporated into the DCD. No additional work is required by the Combined Operating License Applicant to address the aspects of the Combined License information requested in this subsection as delineated in the two following paragraphs:

The design specification and design report for ASME Section III components and piping are available for NRC audit via the reports listed in Table 3.9-19.

The consistency of the reactor vessel core support materials relative to known issues of irradiation-assisted stress corrosion cracking or void swelling has been evaluated and addressed in APP-GW-GLR-035, (Reference 21).

COL Holder Activities

After a Combined License is issued, the following information must be provided by the COL Holder:

Reconciliation of the as-built piping (verification of the thermal cycling and stratification loadings are considered in the stress analysis discussed in Subsection 3.9.3.1.2) are completed by the COL Holder after the construction of the piping systems and prior to fuel load (Reference 33).

The following words represent the original Combined Operating License Information Item commitment, which has been addressed as discussed above.

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

3.9.9 References

21. APP-GW-GLR-035, "Consistency of Reactor Vessel Core Support Materials Relative to Known Issues of Irradiation-Assisted Stress Corrosion Cracking (IASCC) and Void Swelling for the AP1000 Plant," Westinghouse Electric Company LLC, July 2006.
22. APP-GW-GLR-049, "Accumulator Design Specification and Design Report Summary," Westinghouse Electric Company LLC, October 2006.
23. APP-GW-GLR-048, "Core Makeup Tank Design Specification and Design Report Summary," Westinghouse Electric Company LLC, October 2006.
24. APP-GW-GLR-057, "Control Rod Drive Mechanism Design Specification and Design Report Summary," Westinghouse Electric Company LLC, February 2007.
25. APP-GW-GLR-054, "In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary," Westinghouse Electric Company LLC, March 2007.
26. APP-GW-GLR-051, "Pressurizer Design Specification and Design Reports Summary," Westinghouse Electric Company LLC, February 2007.
27. APP-GW-GLR-050, "Reactor Internals Design Specification and Design Reports Summary," Westinghouse Electric Company LLC, January 2007.
28. APP-GW-GLR-052, "Reactor Coolant Pump Design Specification and Reports Summary," Westinghouse Electric Company LLC, 2007.
29. APP-GW-GLR-053, "Passive RHR Heat Exchanger Design Specification and Reports Summary," Westinghouse Electric Company LLC, 2007.
30. APP-GW-GLR-055, "Reactor Vessel Design Specification and Design Report Summary," Westinghouse Electric Company LLC, 2007.
31. APP-GW-GLR-056, "Steam Generator Design Specification and Design Report Summary," Westinghouse Electric Company LLC, 2007.
32. APP-GW-GLR-013, "Safety Class Piping Design Specifications and Design Reports Summary," Westinghouse Electric Company LLC, February 2007
33. APP-GW-GLR-021, "AP1000 As-built COL Information Items," Westinghouse Electric Company LLC, June 2007.

Add Table 3.9-19 to the DCD as follows:

Table 3.9-19
Technical Reports Summarizing Design Specifications and Design Reports for ASME Section III Components and Piping

APP-GW-GLR-013, Reference 32	Safety Class Piping Design Specifications and Design Reports Summary
APP-GW-GLR-048, Reference 23	Core Makeup Tank Design Specification and Design Report Summary
APP-GW-GLR-049, Reference 22	Accumulator Design Specification and Design Report Summary
APP-GW-GLR-050, Reference 27	Reactor Internals Design Specification and Design Report Summary
APP-GW-GLR-051, Reference 26	Pressurizer Design Specification and Design Reports Summary
APP-GW-GLR-052, Reference 28	Reactor Coolant Pump Design Specification and Reports Summary
APP-GW-GLR-053, Reference 29	Passive RHR Heat Exchanger Design Specification and Reports Summary
APP-GW-GLR-054, Reference 25	In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary
APP-GW-GLR-055, Reference 30	Reactor Vessel Design Specification and Design Report Summary
APP-GW-GLR-056, Reference 31	Steam Generator Design Specification and Design Report Summary
APP-GW-GLR-057, Reference 24	Control Rod Drive Mechanism Design Specification and Design Report Summary