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Your ref: Project Number 740
Our ref: DCP/NRC1849

March 15, 2007

Subject: AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-054, Revision 0

In support of Combined License application pre-application activities, Westinghouse is submitting Revision 0 of AP1000 Standard Combined License Technical Report Number 11g. 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 11g 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-054, Revision 0, "In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary," Technical Report Number 11g, is submitted as Enclosure 1 under the attached Oath of Affirmation. The subject of this report was previously identified as the Integrated Head Package Design Summary. The title has been altered to reflect that the In-Core Instrumentation Guide Tube requires an ASME Design Report and the other portions of the Integrated Head Package do not.

It is expected that when the NRC review of Technical Report Number 11g 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. Attachment 2 also includes a consolidated revision of COL Information Item 3.9-2 (DCD Section 3.9.8.2). A list of report references to be added to the DCD is also included.

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.

Very truly yours,



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

/Attachment

1. "Oath of Affirmation," dated March 15, 2007
2. Reports That Impact the COL Information Item 3.9-2 Write-Up

/Enclosure

1. APP-GW-GLR-054, Revision 0, "In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary," Technical Report Number 11g, dated March 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)

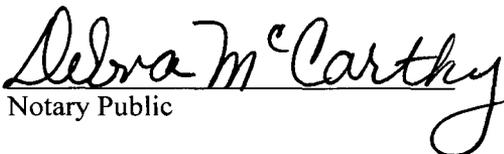
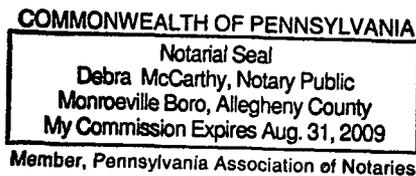
APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

B. W. Bevilacqua, being duly sworn, states that he is Vice President, New Plants Engineering, 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.



B. W. Bevilacqua
Vice President
New Plants Engineering

Subscribed and sworn to
before me this 15th day
of March 2007.



Debra McCarthy
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 3.9-2 Write-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 (IASCC) and Void Swelling for the AP1000 Plant	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 Report Summary	11d
APP-GW-GLR-052	28	Reactor Coolant Pump Design Specification and Design Report Summary	11e
APP-GW-GLR-053	29	Passive RHR Heat Exchanger Design Specification and Design Report 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

Revise DCD Subsection 3.9.8.2 as follows:

3.9.8.2 Design Specifications and Reports

Combined License applicants referencing the AP1000 design will have available for NRC audit the design specifications and design reports prepared for ASME Section III components. **The design specification and design report for ASME Section III components and piping are made available for NRC audit via the reports listed in Table 3.9-19. Combined License applicants will address** 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).** ~~(see subsection 4.5.2.1).~~ *[The design report for the ASME Class 1, 2, and 3 piping will include the reconciliation of the as-built piping as outlined in subsection 3.9.3. This reconciliation includes verification of the thermal cycling and stratification loadings considered in the stress analysis discussed in subsection 3.9.3.1.2.]**

The final design reports including the reconciliation of the as-built piping are completed by the COL holder after the construction of the piping systems and prior to fuel load (Reference 33).

Add Table 3.9-19 to the DCD as follows:

Table 3.9-19 Technical Reports Summarizing Design Specification and Design Reports for ASME Section III Components and Piping.	
<u>Document Number</u>	<u>Document Title</u>
APP-GW-GLR-013, Reference 32	Safety Class Piping Design Specifications and Design Reports Summary
APP-GW-GLR-035, Reference 21	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
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 Report Summary
APP-GW-GLR-052, Reference 28	Reactor Coolant Pump Design Specification and Design Report Summary
APP-GW-GLR-053, Reference 29	Passive RHR Heat Exchanger Design Specification and Design Report 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

Add the following references to DCD subsection 3.9.9

- 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.
22. APP-GW-GLR-050, "Reactor Internals Design Specification and Design Report Summary," Westinghouse Electric Company, LLC, January 2007.
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 Report Summary," Westinghouse Electric Company LLC, February 2007.
- 27 APP-GW-GLR-050, "Reactor Internals Design Specification and Design Report Summary," Westinghouse Electric Company LLC, January 2007.
- 28 APP-GW-GLR-052, "Reactor Coolant Pump Design Specification and Design Report Summary," Westinghouse Electric Company LLC, 2007.
- 29 APP-GW-GLR-053, "Passive RHR Heat Exchanger Design Specification and Design Report 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.

ENCLOSURE 1

APP-GW-GLR-054, Revision 0

In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary

Technical Report Number 11g

AP1000 DOCUMENT COVER SHEET

TDC: _____ Permanent File: _____ APY _____
 RFS#: _____ RFS ITEM #: _____

AP1000 DOCUMENT NO. APP-GW-GLR-054	REVISION NO. 0	Page 1 of 5	ASSIGNED TO W-Quinn
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ALTERNATE DOCUMENT NUMBER: TR 11g

WORK BREAKDOWN #:

ORIGINATING ORGANIZATION: Westinghouse

TITLE: **In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary**

ATTACHMENTS: NONE		DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION: APP-GW-GEE-0130 Rev. 1	
CALCULATION/ANALYSIS REFERENCE: APP-JT90-S3C-002 Rev. 0, APP-MV11-S3R-030 Rev. 0			
ELECTRONIC FILENAME APP-GW-GLR-054.doc	ELECTRONIC FILE FORMAT MS Word	ELECTRONIC FILE DESCRIPTION TEXT	

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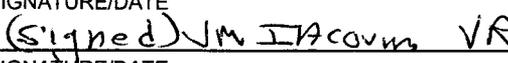
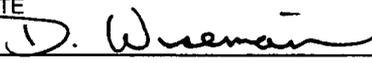
WESTINGHOUSE CLASS 3 (NON PROPRIETARY)

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

LEGAL REVIEW Tom White Eric S. Gillen	SIGNATURE/DATE  3-13-07
PATENT REVIEW Mike Corletti	SIGNATURE/DATE  3-12-07

WESTINGHOUSE PROPRIETARY CLASS 2

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ORIGINATOR John Iacovino	SIGNATURE/DATE (Signed)  VR 3-9-07	
REVIEWERS D. Wiseman	SIGNATURE/DATE  3/12/07	
VERIFIER M. McCullough	SIGNATURE/DATE  3/12/07	VERIFICATION METHOD Page by Page
AP1000 RESPONSIBLE MANAGER K. Quinn	SIGNATURE* 	APPROVAL DATE 3/12/07

* 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

In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary

Revision 0

Westinghouse Electric Company LLC
Nuclear Power Plants
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INTRODUCTION

This report provides partial closure of a Combined Operating License (COL) information item by completing the in-core instrumentation guide tube design requirements and design report, and making them available for audit.

The completion of the in-core instrument guide tube design requirements 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 American Society of Mechanical Engineers (ASME) Section III components, the design specifications and design reports are being made available for audit as each individual component is completed. This will facilitate the review process.

With the completion of the “AP1000 Reactor Vessel Design Specification” (Reference 1), which contains the in-core instrument guide tube design requirements, and the “In-Core Instrumentation Guide Tube Design Report” (Reference 2), 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 in-core instrumentation guide tube.

TECHNICAL BACKGROUND

The in-core instrumentation guide tubes provide the guide path for the in-core instrumentation thimble tube assemblies outside the reactor vessel head so they can be properly inserted through the reactor vessel internals into the reactor core. The in-core instrumentation thimble tube assembly, part of the in-core instrumentation system, contains sensors to measure temperature and nuclear characteristics of the core during operation. There are 42 in-core instrumentation thimble tube assembly appurtenances on the reactor vessel head. Figure 1 shows an in-core instrumentation guide tube on the reactor vessel head along with a control rod drive mechanism (69 total) and the one reactor vessel head vent. An in-core instrumentation guide tube is fabricated from 1-inch Alloy 690 XXS pipe. The in-core instrumentation guide tube is attached at the reactor vessel head with a J-groove weld and at the top with a butt weld connection to a SwagelokTM pressure fitting on the in-core instrumentation thimble tube assembly header.

The design requirements for the in-core instrumentation guide tube are contained in the design specification (Reference 1). The design pressure and temperature for the in-core instrumentation guide tube are 2500 psia and 650 °F, respectively.

The in-core instrumentation guide tube 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. The in-core instrumentation guide tube is considered a Class 1 appurtenance and is governed by the general requirements contained in Section III, Subsection NB of the ASME Code as directed by Paragraph NCA-2131.

A detailed stress analysis was completed for the in-core instrumentation guide tube. The result of the analysis shows compliance with the structural requirements of the design specification and the allowable stresses 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 will comply with the applicable requirements of the ASME Code, as well as the additional structural requirements of the design specification. A separate stress analysis will be performed by the equipment vendor, the Swagelok Company, for the pressure fitting at the top of the in-core instrumentation guide tube.

The final, complete ASME Code stress report will be made available to the NRC for audit as required by DCD Tier 1 Inspections, Tests, Analyses, and Acceptance Criteria 2a in Table 2.2.1-3, after the fabrication of the in-core instrumentation guide tube is completed.

REGULATORY IMPACT

The completion of ASME Section III component design specifications and design reports for audit is discussed in Section 3.9 of the NRC Final Safety Evaluation Report (FSER) for the AP1000. Making the in-core instrumentation guide tube design requirements 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 in-core instrumentation guide tube design information and design report for audit does not alter the conclusions in the FSER.

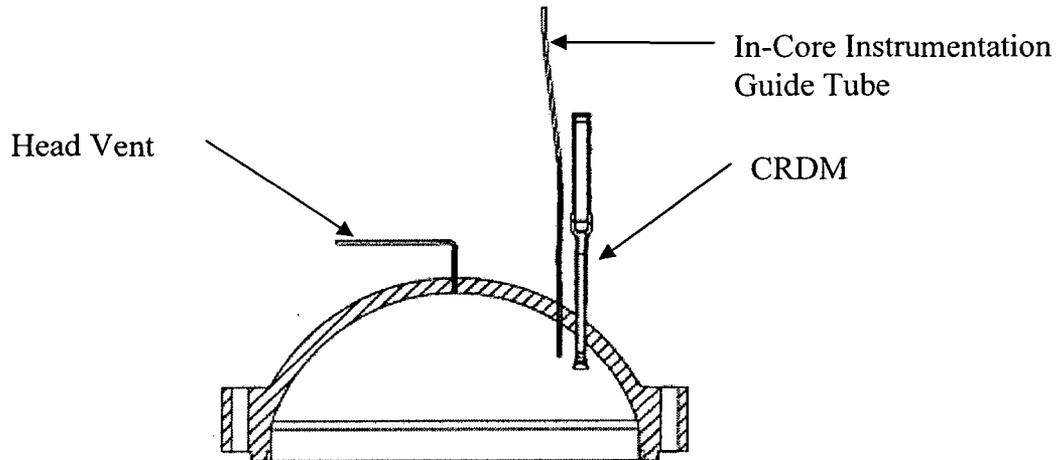


Figure 1. Schematic Cross-Section of Reactor Vessel Head Showing Head Vent, Control Rod Drive Mechanism (CRDM), and In-Core Instrumentation Guide Tube

REFERENCES

1. APP-MV01-Z0-101, Revision 0, "AP1000 Reactor Vessel (RV) Design Specification."
2. APP-MV11-S3R-030, Revision 0, "In-Core Instrumentation Guide Tube Design Report."

DCD MARKUP

Because of the completion of the in-core instrumentation guide tube design requirements and design report for audit, the text in DCD Tier 2, subsection 3.9.8.2 is modified and Reference 25 is added to DCD Section 3.9.9. See below for changes to these two sections.

3.9.8.2 Design Specifications and Reports

Combined License applicants referencing the AP1000 design will have available for NRC audit the design specifications and design reports prepared for ASME Section III components. **The design specifications and design reports for ASME Section III components are made available for NRC audit via the reports listed in Table 3.9-19.** 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

25. APP-GW-GLR-054, "In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary," Westinghouse Electric Company, LLC, March 2007.

Table 3.9-19

Add Table 3.9-19 as shown below:

Table 3.9-19	
TECHNICAL REPORTS SUMMARIZING DESIGN SPECIFICATIONS AND DESIGN REPORTS FOR ASME SECTION III COMPONENTS	
Document Number	Document Title
APP-GW-GLR-050	Reactor Vessel Internals Design Specification and Design Report Summary
APP-GW-GLR-049	Accumulator Design Specification and Design Report Summary
APP-GW-GLR-048	Core Makeup Tank Design Specification and Design Report Summary
APP-GW-GLR-057	Control Rod Drive Mechanism Design Specification and Design Report Summary
APP-GW-GLR-054	In-Core Instrumentation Guide Tube Design Requirements and Design Report Summary