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Attachments 1, 2, 5 and 6 are to be withheld from public disclosure under 10 CFR § 2.390.
When separated from these attachments, this letter is decontrolled.



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

April 15, 2011

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

10 CFR 50.4

**Subject: WATTS BAR NUCLEAR PLANT (WBN) UNIT 2 – INSTRUMENTATION AND
CONTROLS STAFF INFORMATION REQUESTS**

Reference: 1. Licensee Open Items to be Resolved for SER Approval List

The purpose of this letter is to provide TVA's responses to NRC's information requests on the "Licensee Open Items to be Resolved for SER Approval List." Enclosure 1 to this letter provides TVA's responses to the information requested by NRC.

Enclosure 2 contains the supporting documents for TVA's responses to NRC's requests/questions provided in Enclosure 1. Enclosure 3 contains a list of references on which TVA's responses are based. Enclosure 4 provides a list of the new regulatory commitments contained in this letter.

Attachments 1 and 2 contain information proprietary to General Atomics-Electronic Systems Inc. (GA-ESI). TVA requests that the GA-ESI proprietary information be withheld from public disclosure in accordance with 10 CFR § 2.390. Attachments 5 and 6 contain information proprietary to Westinghouse Electric Company LLC (WEC). TVA requests that the WEC proprietary information be withheld from public disclosure in accordance with 10 CFR § 2.390.

If you have any questions, please contact William Crouch at (423) 365-2004.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of April, 2011.

Respectfully,

A handwritten signature in blue ink, appearing to read 'D Stinson', with a stylized flourish at the end.

David Stinson
Watts Bar Unit 2 Vice President

Enclosures:

1. Responses to Licensee Open Items To Be Resolved For SER Approval
2. List of Attachments
3. List of References
4. List of New Commitments

cc (Enclosures):

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U.S. Nuclear Regulatory Commission

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For some NRC requests for additional information (RAIs), this letter provides TVA's initial response. For the other NRC RAIs in this letter, a response has been provided in previous TVA letters to the NRC, and the NRC has subsequently requested additional information. For these requests, the initial TVA response is not repeated below. The additional NRC information requests are identified in this letter as "**Follow-up NRC Requests.**" TVA responses to these items are identified as "**TVA Response to Follow-up NRC Request.**"

The following acronyms/abbreviations are used in this letter:

¹ BEACON™	Best Estimate Analyzer for Core Operations Nuclear
CCF	Common Cause Failure
CERPI	Computer Enhanced Rod Position Indication
CET	Core Exit Thermocouple
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CGI	Commercial Grade Item
EDCR	Engineering Document Construction Release
EMC	Electromagnetic Compatibility
EMI	Electro-Magnetic Interference
² EPRI®	Electric Power Research Institute®
FID	Fixed In-core Detector
FMEA	Failure Modes and Effects Analysis
GA-ESI	General Atomics-Electronic Systems Inc.
³ I/A®	Intelligent Automation
I/F	Current to Frequency Converter
IIS	In-core Instrument System
IITA	In-core Instrument Thimble Assembly
MIDS	Movable In-core Detector System
NIM	Nuclear Instrument Module
NRC	Nuclear Regulatory Commission
OBE	Operating Bases Earthquake
OI	Open Item (from NRC I&C Open Item Matrix)
PAMS	Post Accident Monitoring System
PWR	Pressurized Water Reactor
RFI	Radio Frequency Interference
RRS	Required Response Spectra
SE	Safety Evaluation
SER	Safety Evaluation Report
SRP	Standard Review Plan (NUREG-0800)
SSE	Safe Shutdown Earthquake
TRS	Tested Response Spectra
TVA	Tennessee Valley Authority
WBN	Watts Bar Nuclear Plant
WEC	Westinghouse Electric Company LLC
⁴ WINCISE™	Westinghouse In-Core Information Surveillance and Engineering

¹ BEACON is a registered trademark of the Westinghouse Electric Company LLC

² EPRI and Electric Power Research Institute are registered service marks of the Electric Power Research Institute Inc.

³ I/A is a registered trademark of Invensys plc

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1. NRC Request (Item Number 340)

Provide test result curves for all EMI/RFI tests listed in Table 3.2.3 (page 3-8) of the Qualification Test Report 04508905-QR. In addition, please provide the standards or the guidance documents used as the source for ENV 50140, ENV 55011 Class A, and EN 55022 Class B.

Follow-up NRC Request

No EMI/RFI curves have been provided as yet. TVA to provide representative curves.

TVA Response to Follow-up NRC Request:

GA-ESI qualification report 04038903-7SP, "Qualification Basis for 04034101 (2-RE-90-271, 272, 273 & 274)" Revision C dated February 22, 2011 (Proprietary), submitted in TVA to NRC letter dated February 25, 2011 (Reference 2), section 5.1 states:

"GA-ESI has performed the tests on a 2 channel RM-1000 radiation monitoring system the configuration of which is shown in GA-ESI drawing 04509000 *System Installation Configuration, RFI/EMI Test, RM-1000* the results of which are issued in GA-ESI report 04038800, *RM-1000 EMC Test Report, TVA* and 04509050, *RM-1000 EMC Test Report*. The equipment tested used an RM-1000 microprocessor radiation monitor Display/Control NIM Bin Assembly, an I-F Converter, line filter, and an RD-23 detector. The monitor system being qualified is the same as the monitor system tested and includes ECO-17656 modifications to ensure EMC compliance."

Attachment 1 contains the TVA "Browns Ferry High Range Radiation Monitor," which contains the requested EMI test curves. We have confirmed that the proprietary GA-ESI reports (04509050, "RM-1000 EMC Test Report," dated April 22, 2003, and 04038800, "RM-1000 EMC Test Report," dated November 11, 1999) included in the TVA report are applicable to the WBN Unit 2 RM-1000 monitors. The non-proprietary versions and affidavit for withholding of GA-ESI reports (04509050 and 04038800) will be submitted within two weeks of receipt from GA-ESI.

GA-ESI Qualification Report 04038903-7SP, section 5, provides a detailed discussion of the test results in GA-ESI report 04509050.

2. NRC Request (Item Number 346)

TVA has previously stated in response to open item 319 that RM-1000 System Verification Test Results report, 04507007-1TR is not applicable to WBN-2. However, TVA has not provided a WBN-2 specific test results report. Please identify and provide the appropriate test results reports to complete the review.

⁴ WINCISE is a registered trademark of the Westinghouse Electric Company LLC

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Follow-up NRC Request

TVA to re-evaluate previous responses to OI-316 and OI-319 which have conflicting responses regarding the applicability of 04507007-1TR.

TVA Response to Follow up NRC Request:

Report 04507007-1TR, "RM-1000 System Verification Test Results," is applicable to the WBN Unit 2 monitors. The applicability is that 04507007-1TR includes all test cases called out in the 04507006, "RM-1000 System Test Procedure Specification," and contains evidence that the verification and validation (V&V) tests were performed with Version 1.0 software code. The verification report for Version 1.1 software is document 04508005, "RM-1000 Software Version 1.1 Software Verification Report." Document 04508006, "RM-1000 Version 1.2 Software Verification and Validation Report," shows that the required test was completed to validated Version 1.2 code for the RM-1000.

TVA Engineering reviewed and approved proprietary versions of 04507007-1TR, 04508005, and 04508006, and these documents will be submitted within two weeks of receipt from GA-ESI. The unreviewed proprietary versions, non-proprietary versions, and affidavit for withholding were submitted in TVA to NRC letter July 15, 2010 (Reference 3).

3. NRC Request (Item Number 353)

Please provide a summary of the [manufacturer's] commercial dedication plan for radiation monitors with references to the guidance document that it follows. Also please include different facets (e.g. receiving, inspection, testing etc.) of the plan.

After additional discussion with the NRC, it was determined that the focus of this question is on dedication of CGI used in the digital safety-related RM-1000 radiation monitors. The specific requirement is contained in NUREG-0800, Section 7.0-A, Revision 5, which requires that the dedication meet the requirements of EPRI topical report TR-106439, "Guideline on Evaluation and Acceptance of Commercial Grade Digital Equipment for Nuclear Safety Applications," dated October 1996. The topical report requires that dedication of commercial grade items for digital safety systems utilize two or more of the methods described in EPRI guideline NP-5652, "Guideline for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications (NCIG-07)," dated June 1988.

TVA Response:

The GA-ESI commercial grade dedication (CGD) program is described in procedure (OP-7.3-240, "Safety-Related Commercial Grade Item Parts Acceptance," Revision H). The procedure addresses all aspects of CGD including receiving, inspection, testing, etc. Engineering review of the procedure found that it did not require multiple dedication methods for complex CGI or CGI used in digital safety systems. As a result, the GA-ESI program does not meet the requirements of NUREG-0800, Section 7.0-A, Revision 5. When queried about their process, GA-ESI stated that only Method 1 of EPRI guideline NP-5652 was used for dedication.

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Based on the results of the engineering procedure review and the results of the GA-ESI CGI discussions, Problem Evaluation Report 349088 was initiated to document the condition and to place the monitors in "Conditional Release" status.

GA-ESI has committed to the following plan of action to resolve the CGD issue:

1. GA-ESI shall revise its CGD procedure (OP-7.3-240) to require multiple dedication methods be utilized for complex CGIs and CGIs for digital safety class systems. The evidence that this has been completed will be provided to TVA by April 15, 2011.

Specifically, Method 1 and at least one additional method from the following list will be used to ensure that the CGD procedure complies with the current SRP:

Method 1 - Special Tests and Inspections
Method 2 - Commercial Grade Survey of Supplier
Method 3 - Source Verification
Method 4 - Acceptable Supplier/Item Performance Record

2. GA-ESI shall take actions consistent with the revised operating procedure to address the CGIs used in the WBN Unit 2 safety-related digital monitors. Evidence that those actions have been completed will be provided to TVA no later than September 1, 2011.

Based on the above action plan, TVA will resolve the issues with the GA-ESI CGD of CGI used in the WBN Unit 2 monitors and submit documentation of the resolution to the NRC by:

- GA-ESI procedure OP-7.3-240 revision: April 30, 2011
- Resolution of CGD of CGI used in WBN Unit 2 RM-1000 monitors: September 15, 2011

4. NRC Request (Item Number 355)

Staff has not found the stated exclusion zone for EMI/RFI interfering devices (e.g. hand-held radio devices) in the submitted documents. TVA to provide the distance for the exclusion zones if not provided already. If it is already submitted information then please point to the source of the information.

Follow-up NRC Request

The staff requires TVA to make a commitment to perform an EMI survey of the Containment High Range Radiation Monitors after they are installed and provide the results of the survey to the NRC.

TVA Response to Follow-up NRC Request:

TVA will perform an EMI survey of the containment high range radiation monitors after installation in WBN Unit 2 and submit the results to the NRC within two weeks of the survey being completed.

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5. NRC Request (Item Number 358)

The attachment numbers refer to your February 25, 2011 letter. [1.] In Attachment 2, "Wyle Test Report 41991 Safety Shutdown Earthquake (SSE) Test Response Spectra (TRS) Plots" all five (5) pages, [2.] in Attachment 5, "General Atomics Electronic Systems 04508905-1SP," page 5-5, Figure 5-2, and [3.] in Attachment 23, Qualification Test Report for RM-1000 Processor Module and Current-To-Frequency Converter (04508905-QR)," page 4-25, Figure 4-5 X-Axis SSE Test Response Spectra (TRS) versus Required Response Spectra (RRS), it shows that the TRS were below the RRS at various frequency (5% Damping). Please provide an explanation regarding why this is acceptable.

TVA Response to NRC Request:

An incomplete response was inadvertently submitted in TVA to NRC letter dated March 31, 2011 (Reference 1). The following response supersedes the previous response in its entirety.

1. *Attachment 2, "Wyle Test Report 41991 Safety Shutdown Earthquake (SSE) Test Response Spectra (TRS) Plots" all five (5) pages. These five Test Response Spectra (TRS) Plots versus Required Response Spectra (RRS) show that the TRS were below the RRS at various frequency (5% Damping). Please provide an explanation regarding why this is acceptable.*

Attachment 2 of this letter provides five pages from the first seismic test (Wyle Test report 41991) from GA-ESI report 04508903-1TR, submitted in response to OI-357 in TVA to NRC letter dated March 31, 2011 (Reference 1). The following discussion refers to these pages.

Wyle test report 41991 provided the seismic test results for two RM-1000 monitors (one area monitor and one process monitor) and one I/F converter. During the test, the RM-1000 monitor configured as an area monitor was damaged due to the test table impacting its mechanical stop (see page 4 of Wyle Test Report 41991 attached). This first test was completed for the RM-1000 monitor configured as a process monitor and the I/F converter.

A second seismic test for the RM-1000 monitor configured as an area monitor and two I/F converters (Wyle Test Report 41991-1) is also included in 04508903-1TR. The RM-1000 monitor used in this second test was the same RM-1000 process monitor used in the first seismic test reconfigured (switch in application type 1 mode) as an area monitor. One of the I/F converters tested was the same I/F converter tested in the first seismic test. This second test was performed to complete the testing which could not be performed during the first seismic test due to the damage to the RM-1000 area monitor and the loss of the high voltage power supply to the I/F converter that occurred during the first seismic test. None of the TRS plots in this second seismic test report 41991-1 were below the RRS.

General Atomics "Qualification Test Report for RM-1000 Processor Module and Current-To-Frequency Converter" (04508905-QR) refers to both Wyle Reports 41991 and 41991-1 included in report 04508903-1TR. It is recognized that the five TRS Plots versus the RRS where the TRS were below the RRS is an exceedance that must be

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justified. From Wyle report 41991 it can be determined that these five TRS versus RRS plots are for the seismic response in the front to back panel direction. The RRS used in the Wyle test reports envelopes the TVA standard RRS shown in Fig 3.1 of TVA Standard Specification CEB-SS-5.10, "For Seismic Qualification of Electrical, Mechanical and I&C Devices," submitted in TVA to NRC letter dated February 25, 2011, (Reference 2) below 33 Hz. This TVA standard RRS conservatively envelopes the in-panel seismic demand for most TVA applications. For applications where that is not the case, the required actual RRS is developed. Calculation WCG-ACQ-0766, "In-Cabinet Required Response Spectra for RM-1000 Radiation Monitors in MCR Panel 2-M-30," Revision 0, (Attachment 3) has been issued to generate the 5% RRS for these safety-related RM-1000 monitors, I/F converters and NIM bins for the WBN2 panel (2-M-30) where they will be installed. As can be seen from the RRS plots in calculation WCG-ACQ-0766 the front to back 5% RRS broad band peak is 9.76 g which is lower than the front to back 5% TRS shown in the subject five (5) plots.

2. *Attachment 5, "General Atomics Electronic Systems 04508905-1SP," page 5-5, Figure 5-2. The Figure 5-2 Test Response Spectra (TRS) Plots versus Required Response Spectra (RRS) shows the TRS to be below the RRS at various frequency (5% Damping). Please provide an explanation regarding why this is acceptable.*

The display module for the RM-1000 monitors procured for WBN2 differs from that used in previous RM-1000 qualification tests. The seismic qualification basis for the WBN2 display module is established by similarity to the display module used in RM-2000 monitor qualification tests shown on page 5-4 and 5-5 of 04508905-1SP (pages attached). The basis for the similarity discussion is provided on pages 5-2 and 5-3 of 04508905-1SP. The TRS non-exceedance at approximately 6-7 Hz shown on page 5-5 is not applicable to WBN2 since the RRS shown on that figure is not used for WBN2 qualification. The correct comparison for WBN2 would be the TVA standard RRS shown in Fig 3.1 of CEB-SS-5.10 for 5% damping. The TRS shown on page 5-5 meets or exceeds all points of the TVA standard RRS. Therefore, the seismic qualification of the WBN2 display module is provided by pages 5-4 and 5-5 for which the TRS completely envelopes the TVA standard RRS shown in Fig 3.1 of CEB-SS-5.10. Additionally, as previously stated, Calculation WCG-ACQ-0766 was issued to generate the 5% RRS for the WBN2 panel (2-M-30) where the safety-related RM-1000 monitors will be installed. The vertical 5% RRS plot in calculation WCG-ACQ-0766 broad band peak is 4.2 g which is lower than the 5% TRS shown in 04508905-1SP, page 5-5, Figure 5-2.

3. *Attachment 23, Qualification Test Report for RM-1000 Processor Module and Current-To-Frequency Converter (04508905-QR)", page 4-25, Figure 4-5 X-Axis SSE Test Response Spectra (TRS) versus Required Response Spectra (RRS) shows the TRS to be below the RRS at various frequency (5% Damping). Please provide an explanation regarding why this is acceptable.*

Figure 4-5 is one of the figures identified in item 1. See item 1 for the appropriate discussion.

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6. NRC Request (Item Number 359)

Was the CERPI system developed under a 10 CFR 50 Appendix B compliant program?

TVA Response:

CERPI is a non-safety-related system. Therefore, 10 CFR 50 Appendix B is not applicable.

7. NRC Request (Item Number 360)

In order for staff to review the acceptability of the Incore Instrumentation System (IIS):

- (a) Provide a brief system description of IIS and its regulatory compliance. In your discussion include the discussion of WINCISE and BEACON system which are part of the IIS. Also provide the differences between the system used at WBN Unit vs. at Unit 2, e.g. Movable vs. fixed IIS. For WINCISE provide the basis for acceptance.*
- (b) If this system has been accepted by the staff previously at some other plant then provide the reference to that SE. Identify the document that describes the functionality of the IIS that is identical to the IIS used in the Westinghouse AP1000 reactor design.*
- (c) If this has not been evaluated by the staff previously, then provide the effect of CCF of this system and its effect on safety system or chapter 15 analysis.*
- (d) Does this have any interconnection with safety system?*
- (e) For BEACON provide the acceptability of this system. I believe that this system was accepted at WBN Unit 1. If that is the case then provide the reference to that review. Also provide any differences of this system to the one at WBN Unit 1 system.*
- (f) Please provide detailed information about the In-core Instrumentation System (IIS) to be installed in Watts Bar Unit 2. This information should indicate how the system meets the requirements established in the Standard Review Plan, including system concept, system requirements, system design, and system development, as well as the regulatory requirements identified for Watts Bar Unit 2.*
- (g) Please provide a description on how the system will meet the regulatory requirements identified in Table 7.1-1 of the SRP, applicable to the IIS.*
- (h) Provide detailed description about the connection and communication for the signals to be transmitted from the Core Exit Thermocouples to the Common Q Post Accident Monitoring System (PAMS). Also, describe how this communication will meet the NRC communications regulatory requirements.*
- (i) Please provide the following Westinghouse document: NO-WBT-002, "Westinghouse Incore Information Surveillance & Engineering (WINCISE™) System Technical Manual."*

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- (j) *Provide the failure modes and effects analyses for the IIS, documented in calculation WBNOSG4220 "WB Incore Instrumentation System Failure Modes and Effects Analyses," and demonstrate how these potential failures do not adversely affect reactor safety.*

TVA Response to NRC Request:

- (a) The WBN Unit 2 In-core Instrumentation System (IIS) replaces all of the functionality provided by the Movable Incore Detector System (MIDS) used at WBN Unit 1. The IIS to be used at WBN Unit 2 is a Westinghouse In-Core Information, Surveillance, and Engineering (WINCISE) System that is functionally described in Section 7.7.1.9 of the WBN Unit 2 Final Safety Analysis Report (FSAR). The WINCISE-style IIS used at WBN Unit 2 is essentially the same as the in-core power distribution measurement systems used at most Combustion Engineering style of operating reactors that use a type of in-core neutron sensors commonly called "Fixed In-core Detectors (FID)." The WBN Unit 2 IIS is functionally identical to the IIS used in the Westinghouse ⁵AP-1000™ reactor design. The WBN Unit 2 IIS includes the FIDs, Core Exit Thermocouples (CET), FID and CET signal cables, the FID signal processing hardware, and the FID signal processing software. This hardware and software is required to provide the measured signals to the associated BEACON System to periodically determine whether the reactor is operating within design core peaking factor limits. A detailed description of the WBN Unit 2 IIS hardware is provided in the document titled, "Westinghouse Incore Information Surveillance & Engineering (WINCISE) System Technical Manual," NO-WBT-002, Revision 0 supplied by Westinghouse to TVA in September of 2010.

The qualification for the BEACON System to perform the core power distribution measurement function using the WBN Unit 2 WINCISE-style IIS instrumentation is documented in the generic NRC Safety Evaluation Reports (SER) provided with WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," Addendum I-A and Addendum 2-A.

- (b) The WINCISE-style IIS used at WBN Unit 2 is essentially the same as the in-core power distribution measurement systems used at all Combustion Engineering style of operating reactors that use a type of in-core neutron sensors commonly called "Fixed In-core Detectors (FID)." The WBN Unit 2 IIS is functionally identical to the IIS described in the Westinghouse AP1000 design documents and approved in the Westinghouse AP-1000 SER section 7.5.7 as documented in the non-proprietary attachment to Westinghouse Letter WBT-D-3089, "Response to Open Item 360 on WINCISE," dated April 13, 2011 (Attachment 7).
- (c) The digital in-core flux monitoring portion of the IIS is non-safety-related. As such, CCF analysis is not required by NUREG-0800 section 7.0-A. The IIS has no impact on any Safety Analysis documented in Chapter 15 of the WBN Unit 2 FSAR.
- (d) The IIS includes the 1E qualified CET and CET analog signal cables required to allow the CETs to be directly connected to the Common Q Post Accident Monitoring System (PAMS). There is no other interface to safety systems. The CET signals are

⁵ AP-1000 is a registered trademark of the Westinghouse Electric Company LLC

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electrically isolated from signals output from the non-1E FID signals and signal processing electronics.

- (e) The qualification for the BEACON System to perform the core power distribution measurement function using the WBN Unit 2 WINCISE-style IIS instrumentation is documented in the generic NRC SER provided with WCAP-12472-P-A. This WCAP generically approves the BEACON System for use at PWR reactors including those using Movable In-core Detector Systems (MIDS) like WBN Unit 1 and, through Addendum I-A and 2-A, those like WBN Unit 2 using a WINCISE type fixed in-core instrumentation system.

The specific differences between the Unit 1 and Unit 2 core power distribution measurement systems are too numerous to simply list. A detailed description of the WBN Unit 2 IIS hardware is provided in Section 2 of the WINCISE System Technical Manual NO-WBT-002 (Attachment 5).

- (f) NUREG-0800 section 7.0-A, Table 7.0-A-1, "Review Topics for Various Systems," requires only a limited review for non-safety-related system discussed in NUREG-0800 section 7.7, "Control". WINCISE is a non-safety-related, indication only system within the scope of NUREG-0800 section 7.7. The limited review required is: "Control systems receive a limited review as necessary to confirm that control system failures cannot have an adverse effect on safety system functions and will not pose frequent challenges to the safety systems." The only WINCISE interface with a safety-related system is the CET in the IITA which is hardwired to the Common Q PAMS system. See item (g) below for a description of the qualification process that demonstrates that failures in the balance of the WINCISE system do not impact the performance of the safety-related CET function.
- (g) With the exception of the IITA hardware, WINCISE is a non-safety-related indication system. The IITA assemblies meet the following criteria:
- i. R.G. 1.26 Rev. 3 Quality Group Classification and Standards for Water, Steam and Radioactive Waste Components of Nuclear Power Plants
 - ii. R.G. 1.38 Rev. 2 Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water-Cooled Nuclear Power Plants
 - iii. R.G. 1.71 Rev. 0 Welder Qualification for Areas of Limited Accessibility
 - iv. R.G. 8.8 Rev. 3 Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Stations will be As Low As Reasonably Achievable
 - v. R.G. 8.19 Rev. 1 Occupational Radiation Dose Assessment in Light-Water Reactor Plants Design State Man-Rem Estimates
 - vi. R.G. 1.84 Rev. 27 Design and Fabrication Code Case Acceptability – ASME Section III, Division 1

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- vii. R.G. 1.85 Rev. 27 Material Code Case Acceptability – ASME Section III, Division 1
 - 4.1.4 The design, materials, fabrication, inspection, and testing of the IITA shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section III Class 3, and all applicable Code Cases as proposed by the supplier and approved by Westinghouse. Materials shall be in accordance with this specification.
 - 4.1.5 Component Classification – The IITA is classified as an instrument tube, so it is not under the jurisdiction of the ASME per NCA-1130(c). However, the design, primary pressure boundary materials, and NDE Requirements are per ASME Section III, Class 3 and the IITA is classified as Safety Class 2.

The non-safety-related WINCISE Signal Processing System Cabinets are located inside containment and are therefore required to not impact the function of any safety-related equipment. To meet this requirement the cabinets were tested and passed based on the following criteria:

- i. In accordance with WB-DC-40-31.2, "Watts Bar Nuclear Plant Seismic Qualification of Category 1 Fluid System Components and Electrical or Mechanical Equipment," Revision 8, November 2000 and U.S. NRC Regulatory Guide 1.100, "Seismic Qualification of Electrical and Mechanical Equipment for Nuclear Power Plants," Revision 2, June 1988, the equipment must withstand five OBEs and one SSE without creating missiles. Testing was done in accordance with:
 - (1) IEEE Std 344-1975, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, Inc., 1975
 - (2) IEEE Std 344-1987, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, Inc., 1987
- ii. In accordance with NRC Regulatory Guide 1.180, "Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems," Revision 1, October 2003 and IEEE 323-1983, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generator Stations," Institute of Electrical and Electronics Engineers, Inc., 1983, the equipment must not generate spurious electromagnetic emissions or suffer some common mode failure due to its operating environment that could directly or indirectly impact the operation of safety-related equipment. Testing was performed in accordance with:
 - (1) IEC 61000-6-2, "Electromagnetic compatibility (EMC). Generic Standards. Immunity for Industrial Environments," 2005

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- (2) MIL-STD-461E, "Requirements for the control of Electromagnetic interference Characteristics of Subsystems and Equipment," August 1999
 - (3) IEC 61000-4-4, "Electromagnetic compatibility (EMC) – Part 4-4: Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test," 1995
 - (4) IEC 61000-4-12, "Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques, Section 12: Oscillatory Waves Immunity Tests," 1996
- iii. In order to demonstrate that a maximum expected surge of 600 volts on the power input to the cabinets would not propagate and damage the CET cables in the IITA, the cabinets were surge tested in accordance with IEC 61000-4-5, "Electromagnetic compatibility (EMC) – Part 4-5: Testing and Measurement Techniques - Surge Immunity Test," 1995.
- (h) The cables for the CETs separate from the FID cables at the seal table. The CETs are connected directly to the Common Q PAMS cabinet. The FIDs are connected directly to the in-containment signal processing system cabinets.
- (i) Attachment 5 is the proprietary Section 2 "Equipment Description" of NO-WBT-002, "Westinghouse Incore Information Surveillance & Engineering (WINCISE™) System Technical Manual." This is strictly a proprietary document and a non-proprietary version will not be submitted. An affidavit for withholding will be submitted within two weeks of receipt from Westinghouse.
- (j) Attachment 6 is the proprietary Westinghouse letter, Watts Bar Unit 2 WINCISE Failure Modes and Effects Analysis (FMEA), LTR-NO-11-49-P, dated April 13, 2011, Attachment 8 is the non-proprietary Westinghouse letter, Watts Bar Unit 2 WINCISE Failure Modes and Effects Analysis (FMEA), LTR-NO-11-49-NP. Attachment 9 is the Westinghouse Electric Company CAW-11-3143, Application for Withholding Proprietary Information from Public Disclosure, LTR-NO-11-49-P, Revision 0, "Watts Bar Unit 2 WINCISE Failure Modes and Effects Analysis (FMEA)" (Proprietary), dated April 15, 2011.

Westinghouse is available to discuss any specific questions on the methodology and hardware used in the WBN Unit 2 IIS that the NRC believes are not well defined in the documents listed above.

8. NRC Request (Item Number 361)

Was the Foxboro I/A system developed under a 10 CFR 50 Appendix B compliant program?

TVA Response:

Foxboro I/A is a non-safety-related system. Therefore, 10 CFR 50 Appendix B is not applicable.

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9. NRC Request (Item Number NA)

In response to OI-103, TVA provided excerpts of the draft the WINCISE EDCR 52321 and committed to provide the final version of the EDCR excerpts when they became available.

TVA Response:

Attachment 4 provides the committed excerpts from the issued WINCISE EDCR 52321.

Enclosure 2
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List of Attachments

1. TVA "Browns Ferry High Range Radiation Monitor" which contains proprietary GA-ESI reports 04509050, "RM-1000 EMC Test Report," dated 4/22/03 and 04038800, RM-1000 EMC Test Report," dated 11/11/99 (Letter Item #1 [OI-340])
2. GA-ESI report 04508903-1TR excerpts (proprietary) (Letter Item #5 [OI-358])
3. TVA calculation WCG-ACQ-0766, "In-Cabinet Required Response Spectra for RM-1000 Radiation Monitors in MCR Panel 2-M-30," Revision 0 (Letter Item #5 [OI-358])
4. TVA WINCISE EDCR 52321 excerpts (Letter Item #9 [OI-NA])
5. Westinghouse document NO-WBT-002, "Westinghouse Incore Information Surveillance & Engineering (WINCISE™) System Technical Manual," Section 2, "Hardware Description" (proprietary) (Letter Item #7 [OI-360])
6. Westinghouse document LTR-NO-11-49-P, "Watts Bar Unit 2 WINCISE Failure Modes and Effects Analysis (FMEA)," (proprietary), dated April 13, 2011 (Letter Item #7 [OI-360])
7. Non-proprietary attachment to Westinghouse Letter WBT-D-3089, "Response to Open Item 360 on WINCISE," dated April 13, 2011 (Letter Item #7 [OI-360])
8. Westinghouse document LTR-NO-11-49-NP, "Watts Bar Unit 2 WINCISE Failure Modes and Effects Analysis (FMEA)," (non-proprietary), dated April 13, 2011 (Letter Item #7 [OI-360])
9. Westinghouse Electric Company CAW-11-3143, Application for Withholding Proprietary Information from Public Disclosure, LTR-NO-11-49-P, Revision 0, "Watts Bar Unit 2 WINCISE Failure Modes and Effects Analysis (FMEA)," (Proprietary), dated April 15, 2011 (Letter Item #7 [OI-360])

Enclosure 3
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List of References

1. TVA to NRC letter entitled "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated March 31, 2011 (Letter Item #5 [OI-358])
2. TVA to NRC letter entitled "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated February 25, 2011 (Letter Items #1 and #5 [OI-340 and OI-358])
3. TVA to NRC letter entitled "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated July 15, 2010 (Letter Item #2 [OI-346])

Enclosure 4
TVA Letter Dated April 15, 2011
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List of New Commitments

1. TVA will perform an EMI survey of the containment high range radiation monitors after they are installed in WBN Unit 2 and submit the results to the NRC within two weeks of the survey being completed. (Letter Item #4 [OI-355])
2. Based on the above action plan, TVA will resolve the issues with the GA-ESI CGD of CGI used in the WBN Unit 2 monitors and submit documentation of the resolution to the NRC by:
 - GA-ESI procedure OP-7.3-240 revision: April 30, 2011
 - Resolution of CGD of CGI used in WBN Unit 2 RM-1000 monitors: September 15, 2011(Letter Item #3 [OI-353])
3. The non-proprietary version of GA-ESI report 04509050, RM-1000 EMC Test Report and affidavit for withholding will be submitted within two weeks of receipt from GA-ESI. (Letter Item #1 [OI-340])
4. TVA Engineering reviewed and approved proprietary versions of GA-ESI documents 04507007-1TR, 04508005 and 04508006 and these documents will be submitted within two weeks of receipt from GA-ESI. (Letter Item #2 [OI-346])
5. An affidavit for withholding Westinghouse document NO-WBT-002, "Westinghouse Incore Information Surveillance & Engineering (WINCISE™) System Technical Manual," Section 2, "Hardware Description," will submitted within two weeks of receipt from Westinghouse. (Letter Item #7 [OI-360])