Attachments 2, 5, 6, 10, 13, 16, 19, 22 and 24 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

September 1, 2011

10 CFR 50.4

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

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

References:
1. Licensee Open Items to be Resolved for SER Approval List
2. SSER 23 and SSER 24 (Proposed) Appendix HH Watts Bar Unit 2 Action Items Table

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" and SSER 23 and SSER 24 (Proposed) Appendix HH "Watts Bar Unit 2 Action Items Table." Enclosure 1 to this letter provides TVA's responses to the information requested by NRC. This letter provides responses to SSER 23 and SSER 24 (Proposed) Appendix HH action items 77, 94, 105, 108, 110, 119, 120, 122, 124, 128 and 130.

Enclosure 2 contains the listing of attached documents that support 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 contains a list of new regulatory commitments.

Attachments 2, 5, 6 10, 16 and 19 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. With the exception of Attachment 5, Attachments 3, 7, 11, 17 and 20 contain the non-proprietary versions of these documents. With the exception of Attachment 5, Attachments 4, 8, 12, 18 and 21 contain the affidavits for withholding these documents. A non-proprietary version and affidavit for withholding for Attachment 5 will be submitted no later than December 1, 2011.

Attachment 13 contains information proprietary to Bechtel Power Corporation. TVA requests that the Bechtel Power Corporation proprietary information be withheld from public disclosure in accordance with 10 CFR § 2.390. Attachment 14 contains the non-proprietary version of the document. Attachment 15 contains the affidavit for withholding the document.

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Attachments 22 and 24 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 23 and 25 contain the non-proprietary versions of these documents. Attachments 26 and 27 contain the affidavit for withholding these documents.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 1st day of September, 2011.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

Enclosures:

1. Responses to SSER, Appendix HH, "Watts Bar Unit 2 Action Items Table"
2. List of Attachments
3. List of References
4. New Regulatory Commitment

cc (Enclosures):

U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

Enclosure 1
TVA Letter Dated September 1, 2011
Responses to SSER, Appendix HH, "Watts Bar Unit 2 Action Items Table"

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
CET	Core Exit Thermocouple
CFR	Code of Federal Regulation
EMC	Electro-Magnetic Compatibility
FMEA	Failure Modes and Effects Analysis
GA-ESI	General Atomics Electronic Systems, Inc.
HRCAR	High Range Containment Area Radiation
HVAC	Heating, Ventilating and Air Conditioning
I/O	Input/Output
[2]IEEE™	Institute of Electrical and Electronics Engineers
IIS	Incore Instrument System
IITA	Incore Instrument Thimble Assembly
LOCA	Loss of Coolant Accident
MCR	Main Control Room
NRC	Nuclear Regulatory Commission
PAMS	Post Accident Monitoring System
RAI	Request for Additional Information
RVLIS	Reactor Vessel Level Indicating System
SPND	Self Powered Neutron Detector (a.k.a. SPD)
SPS	Signal Processing System
SRS	Software Requirements Specification
SSER	Supplemental Safety Evaluation Report
SysRS	System Requirements Specification
TADOT	Trip Actuating Device Operational Test
TVA	Tennessee Valley Authority
UPS	Uninterruptible Power Supply
V&V	Verification and Validation
WBN	Watts Bar Nuclear Plant
[3]WINCISE™	Westinghouse In-Core Information Surveillance & Engineering

[1] BEACON is a registered trademark of the Westinghouse Electric Corporation LLC
[2] IEEE is a registered trademark of the Institute of Electrical and Electronics Engineers Inc.
[3] WINCISE is a registered trademark of the Westinghouse Electric Corporation LLC

Enclosure 1
TVA Letter Dated September 1, 2011
Responses to SSER, Appendix HH, "Watts Bar Unit 2 Action Items Table"

1. **NRC Request (SSER 23 Appendix HH Item Number 77)**

It is unclear to the NRC staff which software V&V documents are applicable to the HRCAR monitors. TVA should clarify which software V&V documents are applicable, in order for the staff to complete its evaluation. (SSER 23, Section 7.5.2.3)

TVA Response to NRC Request

The RM-1000 High Range Containment Area Radiation (HRCAR) monitors used by WBN Unit 2 use version 1.2 of the software. The applicable Verification and Validation (V&V) documents are:

a) Software Version 1.0 (initial issue):

General Atomics Electronic Systems, Inc. (GA-ESI) document 04507007-1TR, "RM-1000 System Verification Test Results Engineering Report Sequoyah Nuclear Plant Units 1 and 2," Original Release: July, 1999 (verified to be applicable to WBN Unit 2). This version of the software was never used in any installed monitors and was verified by test. GA-ESI provided the following clarification: ". . . the requirements (test cases) in document 04507006 are covered in document 04507007-1TR. It is on this basis that we've concluded that the version 1.0 software version was validated." Based on review of the document, TVA agrees with the GA-ESI position.

b) Software Version 1.1

GA-ESI document 04508005, "RM-1000 Version 1.1 Software Verification Report," January 2002

c) Software Version 1.2

GA-ESI document 04508006, "RM-1000 Version 1.2 Software Verification Report," Revision A, April 2008

2. **NRC Request (SSER 23 Appendix HH Item Number 94)**

TVA should provide to the staff either information that demonstrates that the WBN Unit 2 Common Q PAMS meets the applicable requirements in IEEE Std. 603-1991, or justification for why the Common Q PAMS should not meet those requirements. (SSER 23, Section 7.5.2.2.3)

Follow-up NRC Request

Demonstrate how the Common Q PAMS meets the design bases requirements of IEEE 603-1991 Clause 4.

TVA Response to Follow-up NRC Request

Attachment 1 contains the evaluation of the Common Q Post Accident Monitoring System (PAMS) against the requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard IEEE 603-1991, Clause 4.

3. **NRC Request (SSER 23 Appendix HH Item Number 105)**

TVA should produce an acceptable description of how the WBN Unit 2 Common Q PAMS SysRS and SRS implement the design basis requirements of IEEE Std. 603-1991 Clause 4. (SSER 23, Section 7.5.2.2.3.4.3.1)

TVA Response to NRC Request

Attachment 1 contains the evaluation of the Common Q PAMS against the requirements of IEEE 603-1991, Clause 4.

4. **NRC Request (SSER 23 Appendix HH Item Number 108)**

TVA should demonstrate to the NRC staff that there are no synergistic effects between temperature and humidity for the Common Q PAMS equipment. (SSER 23, Section 7.5.2.2.3.5.2)

TVA Response to NRC Request

Based on an analysis of TVA calculations EPM-MCP-071689, "Cooling/Heating Load & Equipment/Component Performance Analysis For The Control Building Electrical Board Room Areas (EL. 692.0 & 708.0)," Revision 19 and EPM-LCP-072489, "Cooling And Heating Load Analysis, Main Control Room HVAC," Revision 13, the Common Q PAMS hardware is not located in an environment where it is simultaneously exposed to high temperature and high humidity. The following tables summarize the results of the analysis.

Normal Operation:

	Summer		Winter	
Location	**Temperature, °F**	**Relative Humidity, %**	**Temperature, °F**	**Relative Humidity, %**
Main Control Room (MCR)	78.1	41	74.9	46
Unit 2 Auxiliary Instrument Room (AIR)	85	33	69	55

Accident Condition:
Loss of Coolant Accident (LOCA) :

	Temperature, °F	**Humidity ratio, pound moisture/ pound dry air**	**Relative Humidity, %**
MCR	80.3	0.0070	31
Unit 2 AIR	88	0.0069	25

5. NRC Request (SSER 23 Appendix HH Item Number 110)

TVA should provide information to the NRC staff describing how the WBN Unit 2 Common Q PAMS design supports periodic testing of the RVLIS function. (SSER 23, Section 7.5.2.2.3.9.2.6)

TVA Response to NRC Request

The Common Q PAMS does not have a set of test functions specific to the Reactor Vessel Level Indicating System (RVLIS) functions. Rather it provides a common set of test functions for periodic testing of the PAMS.

The included test functions applicable to periodic testing of RVLIS are:

1. Annunciator Test - This test allows verification that each PAMS function alarm actuates the appropriate annunciator window in the MCR.

2. Analog Output Test - Allows testing of the analog outputs on the analog output test display. The outputs can be adjusted between 0 and 100% and allows verification of the correct analog output value.

3. Input/Output (I/O) Simulator Connection - This function allows the injection of test signals and verification of outputs for the PAMS functions.

The ability to perform a software test of the RVLIS function is not required by WBN Unit 2 Technical Specifications, Revision F. WBN Unit 2 Technical Specification 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," requires that a RVLIS channel check be performed on a 31-day interval, and a loop calibration and a Trip Actuating Device Operational Test (TADOT) be performed on an 18-month interval.

Technical Specifications define a channel check as follows:

> "A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter."

Technical Specifications define a TADOT as follows:

> "A TADOT shall consist of operating the trip actuating device and verifying the OPERABILITY of required alarm, interlock, display, and trip functions. The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the required accuracy."

A channel calibration involves testing the loop from the sensor to the display to verify proper operation.

None of the Technical Specification required tests described above require a RVLIS software test function. However, they do fully test the RVLIS function of the PAMS.

6. **NRC Request (SSER 24 (Proposed) Appendix HH Item Number 119)**

TVA should submit WNA-CN-00157-WBT, Revision 0, to the NRC by letter. The NRC staff should confirm by review of WNA-CN-00157-WBT, Revision 0, that no credible source of faulting can negatively impact the CETs or PAMS train. (SSER 24 (Proposed), *Section 7.7.1.9.5)*

TVA Response to NRC Request

Attachment 2 contains Westinghouse Electric Company WNA-CN-00157-WBT-P, Revision 0, "Watts Bar 2 Incore Instrument System (IIS) Signal Processing System (SPS) Isolation Requirements," (Proprietary). Attachment 3 contains Westinghouse Electric Company WNA-CN-00157-WBT-NP, Revision 0, "Watts Bar 2 Incore Instrument System (IIS) Signal Processing System (SPS) Isolation Requirements," (Non-Proprietary). Attachment 4 contains CAW-11-3215, Application for Withholding Proprietary Information from Public Disclosure, WNA-CN-00157-WBT-P, Revision 0, "Watts Bar 2 Incore Instrument System (IIS) Signal Processing System (SPS) Isolation Requirements," (Proprietary).

The impact of a failed Core Exit Thermocouple (CET) on a PAMS channel is addressed in WNA-AR-00180-WBT-P, Revision 1, "Failure Modes and Effects Analysis (FMEA) for the Post Accident Monitoring System," Page 3-6, submitted in TVA to NRC letter dated March 2, 2011 (Reference 1).

7. **NRC Request (SSER 24 (Proposed) Appendix HH Item Number 120)**

TVA should confirm to the NRC staff that the maximum over-voltage or surge voltage that could affect the system is 264 VAC, assuming that the power supply cable to the SPS cabinet is not routed with other cables greater than 264 Vac. (SSER 24, Section 7.7.1.9.5)

TVA Response to NRC Request

TVA Design Criteria Document NPG-DCD-WB-DC-30-27 Revision 33, "AC and DC Control Power Systems - (Unit 1 / Unit 2)," Section 4.2.2 states that the maximum uninterruptible power supply (UPS) output under fault conditions is 195 Vpeak. During normal operation, the voltage regulation is ± 2% of 120 Vac.

As documented in Westinghouse Electric Company EQ-QR-39-WBT, "Equipment Qualification Summary Report for WINCISE Signal Processing System," Revision 0, (Attachment 5) the SPS cabinets were tested on the ac inputs to withstand a maximum surge of 4000 volts with no loss of function after the surge. A non-proprietary version of EQ-QR-39-WBT and affidavit for withholding will be submitted no later than December 1, 2011.

Based on the above, the system is not expected to see an operating voltage in excess of 195 Vpeak. However, if it does, the system is capable of withstanding a surge up to 4000 Vpeak with no loss of function.

8. NRC Request (SSER 24 (Proposed) Appendix HH Item Number 122)

TVA should confirm to the NRC staff that different divisions of safety power are supplied to the IIS SPS cabinets, with the power cables routed in separate shielded conduits. (SSER 24 (Proposed)*, Section 7.7.1.9.5)*

TVA Response to NRC Request

SPS Cabinets 2-L-201 and 2-L-202 are fed from 120V Vital Instrument Power Board III (Train A) and IV (Train B), respectively. Self-powered detector (SPD) signals coming from incore instrument thimble assemblies (IITAs) shared with Train A/PAM 1 Core Exit Thermocouples (CETs) are connected to 2-L-201 while SPD signals coming from IITAs shared with Train B/PAM 2 CETs are connected to 2-L-202.

These power cables are only routed in separate shielded conduits inside containment. Outside containment, they are routed in cable trays and/or conduits with cables of the same node voltage (V3) and train designation.

9. NRC Request (SSER 24 (Proposed) Appendix HH Item Number 124)

While the BEACON datalink on the Application server can connect to either BEACON machine, only BEACON A is used for communication. TVA should clarify to the NRC staff whether automatic switchover to the other server is not permitted. (SSER 24 (Proposed)*, Section 7.7.1.9.5)*

TVA Response to NRC Request

Automatic switchover is not possible with the Unit 2 BEACON servers; however, if it were, there is no reason for it not to be permitted. The BEACON servers are not configured in a fully redundant manner and require minimal user intervention to swap over to the redundant backup server. Further information can be found in page 4 of 5 of Attachment 3 in TVA letter dated June 10, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Instrumentation and Control Staff Information Requests" (ML11167A110) (Reference 2).

10. NRC Request (SSER 24 (Proposed) Appendix HH Item Number 128)

TVA should submit the seismic qualification test report procedures and results for the SPS cabinets to the NRC staff for review. (SSER 24 (Proposed)*, Section 7.7.1.9.5)*

TVA Response to NRC Request

Westinghouse considers test procedures to be commercially sensitive documents and has declined to provide them for submittal. The test procedure documents, listed below, are available for audit at the Westinghouse Rockville office. The results of the seismic testing are included in EQ-QR-39-WBT, "Equipment Qualification Summary Report for WINCISE Signal Processing System," Revision 0. Attachment 5 contains the proprietary version of the report. A non-proprietary version and affidavit for withholding will be submitted no later than December 1, 2011.

Document Title	Document #
Electromagnetic Compatibility Test Plan and Procedure for Westinghouse Incore Information Surveillance & Engineering System (WINCISE) Signal Processing System Equipment Qualification Cabinet	EQ-TP-98-WBT
Monitoring Test Procedure for Westinghouse Incore Information Surveillance & Engineering System (WINCISE) Signal Processing System Equipment Qualification Cabinet	EQ-TP-98-WBT, Appendix A
Seismic Qualification Procedure for Westinghouse Incore Information Surveillance & Engineering System (WINCISE) Signal Processing System Equipment Qualification Cabinet	EQ-TP-99-WBT
Monitoring Test Procedure for Westinghouse Incore Information Surveillance & Engineering System (WINCISE) Signal Processing System Equipment Qualification Cabinet	EQ-TP-99-WBT, Appendix B

11. NRC Request (SSER 24 (Proposed) Appendix HH Item Number 130)

TVA should provide a summary to the NRC staff of the EMC qualification test results of the SPS cabinets. (SSER 24 (Proposed)*, Section 7.7.1.9.5)*

TVA Response to NRC Request

The summary of the Electro-Magnetic Compatibility (EMC) test results is included in EQ-QR-39-WBT, "Equipment Qualification Summary Report for WINCISE Signal Processing System," Revision 0. Attachment 5 contains the proprietary version of the report. A non-proprietary version and affidavit for withholding will be submitted no later than December 1, 2011.

12. NRC Request

Based on FSAR Amendment 105, TVA changed its commitment from Regulatory Guide 1.152, Revision 2 to Revision 3. Based on this change, TVA to demonstrate how the Common Q PAMS meets the requirements of Regulatory Guide 1.152, Revision 3 for a secure Development and Operational Environment.

TVA Response to NRC Request

The secure development environment is addressed in WCAP-17427-P, Revision 1. Attachment 6 contains Westinghouse Electric Company WCAP-17427-P, Revision 1, "Watts Bar Nuclear Plant Unit 2 Common Q Post Accident Monitoring System Computer Security Assessment," (Proprietary). Attachment 7 contains Westinghouse Electric Company WCAP-17427-NP, Revision 1, "Watts Bar Nuclear Plant Unit 2 Common Q Post Accident Monitoring System Computer Security Assessment," (Non-Proprietary). Attachment 8 contains Westinghouse Electric Company CAW-11-3241, Application for Withholding Proprietary Information from Public Disclosure, WCAP-17427-P, Revision 1,

"Watts Bar Nuclear Plant Unit 2 Common Q Post Accident Monitoring System Computer Security Assessment," (Proprietary).

Attachment 9 contains TVA document "Common Q PAMS Secure Operational Environment per Regulatory Guide 1.152 Revision 3."

13. NRC Request

TVA to provide a non-proprietary version and affidavit for withholding for the WINCISE technical manual.

TVA Response to NRC Request

Westinghouse procedures do not allow for creation of a non-proprietary technical manual. In order to submit a non-proprietary technical manual, Westinghouse converted the previously reviewed and approved technical manual into a WCAP. Because this is the same document previously approved by engineering, no engineering review of the WCAP is required.

Attachment 10 contains Westinghouse Electric Company WCAP-17458-P, Revision 0, "WINCISE™ Signal Processing System Cabinet Operation & Maintenance Manual," (Proprietary). Attachment 11 contains Westinghouse Electric Company WCAP-17458-NP, Revision 0, "WINCISE™ Signal Processing System Cabinet Operation & Maintenance Manual," (Non-Proprietary). Attachment 12 contains Westinghouse Electric Company CAW-11-3218, Application for Withholding Proprietary Information from Public Disclosure, WCAP-17458-P, Revision 0, "WINCISE™ Signal Processing System Cabinet Operation & Maintenance Manual," (Proprietary).

14. NRC Request

TVA to provide non-proprietary versions and affidavits for withholding for Bechtel proprietary material requisitions

TVA Response to NRC Request

After review by Bechtel Engineering and Procurement, it was determined that requisition 25402-011-MRA-HARA-00002 Revisions 1 and 4 submitted as Attachment 11 in TVA to NRC letter dated October 29, 2010 (Reference 3), contain no proprietary information and can be released as public records.

After review by Bechtel Engineering and Procurement, it was determined that requisition 25402-011-MRA-JD01-00001, Revision 0, submitted as Attachment 23 in TVA to NRC letter dated October 29, 2010 (Reference 3), contains proprietary information. Attachment 13 contains demarcated Bechtel Power Corporation document 25402-011-MRA-JD01-00001, "NSSS and BOP Controls Upgrade," Revision 0 (Proprietary). Attachment 14 contains Bechtel Power Corporation document 25402-011-MRA-JD01-00001, "NSSS and BOP Controls Upgrade," Revision 0 (Non-Proprietary). Attachment 15 contains Bechtel Power Corporation letter ELS-BM-TVA-U2CC-2011-0002, "Application for Withholding Proprietary Information from Public Disclosure, Material Requisition 25402-011-MRA-JD01-00001, Revision 0, "NSSS and BOP Controls Upgrade," (Proprietary).

15. NRC Request

TVA to submit calculation note 420A90-P, "WINCISE Functional Specification for Watts Bar Unit 2," for staff review.

TVA Response to NRC Request

Attachment 16 contains Westinghouse Electric Company 420A90-P, Revision 2, "WINCISE Functional Specification for Watts Bar Unit 2," (Proprietary). Attachment 17 contains Westinghouse Electric Company 420A90-NP, Revision 2, "WINCISE Functional Specification for Watts Bar Unit 2," (Non-Proprietary). Attachment 18 contains Westinghouse Electric Company CAW-11-3216, Application for Withholding Proprietary Information From Public Disclosure, 420A90-P, Revision 2, "WINCISE Functional Specification for Watts Bar Unit 2" (Proprietary).

16. NRC Request

TVA to submit Westinghouse document WNA-DS-01811-WBT-P, "WINCISE Signal Processing System Design Requirements," for staff review.

TVA Response to NRC Request

Attachment 19 contains Westinghouse Electric Company WNA-DS-01811-WBT-P, Revision 0, "Signal Processing System Design Requirements," (Proprietary). Attachment 20 contains Westinghouse Electric Company WNA-DS-01811-WBT-NP, Revision 0, "Signal Processing System Design Requirements," (Non-Proprietary). Attachment 21 contains Westinghouse Electric Company CAW-11-3217, Application for Withholding Proprietary Information From Public Disclosure, WNA-DS-01811-WBT-P, Revision 0, "WINCISE Signal Processing System Design Requirements," (Proprietary).

17. NRC Request

TVA to submit demarcated proprietary and non-proprietary versions of General Atomics Electronic Systems 04038903-7SP, Revision C, "Qualification Basis for 04034101-001 (2-RE-90-271, -272, -273 & -274)," along with an affidavit for withholding.

TVA Response to NRC Request

Attachment 22 contains demarcated General Atomics Electronic Systems, Inc.(GA-ESI) 04038903-7SP, Revision C, "Qualification Basis for 04034101-001 (2-RE-90-271, -272, -273 & -274)" (Proprietary). Attachment 23 contains GA-ESI 04038903-7SP, Revision C, "Qualification Basis for 04034101-001 (2-RE-90-271, -272, -273 & -274)," (Non-Proprietary). Attachment 26 contains GA-ESI-4482, "Request by General Atomics Electronic Systems, Inc. to Withhold Certain Information from Public Disclosure under 10CFR2.390." Attachment 27 contains GA-ESI-4482, Enclosure "Affidavit for Withholding."

18. NRC Request

TVA to submit demarcated proprietary and non-proprietary versions of General Atomics Electronic Systems 04508905-1SP, Revision B, "Qualification Test Report Supplement, RM-1000 Upgrades" (Proprietary) along with an affidavit for withholding.

TVA Response to NRC Request

Attachment 24 contains demarcated GA-ESI 04508905-1 SP, Revision B, "Qualification Test Report Supplement, RM-1000 Upgrades" (Proprietary). Attachment 25 contains GA-ESI 04508905-1 SP, Revision B, "Qualification Test Report Supplement, RM-1000 Upgrades" (Non-Proprietary). Attachment 26 contains GA-ESI-4482, "Request by General Atomics Electronic Systems, Inc. to Withhold Certain Information from Public Disclosure under 10CFR2.390." Attachment 27 contains GA-ESI-4482, Enclosure "Affidavit for Withholding."

Enclosure 2
TVA Letter Dated September 1, 2011
List of Attachments

1. TVA document titled "Common Q PAMS Conformance to the Requirements of IEEE 603-1991 Clause 4 Safety System Design Basis," dated August 29, 2011

2. Westinghouse Electric Company WNA-CN-00157-WBT-P, Revision 0, "Watts Bar 2 Incore Instrument System (IIS) Signal Processing System (SPS) Isolation Requirements," (Proprietary)

3. Westinghouse Electric Company WNA-CN-00157-WBT-NP, Revision 0, "Watts Bar 2 Incore Instrument System (IIS) Signal Processing System (SPS) Isolation Requirements," (Non-Proprietary)

4. Westinghouse Electric Company CAW-11-3215, Application for Withholding Proprietary Information from Public Disclosure, WNA-CN-00157-WBT-P, Revision 0, "Watts Bar 2 Incore Instrument System (IIS) Signal Processing System (SPS) Isolation Requirements," (Proprietary)

5. Westinghouse Electric Company EQ-QR-39-WBT, Revision 0, "Equipment Qualification Summary Report for WINCISE Signal Processing System," (Proprietary)

6. Westinghouse Electric Company WCAP-17427-P, Revision 1, "Watts Bar Nuclear Plant Unit 2 Common Q Post Accident Monitoring System Computer Security Assessment," (Proprietary)

7. Westinghouse Electric Company WCAP-17427-NP, Revision 1, "Watts Bar Nuclear Plant Unit 2 Common Q Post Accident Monitoring System Computer Security Assessment," (Non-Proprietary)

8. Westinghouse Electric Company CAW-11-3241, Application for Withholding Proprietary Information from Public Disclosure, WCAP-17427-P, Revision 1, "Watts Bar Nuclear Plant Unit 2 Common Q Post Accident Monitoring System Computer Security Assessment," (Proprietary)"

9. TVA document titled "Common Q PAMS Secure Operational Environment per Regulatory Guide 1.152 Revision 3"

10. Westinghouse Electric Company WCAP-17458-P, Revision 0, "WINCISE™ Signal Processing System Cabinet Operation & Maintenance Manual," (Proprietary)

11. Westinghouse Electric Company WCAP-17458-NP, Revision 0, "WINCISE™ Signal Processing System Cabinet Operation & Maintenance Manual," (Non-Proprietary)

12. Westinghouse Electric Company CAW-11-3218, Application for Withholding Proprietary Information from Public Disclosure, WCAP-17458-P, Revision 0, "WINCISE™ Signal Processing System Cabinet Operation & Maintenance Manual," (Proprietary)

13. Demarcated Bechtel Power Corporation document 25402-011-MRA-JD01-00001, "NSSS and BOP Controls Upgrade," Revision 0 (Proprietary)

14. Bechtel Power Corporation document 25402-011-MRA-JD01-00001, "NSSS and BOP Controls Upgrade," Revision 0 (Non-Proprietary)

Enclosure 2
TVA Letter Dated September 1, 2011
List of Attachments

15. Bechtel Power Corporation letter ELS-BM-TVA-U2CC-2011-0002, "Application for Withholding Proprietary Information from Public Disclosure, Material Requisition 25402-011-MRA-JD01-00001, Revision 0, NSSS and BOP Controls Upgrade," (Proprietary)

16. Westinghouse Electric Company 420A90-P, Revision 2, "WINCISE Functional Specification for Watts Bar Unit 2," (Proprietary)

17. Westinghouse Electric Company 420A90-NP, Revision 2, "WINCISE Functional Specification for Watts Bar Unit 2," (Non-Proprietary)

18. Westinghouse Electric Company CAW-11-3216, Application for Withholding Proprietary Information From Public Disclosure, 420A90-P, Revision 2, "WINCISE Functional Specification for Watts Bar Unit 2" (Proprietary)

19. Westinghouse Electric Company WNA-DS-01811-WBT-P, Revision 0, "WINCISE Signal Processing System Design Requirements," (Proprietary)

20. Westinghouse Electric Company WNA-DS-01811-WBT-NP, Revision 0, "WINCISE Signal Processing System Design Requirements," (Non-Proprietary)

21. Westinghouse Electric Company CAW -11-3217, Application for Withholding Proprietary Information From Public Disclosure, WNA-DS-01811-WBT-P, Revision 0, "WINCISE Signal Processing System Design Requirements," (Proprietary)

22. Demarcated General Atomics Electronic Systems 04038903-7SP, Revision C, "Qualification Basis for 04034101-001 (2-RE-90-271, -272, -273 & -274)" (Proprietary)

23. General Atomics Electronic Systems 04038903-7SP, Revision C, "Qualification Basis for 04034101-001 (2-RE-90-271, -272, -273 & -274)" (Non-Proprietary)

24. Demarcated General Atomics Electronic Systems 04508905-1 SP, Revision B, "Qualification Test Report Supplement, RM-1000 Upgrades" (Proprietary)

25. General Atomics Electronic Systems 04508905-1 SP, Revision B, "Qualification Test Report Supplement, RM-1000 Upgrades" (Non-Proprietary)

26. General Atomics Electronic Systems GA/ESI-4482, "Request by General Atomics Electronic Systems, Inc. to Withhold Certain Information from Public Disclosure under 10CFR2.390"

27. General Atomics Electronic Systems GA/ESI-4482, Enclosure "Affidavit for Withholding"

Enclosure 3
TVA Letter Dated September 1, 2011
List of References

1. TVA to NRC letter titled "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated March 2, 2011 (Letter Item #6 [SSER 24 (Proposed) - Appendix HH action item #119])

2. TVA to NRC letter titled "Watts Bar Nuclear Plant (WBN) Unit 2 - Instrumentation and Control Staff Information Requests," dated June 10, 2011 (ML11167A110) (Letter Item #9 [SSER 24 (Proposed) - Appendix HH action item #124])

3. TVA to NRC letter titled "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated October 29, 2010 (Letter Item #14)

Enclosure 4
TVA Letter Dated September 1, 2011
List of New Regulatory Commitment

1. A non-proprietary version of EQ-QR-39-WBT and affidavit for withholding will be submitted no later than December 1, 2011. (Letter Items #7 [SSER 24 (Proposed) - Appendix HH action item 120], #10 [SSER 24 (Proposed) - Appendix HH action item-128] and #11 [SSER 24 (Proposed) - Appendix HH action item-130])

Attachment 1

TVA document titled "Common Q PAMS Conformance to the Requirements of IEEE 603-1991 Clause 4 Safety System Design Basis,"

Notes: 1. The following acronyms/abbreviations are used in this document:

AIR	Auxiliary Instrument Room
CET	Core Exit Thermocouple
Common Q	Common Qualified Platform
DBE	Design Basis Earthquake
ECCS	Emergency Core Cooling System
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference
[1]EPRI®	Electric Power Research Institute
EQ	Environmental Qualification
ESD	Electrostatic Discharge
FMEA	Failure Modes and Effects Analysis
FSAR	Final Safety Analysis Report
GHz	Gigahertz
Hz	Hertz (frequency in cycles per second)
ICCM	Inadequate Core Cooling Monitor
[2]IEEE™	Institute of Electrical and Electronics Engineers
kHz	Kilohertz
MHz	Megahertz
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
MCR	Main Control Room
NRC	Nuclear Regulatory Commission
OBE	Operating Bases Earthquake
PAMS	Post Accident Monitoring System
RCCA	Rod Control Cluster Assembly
RCS	Reactor Coolant System
RFI	Radio Frequency Interference
RG	Regulatory Guide
rms	root mean square
RVLIS	Reactor Vessel Level Indicating System
SGTR	Steam Generator Tube Rupture
SI	Safety Injection
SMM	Saturation Margin Monitor
SSC	Structure/System or Component
TVA	Tennessee Valley Authority
UPS	Uninterruptible Power Supply
Vac	Volts alternating current
WBN	Watts Bar Nuclear Plant

2. Italicized text is quoted directly from IEEE 603-1991.

3. Following each [3]IEEE 603™-1991, Clause 4 requirement, is a discussion of the Common Q PAMS licensing basis.

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[1] EPRI is a registered trademark of the Electric Power Research Institute Inc.
[2] IEEE is a registered trademark of the Institute of Electrical and Electronics Engineers Inc.

4. In the following discussion it is acknowledged that a PAM variable may meet more than one type and category classification. For simplification, the discussion uses the highest classification with the most stringent requirements.

5. The WBN Unit 2 design basis is contained in multiple documents. The design basis documents used in the preparation of this report are listed in the References section at the end of the report.

IEEE 603-1991 Clause 4 "Safety system design basis," requires that:

"A specific basis shall be established for the design of each safety system of the nuclear power generating station. The design basis shall also be available as needed to facilitate the determination of the adequacy of the safety system, including design changes. The design basis shall be consistent with the requirements of ANSI/ANS 51.1-1983 or ANSI/ANS 52.1-1983 and shall document as a minimum:"

The design basis for the Watts Bar Nuclear (WBN) Unit 2 Common Q Post Accident Monitoring System (PAMS) uses the design basis for the WBN Unit 1 Inadequate Core Cooling Monitor (ICCM-86) PAMS. The functions performed / parameters displayed are the same as WBN Unit 1 which are:

- Core Exit Thermocouples (CET)
- Reactor Vessel Level Indicating System (RVLIS)
- Saturation Margin Monitor (SMM) (aka Subcooling Margin Monitor)

The Common Q PAMS is designed to meet the requirements of Regulatory Guide (RG) 1.97, "Post-Accident Monitoring Instrumentation," Revision 2 which is the licensing basis for WBN2. RG 1.97, defines type A variables as:

> "those variables to be monitored that provide the primary information required to permit the control room operators to take the specified manually controlled actions for which no automatic control is provided and that are required for safety systems to accomplish their safety function for design basis accident events."

For WBN2, the CET and SMM functions in the Common Q PAMS meet the RG 1.97 definition for a Type A variable. This is documented in TVA calculation WBNOSG4047, "PAM Type "A" Variables Determination."

By definition, Type A variables are "key variables" and must meet Category 1 design and qualification criteria, as defined in RG 1.97, Section 1.3.1.

Regulatory Guide 1.97, Revision 2, Table 2 defines RVLIS as a category B1 variable. WBN Unit 2 defines this variable as type B1.

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[3] IEEE 603 is a registered trademark of the Institute of Electrical and Electronics Engineers Inc.

By definition, Type B variables must meet Category 1 design and qualification criteria, as defined in RG 1.97, Section 1.3.1.

Deviations of the PAM variables to the requirements of RG 1.97 Revision 2 are documented in WBN Unit 2 FSAR Table 7.5-2, "Regulatory Guide 1.97 Post Accident Monitoring Variables Lists," Deviations 1 through 37.

IEEE 603-1991 breaks down the general design basis requirement as follows:

4.1. *The design basis events applicable to each mode of operation of the generating station along with the initial conditions and allowable limits of plant conditions for each such event.*

The design basis events applicable to each mode of operation of the generating station along with the initial conditions and allowable limits of plant conditions for each such event are defined in WB-DC-40-64, Revision 12, "Design Basis Events Design Criteria."

4.2. *The safety functions and corresponding protective actions of the execute features for each design basis event.*

The PAMS has no automatic execute features. Manual safety-related actions are based on the following PAMS indications:

- Core Exit Thermocouples
- Saturation Margin Monitor (SMM)

A list of the safety-related actions is contained in the response to item 4.5 below.

4.3. *The permissive conditions for each operating bypass capability that is to be provided.*

Not applicable. The PAMS has no automatic execute features to bypass.

4.4. *The variables or combinations of variables, or both, that are to be monitored manually or automatically, or both, to control each protective action; the analytical limit associated with each variable, the ranges (normal, abnormal, and accident conditions); and the rates of change of these variables to be accommodated until proper completion of the protective action is ensured.*

There are no automatic protection associated with the PAMS. The variables that are monitored manually for protective actions are the Core Exit Thermocouples (CETS) and the Saturation Margin Monitor (SMM):

Variable	Analytical Limit	Normal Range	Abnormal Range	Accident Range	Rate of Change
CET	200 to 2300°F	200 to 700°F	200 to 1000°F	1000 to 2300°F	NA
SMM	200 to -800°F	200 to -200°F	200 to -800°F	200 to -800°F	NA

4.5. The following minimum criteria for each action identified in 4.2 whose operation may be controlled by manual means initially or subsequent to initiation. See IEEE Std 494-1974 (R1990).

4.5.1. The points in time and the plant conditions during which manual control is allowed.

- CET temperatures and SMM parameters provide the operator sufficient information (natural circulation determination) to determine whether or not an increase in steam dumping is required to establish natural circulation (event recovery or maintain stabilized conditions depending on the specific event).
- SMM is used to determine if ECCS pumps should be manually started following a Safety Injection (SI).
- SMM is used to determine if the operator should transition from the Faulted Steam Generator Isolation procedure to the Loss of Reactor or Secondary Coolant procedure.
- SMM is used to determine if the Reactor Coolant System (RCS) can be depressurized to limit the primary to secondary leakage during a steam generator tube rupture event.
- SMM is used to determine if the SI can be terminated to prevent ruptured Steam Generator overfill during a steam generator tube rupture event.
- SMM is used to determine if ECCS pumps should be manually started to stabilize pressurizer level during a steam generator tube rupture event.
- SMM is used to determine if the cold leg accumulators should be isolated during a steam generator tube rupture event.
- SMM is used to control ruptured steam generator pressure to limit offsite releases during a steam generator tube rupture event.
- SMM is used to provide the operator sufficient information (natural circulation determination) to determine whether or not an increase in steam dumping is required to establish natural circulation during a steam generator tube rupture event.
- SMM is used to determine if the SI can be terminated to allow proper inventory and pressure control of the RCS following a SI.

- SMM is used to determine if the SI can be terminated to allow proper inventory and pressure control of the RCS following a SI.

- SMM is used to allow the operator to maintain the proper relationship between RCS pressure and temperature following a SI.

- SMM informs the operator of the departure from the desired subcooling margin and the need to reinitiate SI.

- SMM is used to determine if the SI can be terminated to allow proper inventory and pressure control of the RCS following a loss of reactor or secondary coolant.

- SMM is used to determine when RCS depressurization can be terminated following a steam generator tube rupture.

4.5.2. *The justification for permitting initiation or control subsequent to initiation solely by manual means.*

Not applicable. The Common Q PAMS indications are used for manual actions for which no automatic action is available.

4.5.3. *The range of environmental conditions imposed upon the operator during normal, abnormal, and accident circumstances throughout which the manual operations shall be performed.*

The range of conditions are those experienced by the operator in either the Main Control Room (MCR) or Auxiliary Instrument Room (AIR) during normal and accident conditions. The table below summarizes the conditions. Where the values are different, information is provided for both the MCR and the AIR.

Parameter	Normal	Abnormal	Accident
Temperature Range	MCR 75 to 80°F AIR 64 to 90°F	60 to 104°F	MCR 75 to 82°F AIR 55 to 87°F
Relative Humidity	MCR 40 to 60% AIR 40 to 70%	20 to 90%	NA
Radiation Exposure	40 year TID 350.4 Rad	NA	MCR 40 year TID 362.76 Rad AIR 40 year TID 512.5 Rad
Design Bases Earthquake (DBE)	NA	NA	3.0g horizontal and 2.0g vertical

4.5.4. *The variables in 4.4 that shall be displayed for the operator to use in taking manual action. See IEEE Std 497-2002 for additional information.*

- Core Exit Thermocouple Temperature

- Reactor Coolant Saturation Margin

4.6. *For those variables in 4.4 that have a spatial dependence (i.e., where the variable varies as a function of position in a particular region), the minimum number and locations of sensors required for protective purposes.*

The Core Exit Thermocouple variable has a spatial dependence. The minimum number and location of the CETs is two channels with a minimum of two thermocouples/channel in each core quadrant.

4.7. *The range of transient and steady-state conditions of both motive and control power and the environment (for example voltage, frequency, radiation, temperature, humidity, pressure and vibration) during normal, abnormal, and accident circumstances throughout which the safety system shall perform.*

The Common Q PAMS hardware is located in either the Main Control Room (MCR) or the Auxiliary Instrument Room (AIR). These areas are defined as mild environments. The table below summarizes the conditions. Where the values are different, information is provided for both the MCR and the AIR.

Control power is provided by an uninterruptible power supply (UPS) in the 120 Vac vital distribution system.

Parameter	Normal	Abnormal	Accident
Control Power Voltage	± 2% of nominal output (120 Vac rms)	120 Vac ± 15% rms	60 to 195 V peak
Control Power Frequency	60 ± 0.5 Hz	± 0.2 Hz	NA
Control Power Harmonic distortion	5% maximum	NA	NA
Temperature Range	MCR 75 to 80°F AIR 64 to 90°F	60 to 104°F	MCR 75 to 82°F AIR 55 to 87°F
Relative Humidity	MCR 40 to 60% AIR 40 to 70%	20 to 90%	NA
Radiation Exposure	40 year TID 350.4 Rad	NA	MCR 40 year TID 362.76 Rad AIR 40 year TID 512.5 Rad
Operating Bases Earthquake (OBE)	NA	0.09g for horizontal motion and 0.06g for vertical motion	NA
Design Bases Earthquake (DBE)	NA	NA	3.0g horizontal and 2.0g vertical

Electromagnetic susceptibility testing is performed in accordance with TVA Standard Specification SS E18.14.01, "Electromagnetic Interference (EMI) Testing Requirements for Electronic Devices." The testing includes the following:

- Radiated Susceptibility

- Conducted Susceptibility
- Surge Susceptibility
- Impulse and Burst of Impulses Susceptibility
- Electrostatic Discharge (ESD) Susceptibility
- Radiated Emissions
- Conducted Emissions

Susceptibility testing acceptance criteria is that the equipment exhibits no malfunction when exposed to the test conditions.

Radiated Emissions testing is acceptable if the electromagnetic emissions do not exceed the values determined by EPRI Topical Report, TR-102323, Final Report September 1994, "Guidelines for Electromagnetic Interference Testing in Power Plants," Figure 7.4. The required frequency range is 1 MHz to 1 GHz.

Conducted Emissions testing is acceptable if the electromagnetic emission on the power leads shall not exceed the values determined by EPRI Topical Report, TR-102323, Final Report September 1994, "Guidelines for Electromagnetic Interference Testing in Power Plants," Figure 7-4. The required frequency range is 10 kHz to 400 MHz.

4.8. *The conditions having the potential for functional degradation of safety system performance and for which provisions shall be incorporated to retain the capability for performing the safety functions (for example, missiles, pipe breaks, fires, loss of ventilation, spurious operation of fire suppression systems, operator error, failure in non-safety-related systems).*

The PAMS equipment itself is located in a mild environment area and is not susceptible to missiles or pipe breaks. Analysis (calculations EPMMCP071689 and EPMLCP072489) has shown that a loss of ventilation in the MCR or AIR will not result in conditions that would cause equipment failure. The PAMS is designed and installed as a class 1E system and does not rely on any non-safety-related SSC to remain operable.

The CO_2 piping, storage vessels, and other components are installed at elevations lower than the Main and Auxiliary Control Rooms to prevent rendering these rooms uninhabitable during any operating or accident condition.

The AIR is protected by the CO_2 fire protection system. The CO_2 system is designed (or plant equipment protected) to assure an initiating failure such as a pipe break or a single inadvertent actuation of the system will not damage nuclear safety-related systems to the degree that the failure will:

- Prevent the functioning of both trains of safety-related plant features needed for safe shutdown or cause the release of radioactivity.

- Prevent the habitability of the Main Control Room due to toxic levels or depletion of oxygen by any gases.

The PAMS does not have any automatic control functions that are susceptible to operator error. If the operator were to misinterpret or misread the PAMS display, it could result in miss-operation of other plant equipment used in response to an accident. However, TVA Design Criteria Document WB-DC-40-64, Revision 12, "Design Basis Events Design Criteria," Appendix A "Generic Operator Action Criteria" A.2.2 states:

> "Safety-related operator actions or sequences of actions may be performed by an operator only where a single operator error of one manipulation does not result in exceeding design requirements for design basis events."

Operator error is possible in the entry of constants, alarm setpoints etc. used by the PAMS functions. This type of error is minimized by the system requiring a verification step for changing parameters. The CET and SMM functions have built in diagnostic programs for testing the functions.

In addition, A.2.3 states:

"The number of safety-related operator actions or sequences of actions shall be minimized to the extent that the operator(s) has sufficient time to monitor the results of actions on the plant status and to perform required and optional operator actions. Preplanned safety-related operator actions required for mitigation of a design basis event are based on indications of post-accident monitoring (PAM) Type A variables. Optional and contingency safety-related operator actions may be initiated based on indications of PAM Type B and C variables. Definitions and identification of PAM variables are provided in the PAM design criteria WB-DC-30-7 (Reference A.5.1)."

Based on the above requirements, the impact of operator error due to misinterpreting or misreading a PAMS indication is minimized and sufficient time is planned to allow the operator to identify the error and take corrective action.

4.9. *The methods to be used to determine that the reliability of the safety system design is appropriate for each safety system design and any qualitative or quantitative reliability goals that may be imposed on the system design.*

Reliability goals for the PAMS were established as part of the procurement contract for the system and are included in the Contract Compliance Matrix (Section 12) in Westinghouse document WNA-LI-00058-WBT-P, Revision 3, "Post-Accident Monitoring System (PAMS) Licensing Technical Report." The specific items are:

178. The proposed system shall have a Mean Time Between Failure (MTBF) of greater than 40 years. A failure for this case is considered the loss of system ability to Monitor/Display. The Offerer shall provide MTBF data for the proposed system and the rationale behind it.

179. The proposed system shall have a Mean Time To Repair (MTTR) of less than 2 hours. The Offerer shall provide MTTR data for the proposed system and the rationale behind it.

A reliability analysis of the PAMS was performed (WNA-AR-00189-WBT, Revision 0 "Post Accident Monitoring System Reliability Analysis") and approved by engineering. The reliability analysis demonstrates the system conformance to the procurement specification requirements.

Westinghouse performed a Failure Modes and Effects Analysis of the PAMS. This analysis is documented WNA-AR-00180-WBT, Revision 0, "Failure Modes and Effects Analysis (FMEA) for the Post Accident Monitoring System," which was approved by engineering.

4.10. The critical points in time or the plant conditions, after the onset of a design basis event, including:

4.10.1. *The point in time or plant conditions for which the protective actions of the safety system shall be initiated.*

Not Applicable. The PAMS has no protective or control functions. For safety related operator actions based on PAMS variables, refer to the response to 4.5.1.

4.10.2. The point in time or plant conditions that define the proper completion of the safety function.

For WBN Unit 2, completion of the safety function is defined as "safe shutdown." Typically, if the event occurs at power, safe shutdown is defined as technical specification mode 3, hot standby. However, the definition of safe shutdown may also include specification of particular conditions (e.g., for a steam generator tube rupture, the definition of safe shutdown includes the equalization of pressure between the primary and secondary side). The specific safe shutdown criteria for each event are included in TVA Design Criteria Document WB-DC-40-64, Revision 12, "Design Basis Events Design Criteria."

4.10.3. The point in time or the plant conditions that require automatic control of protective actions.

Not Applicable, The PAMS performs no automatic protective actions.

4.10.4. The point in time or the plant conditions that allow returning a safety system to normal.

Not Applicable. The PAMS has no execute or control functions to be returned to normal.

4.11. The equipment protective provisions that prevent the safety systems from accomplishing their safety functions.

Not Applicable. The PAMS safety function is not dependent on the availability of external protective equipment.

4.12. *Any other special design basis that may be imposed on the system design (example, diversity, interlocks, regulatory agency criteria)*

Additional regulatory and industry standard criteria that the PAMS is required to meet and compliance with those criteria is included in the WBN Unit 2 FSAR, Amendment 105, Table 7.1-1, "Watts Bar Nuclear Plant NRC Regulatory Guide Conformance."

References:

1. IEEE 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations"

2. Regulatory Guide 1.97, Revision 2, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident"

3. WBN Unit 2 Final Safety Analysis Report, Amendment 105, Table 7.1-1 "Watts Bar Nuclear Plant NRC Regulatory Guide Conformance"

4. Watts Bar Unit 2 Final Safety Analysis Report, Amendment 105, Table 7.5-2 "Regulatory Guide 1.97 Post Accident Monitoring Variables Lists"

5. Watts Bar Unit 2 Final Safety Analysis Report, Amendment 105, Chapter 15, "Accident Analyses"

6. TVA Calculation WBNOSG4047, Revision 4, "PAM Type "A" Variables Determination"

7. TVA Calculation EPMMCP071689, Revision 19, "Cooling/Heating Load & Equipment/Component Performance Analysis for the Control Building Electrical Board Room Areas (EL. 692.0 & 708.0)"

8. TVA Calculation EPMLCP072489, Revision 13, "Cooling and Heating Load Analysis, Main Control Room HVAC"

9. TVA Calculation WBNAPS3127, Revision 0, "EQ Dose in the Control Building"

10. TVA Calculation WBNAPS4004, Revision 27, "Summary of Mild Environment Conditions for Watts Bar Nuclear Plant"

11. TVA Design Criteria Document WB-DC-30-20, Revision 3, "Control Panels"

12. TVA Design Criteria Document WB-DC-30-23, Revision 2, "Human Factors"

13. TVA Design Criteria Document WB-DC-30-27, Revision 33, "AC and DC Control Power Systems - (Unit 1 / Unit 2)"

14. TVA Design Criteria Document WB-DC-30-32, Revision 3, "Design Criteria for Grounding"

15. TVA Design Criteria Document WB-DC-30-4,Revision 22, "Separation / Isolation"

16. TVA Design Criteria Document WB-DC-40-31.2, Revision 12, "Seismic Qualification of Category I Fluid System Components and Electrical or Mechanical Equipment"

17. TVA Design Criteria Document WB-DC-40-42, Revision 6, "Environmental Design"

18. TVA Design Criteria Document WB-DC-40-64, Revision 12, "Design Basis Events Design Criteria"

19. TVA System Description N3-30CB-4002, Revision 16, "Control Building Heating, Ventilating, Air Conditioning, and Air Cleanup System"

20. TVA System Description N3-39-4002, Revision 10, "CO_2 Storage, Fire Protection, And Purging"

21. TVA Drawing 2-47E235-16, Revision 0, "Environmental Data Environment - Mild EL 755.0"

22. TVA Drawing 2-47E235-16, Revision 0, "Environmental Data Environment - Mild EL 708.0"

23. Westinghouse document WNA-AR-00189-WBT-P, Revision 0 "Post Accident Monitoring System Reliability Analysis"

24. Westinghouse document WNA-AR-00180-WBT-P, Revision 0, "Failure Modes and Effects Analysis (FMEA) for the Post Accident Monitoring System"

25. Westinghouse document WNA-LI-00058-WBT-P, Revision 3, "Post-Accident Monitoring System (PAMS) Licensing Technical Report"