## WBN2Public Resource

**From:** Boyd, Desiree L [dlboyd@tva.gov]
**Sent:** Friday, May 06, 2011 2:20 PM
**To:** Epperson, Dan; Poole, Justin; Raghavan, Rags; Milano, Patrick; Campbell, Stephen
**Cc:** Crouch, William D; Hamill, Carol L; Boyd, Desiree L; Knuettel, Edward Terry
**Subject:** TVA letter to NRC_05-06-11_I&C RAI Response
**Attachments:** 05-06-11_I&C RAI Response_Final.pdf

***Please see attached TVA letter that was sent to the NRC today.***

***The attachments are too large to send by e-mail. For those of you who receive a cc in the mail, the attachments will be included with your letter***

***Thank You,***

~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~

*Désireé L. Boyd*

***WBN 2 Licensing Support***
***Sun Technical Services***
***dlboyd@tva.gov***
***423-365-8764***

~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~*~

**Hearing Identifier:** Watts_Bar_2_Operating_LA_Public
**Email Number:** 371

**Mail Envelope Properties** (7AB41F650F76BD44B5BCAB7C0CCABFAF1E8A9D7E)

**Subject:** TVA letter to NRC_05-06-11_I&C RAI Response
**Sent Date:** 5/6/2011 2:19:57 PM
**Received Date:** 5/6/2011 3:23:38 PM
**From:** Boyd, Desiree L

**Created By:** dlboyd@tva.gov

**Recipients:**
"Crouch, William D" <wdcrouch@tva.gov>
Tracking Status: None
"Hamill, Carol L" <clhamill@tva.gov>
Tracking Status: None
"Boyd, Desiree L" <dlboyd@tva.gov>
Tracking Status: None
"Knuettel, Edward Terry" <etknuettel@tva.gov>
Tracking Status: None
"Epperson, Dan" <Dan.Epperson@nrc.gov>
Tracking Status: None
"Poole, Justin" <Justin.Poole@nrc.gov>
Tracking Status: None
"Raghavan, Rags" <Rags.Raghavan@nrc.gov>
Tracking Status: None
"Milano, Patrick" <Patrick.Milano@nrc.gov>
Tracking Status: None
"Campbell, Stephen" <Stephen.Campbell@nrc.gov>
Tracking Status: None

**Post Office:** TVANUCXVS2.main.tva.gov

| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 486 | 5/6/2011 3:23:38 PM |
| 05-06-11_I&C RAI Response_Final.pdf | 407017 | |

**Options**
**Priority:** Standard
**Return Notification:** No
**Reply Requested:** No
**Sensitivity:** Normal
**Expiration Date:**
**Recipients Received:**

Attachments 4 and 8 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

May 6, 2011

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

Watts Bar Nuclear Plant, Unit 2 — 10 CFR 50.4
NRC Docket No. 50-391

**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 contains the new regulatory commitments contained in this letter.

Attachments 4 and 8 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.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 6th day of May, 2011.

Respectfully,

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):

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

bcc (Enclosures):

Stephen Campbell
U.S. Nuclear Regulatory Commission
MS 08H4A
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

Charles Casto, Deputy Regional Administrator for Construction
U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

David Rahn
U.S. Nuclear Regulatory Commission
MS 09D2
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

George A. Wilson, Jr.
U.S. Nuclear Regulatory Commission
MS 09E3
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

**Enclosure 1**
**TVA Letter Dated May 6, 2011**
**Responses to Licensee Open Items to be Resolved for SER Approval**

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:

| | |
|---|---|
| AC 160 | [1]Advant® Controller 160 |
| [2]ANSI™ | American National Standards Institute |
| [3]AP-1000 | Westinghouse Generation III+ advanced light water reactor design |
| [4]BEACON™ | Best Estimate Analyzer for Core Operations Nuclear |
| BISI | Bypass and Inoperable Status Indication |
| CET | Core Exit Thermocouple |
| CFR | Code of Federal Regulation |
| CGI | Commercial Grade Item |
| [5]DMIMS-DX™ | Digital Metal Impact Monitoring System |
| EDCR | Engineering Document Change Request |
| EFPD | Effective Full Power Day |
| EMC | Electro-Magnetic Compatibility |
| EMI | Electro-Magnetic Interference |
| ENV | European Standard |
| [6]EPRI® | Electric Power Research Institute® |
| EQ | Environmental Qualification |
| FID | Fixed Incore Detector |
| FSAR | Final Safety Analysis Report |
| GA-ESI | General Atomic-Electronic Systems Inc. |
| ICS | Integrated Computer System (aka Plant Computer) |
| [7]IEEE™ | Institute of Electrical and Electronics Engineers |
| IIS | Incore Instrument System |
| IITA | Incore Instrument Thimble Assembly |
| LPMS | Loose Parts Monitoring System |
| MCR | Main Control Room |
| MIDS | Movable In-core Detector System |
| MTP | Maintenance and Test Panel |
| NDL | Nuclear Data Link |
| NEI | Nuclear Energy Institute |
| NIST | National Institute of Standards and Technology |
| NRC | Nuclear Regulatory Commission |
| OI | Open Item (from NRC I&C Open Item Matrix) |
| OM | Operators Module |

[1] Advant is registered trademark of ABB Automation Technology Products Management AG
[2] ANSI is a registered trademark of the American National Standards Institute
[3] AP-1000 is a registered trademark of the Westinghouse Electric Company LLC
[4] BEACON is a registered trademark of the Westinghouse Electric Company LLC
[5] DMIMS-DX is a registered trademark of the Westinghouse Electric Company LLC
[6] EPRI and Electric Power Research Institute are registered service marks of the Electric Power Research Institute Inc.
[7] IEEE is a registered trademark of the Institute of Electrical and Electronics Engineers Inc.

| | |
|---|---|
| PAMS | Post Accident Monitoring System |
| PDMS | Power Distribution Monitor System |
| RAI | Request for Additional Information |
| RFI | Radio Frequency Interference |
| RG | Regulatory Guide |
| RTP | Reactor Thermal Power |
| SDD | Software Design Document |
| SE | Safety Evaluation |
| SPDS | Safety Parameter Display System |
| SPD | Self Powered Detector |
| SRP | Standard Review Plan (NUREG-800) |
| SRS | Software Requirements Specification |
| SSER | Supplemental Safety Evaluation Report |
| SWCCF | Software Common Cause Failure |
| SysRS | System Requirements Specification |
| TSC | Technical Support Center |
| TSM | Technical Specification Monitor |
| TVA | Tennessee Valley Authority |
| V&V | Verification and Validation |
| WEC | Westinghouse Electric Company LLC |
| WBN | Watts Bar Nuclear Plant |
| [8]WINCISE™ | Westinghouse In-Core Information Surveillance & Engineering |

**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**

*NRC current review guidance is based on compliance with RG 1.180 or equal with justification for variations. TVA is requested to provide the roadmap for compliance to RG 1.180 with justifications for any deviations. Simply following TVA standard specification SS E18.14.01, Rev. 3 is not sufficient.*

**TVA Response to Follow-up NRC Request**

Attachment 1 provides a comparison of the TVA EMC Standard Specification E18.14.01, Revision 3 requirements to Regulatory Guide (RG) 1.180 Revision 1 requirements. The comparison shows that the TVA specification complies with the RG requirements.

[8] WINCISE is a registered trademark of the Westinghouse Electric Corporation LLC

**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.*

**Follow-up NRC Request**

*Report 04507007-1TR, 1999 states in the Test Summary that "Initially the testing was done using the [Sorrento Electronics] safety related production modules that had undergone software V&V testing. The majority of the testing was done by using two of the Sequoyah non-safety related production modules for the TVA contract, substituted for the [Sorrento Electronics] modules." Since the report is based on primarily non safety related components TVA to clarify and justify why NRC should accept this test report for safety related V&V testing.*

**TVA Response to Follow up NRC Request**

GA-ESI has a single process for buying material, assembling, and testing modules. The same safety-related processes are used for any part number, safety-related or not, to avoid having to store the same part number in two different locations and avoid the possibility of mixing them up. Therefore, the Sorrento Electronics "safety-related" production modules and the Sequoyah "non-safety-related" modules are physically identical. Based on the above, the report is acceptable.

**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-800, Section 7.0A, 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.*

**Follow-up NRC Request**

*(1) TVA to review and satisfy itself with the procedure and provide NRC a copy of the procedure for review.*

*(2) In addition, TVA and GA-ESI to provide information as to what additional measures were taken by GA-ESI with available documentation to prove that more than one method was followed for commercial dedication.*

**TVA Response to Follow up NRC Request**

(1) TVA has reviewed the revised GA-ESI procedure and determined that the revision brings the GA-ESI commercial grade dedication program into conformance with the requirements of NUREG-800, Section 7.0A, Revision 5 EPRI Topical Report TR-106439 and EPRI guideline NP-5652. Attachment 2 contains GA-ESI Procedure OP-7.3-240, "Safety-Related Commercial Grade Item Parts Acceptance," Revision I.

(2) As stated in Attachment 4 of TVA letter to NRC dated April 15, 2011 (Reference 1), the due date for resolution of this issue is September 15, 2011.

**4. NRC Request (Item Number 362)**

*OI #331 requested TVA to provide information regarding how the Loose Parts Monitoring System (LPMS) in-containment components (e.g., Accelerometer ( including the integral insulated hardline cable), Softline cable, and Remote Charge Preamplifiers) were qualified for vibration as addressed in regulatory position C.1.g of RG 1.133, Rev. 1. TVA responded by stating that "TVA has reviewed the information provided by Westinghouse describing how the Loose Part Monitoring System (LPMS) sensor is qualified for normal operating conditions provided in Westinghouse letter WBT-D-2782, dated December 17, 2010 (Reference 11) as addressed in regulatory position C.1.g of Reg. Guide 1.133 and found it acceptable. Vibration qualification is not applicable to the softline cable. Due to the installation location (junction boxes mounted to the shield or fan room walls) and previous seismic qualification, vibration qualification of the charge converter/preamplifier is not required. This completes the response to this item."*

*However, the staff still desires further clarification on this response. (1) Specifically, please provide a documented basis that demonstrates the LPMS in-containment equipment is qualified for normal operating conditions (e.g., test results compared to the equipment qualification specification), including vibration qualification. (2) Also, provide justification for why vibration qualification if the Remote Charge Preamplifier is not required*

**TVA Partial Response to NRC Request**

(1) Attachment 4 contains Westinghouse document "WBT DMIMS-DX™ Seismic Evaluation of the Digital Metal Impact Monitoring System (DMIMS-DX™) for Watts Bar Unit 2," EQ-QR-33-WBT, Revision 0 (proprietary). The non-proprietary version of "WBT DMIMS-DX™ Seismic Evaluation of the Digital Metal Impact Monitoring System (DMIMS-DX™) for Watts Bar Unit 2," EQ-QR-33-WBT, Revision 0 and the affidavit for withholding will be submitted within two weeks of receipt from Westinghouse.

Attachment 5 contains Westinghouse non-proprietary white paper WBT-D-2782, "Westinghouse DMIMS-DX In-Containment equipment environmental specifications."

EQ-EV-71-WBT-P, Revision 1, "Environmental Evaluation and Operating History of the Westinghouse DMIMS-DX Preamplifier and Softline Cable Used at Watts Bar 2," dated February 2011 was submitted in TVA letter to NRC dated February 25, 2011 (Reference 3).

(2) The Remote Charge Preamplifiers are mounted in junction boxes inside

containment. The junction boxes are hard mounted either to the crane wall or to a fan room wall. The crane wall and fan room walls are not subject to any significant vibration during normal operation.

**5. NRC Request (Item Number 363)**

*OI#199 requested TVA to provide information concerning how TVA plans to meet regulatory criteria for Quality (10 CFR 50.55a(a)(1)) associated with the Technical Support Center and Nuclear Data Link. TVA responded in Letter Dated October 5, 2010, Item 63; however, TVA's response does not address the quality aspects of these system features. A similar question had been asked for Quality Criteria adherence for the SPDS and the BISI functions of the Integrated Computer System. In response to that request (same letter) TVA provided a description of TVA procedures, BISI software development procedures, and various management measures that will be taken to assure high quality in the design, operation, and maintenance of the SPDS and BISI functions of the ICS. Since the TSC and Nuclear Data Link information originates in the SPDS function of the ICS, are there any aspects of the quality measures that apply to the TSC and NDL features developed as part of quality processes for the ICS that are applicable to the data communications features?*

*Specifically, what is the scope of TVA Procedure SPP-2.6 "Computer Software Control"? How does it apply to the ICS functions of a) SPDS, b) BISI, and c) TSC and NDL functions? Wouldn't there be aspects of the quality procedures that apply to the development, maintenance, and operations of the software needed to support the data communications features. Also, what quality measures will be applied to develop, maintain, and operate the hardware that accomplishes the TSC and NDL functions to ensure that these features will be reliable and available when needed?*

**TVA Response to NRC Request:**

TVA Procedure SPP-2.6 "Computer Software Control," has been superseded by TVA Procedure NPG-SPP-12.7, "Computer Software Control," Revision 0, dated December 17, 2010 (Attachment 3).

To ensure quality, the design, testing, and inspection of all Integrated Computer System (ICS) software including (a) SPDS, (b) BISI and (c) Technical Support Center (TSC) and Nuclear Data Link (NDL) functionality is controlled by qualified personnel in accordance with TVA Procedure NPG-SPP-12.7. The TSC and NDL functions are provided and performed by the ICS and, in the case of NDL, the Central Emergency Control Center (CECC) computers in Chattanooga.

Any changes to ICS software must be documented and controlled using TVA Procedure NPG-SPP-12.7. This includes the (a) SPDS, (b) BISI and (c) TSC and NDL functions. The procedure details controls and processes required for the development, modification, and configuration management of computer software used to support the design, operation, modification, and maintenance of TVA's nuclear power plants consistent with the Nuclear Quality Assurance Plan.

Controls in NPG-SPP-12.7 guide the development and testing of the software changes. Other controls established by this procedure to further maintain quality standards are:

- The application custodian implements controls to prevent unauthorized changes to the software.
- Changes are made in a non-production environment, and validation testing takes place before the change is installed on the ICS when possible.
- Once validation testing begins, the source code is placed under configuration control.
- When the modifications are installed on the ICS, an operability test is performed to demonstrate that the software is installed correctly and is functioning correctly in its operating environment.
- Documentation related to ICS software changes are quality assurance (QA) records.
- The software source code is kept in a physically secure, environmentally controlled space to prevent inadvertent changes.
- Cyber security considerations are also considered in the storage environment.
- The data goes through several validation steps before being presented to the operators.
- When redundant sensors are used, the data received by the computer can be processed by software to determine if the quality of one or more points is questionable.

The hardware involved in the TSC and NDL functionality is verified to be operable on a periodic basis.

In the case of the NDL functionality, the ICS transmits the required data to the CECC on a continuous basis. The CECC monitors the status of the ICS data communications, and alarms are generated when the link is not active. The Emergency Plan (EP) staff conducts a quarterly test that verifies that NDL data is successfully transmitted from each unit to the NRC.

**6. NRC Request (Item Number 364)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response: TVA performed an analysis and concluded that the Common Q PAMS equipment does not need to meet either IEEE 279-1971 or IEEE 603-1991 and so no analysis was performed or provided.*

*However, SRP (NUREG-0800 Rev. 2 dated March 2007) Section 7.7, "Information System Important to Safety," specifically identifies IEEE Std 603-1991 as being applicable to accident monitoring instrumentation. Based upon the review of this item, the staff finds the following open items:*

1. *TVA to demonstrate that the Common Q PAMS meets the applicable regulatory requirements in IEEE Std 603-1991.*

2. *TVA to update FSAR (Amendment 103) Table 7.1-1 to reference IEEE Std 603-1991 for WBN2 Common Q PAMS and Sorrento Containment High Radiation Monitors.*

**TVA Partial Response to NRC Request:**

2. Table 7.1-1 will be updated to reference IEEE Std 603-1991 for the Common Q PAMS.

   TVA has reviewed the requirements of IEEE Std 603-1991 for the Sorrento Containment High Range Radiation Monitors and determined that IEEE Std 603-1991 is not applicable. IEEE 603-1991 is applicable to actuation systems. While TVA lists the containment high range radiation monitors as RG 1.97 Revision 2 Type A variables, the classification is not based on the RG 1.97 requirements which states:

   "Type A, those variables that provide primary information needed to permit the control room operating personnel 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 functions for design basis accident event."

   TVA calculation WBN0SG4047, "PAM Type 'A' Variables Determination," uses a broader definition. The calculation definition is:

   "The type 'A' variables will be divided into three groups based on the parameter's purpose. The groups are: (1) event identification, (2) event recovery to plant stabilization, and (3) maintaining the stabilized conditions from event recovery to hot standby. Following a reactor trip, the termination point for transients at WBNP is considered a stabilized condition at hot standby per chapter 15 of the WBN FSAR. Event recovery actions are those manual actions taken to mitigate a design basis accident to a stabilized condition. The plant can be considered stabilized when the plant parameters vary slowly and automatic systems are not being initiated. The diagnostic process consciously performed by the operator via the plant variables to interpret an event indication will be considered as a safety-related operator action regardless of the lack of manual manipulation of equipment. This diagnostic process is necessary to enable the operator to distinguish the 'type' of transient and take the correct mitigating actions."

   A review of TVA calculation WBN0SG4047 and the associated Emergency Instructions found that there are no operator actions that meet the RG 1.97 Revision 2 definition for a Type A variable which are based on the containment high range radiation monitors. Based on this review, IEEE 603 is not applicable to the containment high range radiation monitors.

**7. NRC Request (Item Number 365)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response: "that WBN2 is not committed in complying with Reg. Guide 1.75…Since WBN2 is not committed to RG 1.75 or IEEE-384, no comparison is required…"*

*However, WBN2 is committed to RG 1.75 Rev. 2, "Physical Independence of Electric Systems." RG 1.75 Rev. 3 and IEEE Std. 384-1992 are used, in part, to address IEEE Std 603-1991 Clause 5.6.1. The current NRC staff position for RG 1.75 is documented in Rev. 3. Based upon the review of this item, the staff finds the following open item:*

1. *TVA to update FSAR (Amendment 103) Table 7.1-1 to include RG 1.75 Rev. 3 for WBN2 Common Q PAMS and the Sorrento Containment High Radiation monitor.*

*The Common Q PAMS was designed to meet the requirements of RG 1.75 Rev. 2. WBN2 did not perform an analysis to RG 1.75 Rev. 3. Based upon the review of this item, the staff finds the following open item:*

2. *TVA to evaluate Common Q PAMS and the Sorrento Containment High Radiation monitor for conformance with RG 1.75 Rev. 3.*

**TVA Response to NRC Request:**

The Common Q PAMS and containment high range radiation monitor internal wiring meets the requirements of RG 1.75. The external Common Q PAMS and containment high range radiation monitor cables are routed as 1E, 10 CFR 50.49, trained cables in accordance with WBN Design Criteria WB-DC-30-4, which is not in conformance with RG 1.75 Revision 3 or IEEE Std 384-1992.

As noted in WBN Unit 2 FSAR Section 8.1.5.3, "Compliance to Regulatory Guides and IEEE Standards," note 2, RG 1.75 was issued after the WBN design was complete. Separations criteria for WBN are given in Section 8.3.1.4.2."

FSAR Section 8.3.1.4.2 provides a detailed discussion of the WBN Unit 2 separation requirements and compensatory actions. To ensure that non-1E cables do not degrade 1E cables, non-1E routed in Class 1 structures are evaluated to ensure that they are adequately protected to prevent propagation of damage from the non-1E cables to 1E cables.

The NRC reviewed TVA's separation criteria as supplemented by a breaker testing program in SSER 16 and found it to be acceptable. The same criteria and breaker testing program are applicable to WBN Unit 2.

**8. NRC Request (Item Number 366)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response: TVA stated that the Common Q PAMS equipment fully meets the RG 1.100 Rev. 0 and is compliant with Rev. 3, with exception of testing above 33 Hz, which is not applicable to Watts Bar.*

*The WBN2 FSAR (Amendment 103) references Regulatory Guide 1.100 Rev. 1 "Seismic Qualification of Electrical Equipment for Nuclear Power Plants." The Common Q PAMS was designed to meet the requirements of RG 1.100 Rev. 2. RG 1.100 Rev. 3 is the current revision of this guide and is endorsed by the NRC. RG 1.100 Rev. 3 endorses IEEE 344-2004.*

*Based upon the review of this item, the staff finds the following open item:*

*1 TVA to update FSAR (Amendment 103) Table 7.1-1 to include RG 1.100 Rev. 3 for WBN2 Common Q PAMS and the Sorrento Containment High Radiation monitor.*

*or*

*2 TVA to evaluate Common Q PAMS for conformance with RG 1.100 Rev. 1.*

**TVA Response to NRC Request:**

The Common Q PAMS and RM-1000 radiation monitors comply with IEEE 344-2004 and with RG 1.100 Revision 3 with the exception of issues associated with testing above 33Hz. FSAR Table 7.1-1 will be updated to reflect conformance.

**9. NRC Request (Item Number 367)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response.*

*The WBN2 FSAR (Amendment 103) references RG 1.153 Rev. 0, "Criteria for Safety Systems." The Common Q PAMS is designed to meet the requirements of RG 1.153 Rev. 1. By letter dated February 25, 2010 (ML110620219), TVA stated:*

*"The subject Regulatory Guides [RG 1.153 Rev. 0 & 1] endorse and reference other standards. Common Q PAMS has been evaluated to comply with the requirements of these other endorsed standards ([Comparison report in this letter titled IEEE-279-1971 to IEEE-603-1991 Comparison]). Therefore no additional analysis needs to be performed and no further action is necessary."*

*However, the "Comparison report in this letter titled IEEE-279-1971 to IEEE-603-1991 Comparison," stated:*

*"The first of the two standards, IEEE-279, is part of the design basis of WBN2 but is not relevant to Common Q PAMS. The second standard, IEEE-603-1991 is not part of the design basis for the Common Q PAMS for WBN2."*

*Based on the reasoning quoted above, WBN2 did not evaluate the Common Q PAMS against the criteria of RG 1.153 Rev. 1; therefore, the staff finds the following open item (see also Open Items 364 No. 1 & 2 above.):*

*1. TVA to evaluate Common Q PAMS for conformance with RG 1.153 Rev. 1.*

**TVA Response to NRC Request:**

Common Q PAMS complies with RG 1.153, Revision 1. The response in Attachment 4 of TVA to NRC letter dated February 25, 2011 (Reference 3) was in error.

**10. NRC Request (Item Number 368)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response.*

*The WBN2 FSAR (Amendment 103) references RG 1.152 Rev. 0, "Criteria for Digital Computers in Safety Systems of Nuclear Power Plants." The Common Q PAMS was designed to meet the requirements of RG 1.152 Rev. 1. RG 1.152 Rev. 2 is the current revision of this guide and is endorsed by the NRC. By letter dated February 25, 2010 (ML110620219), TVA stated:*

*"RG 1.152 rev 2 endorses ANSI/IEEE-ANS-7-4.3.2-2003, but also provides extra regulatory guidance concerning computer based cyber security. Since this revision was not part of the design basis of WBN2 or Common Q PAMS, the project makes no commitment to the compliance of RG 1.152 rev 2."*

*Based upon the review of this item, the staff finds the following open item:*

*1. TVA to evaluate Common Q PAMS for conformance with RG 1.152, Rev. 2.*

**TVA Response to NRC Request:**

As documented in Attachment 6, Common Q PAMS is in conformance with RG 1.152, Revision 2, with the exception of the cyber security requirements.

The Common Q PAMS will meet the cyber security requirements for the WBN Unit 2 Nuclear Security Program as mandated by 10 CFR 73.54 via WBN Unit 2 Procedure 25402-3DP-G04G-00508, "Cyber Security Program." This cyber security procedure addresses the security controls identified in NIST Special Publication 800-53, "Recommended Security Controls for Federal Information Systems and Organizations," Revision 3, which are very similar to the recommended controls endorsed by the NRC in RG 5.71, "Cyber Security Programs For Nuclear Facilities," Revision 0, and NEI 08-09, "Cyber Security Plan for Nuclear Power Reactors," Revision 6.

**11. NRC Request (Item Number 370)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response.*

*The WBN2 FSAR (Amendment 103) does not reference RG 1.168, IEEE 1012, or IEEE 1028. IEEE Std 7-4.3.2-2003 identifies IEEE Std 1012-1998 as normative. RG 1.168 Rev. 1 endorses, with clarifications, IEEE 1012-1998. The current staff positions are documented in RG 1.168 Rev. 1, IEEE 1012-1998, and IEEE 1020-1997. Based upon the review of this item, the staff finds the following open item:*

1. *WBN2 to update FSAR Table 7.1-1 to reference RG 1.168 Rev. 1, IEEE 1012-1998, and IEEE 1020-1997 as being applicable to WBN2 Common Q PAMS and the Sorrento Containment High Radiation monitor.*

**TVA Partial Response to NRC Request:**

Common Q PAMS is designed in accordance with RG 1.168, Revision 1, IEEE 1012-1998 and IEEE 1020-1997. These references will be added to FSAR Table 7.1-1.

**12. NRC Request (Item Number 372)**

*On 5/6/2010 (See Open Item No. 81) the NRC Staff requested an evaluation of the Common Q PAMS against the current staff position.*

*By letter dated 2/25/11 (ML110620219), TVA docketed a response.*

*The requirements in the SysRS and SRS are not traceable back to the design basis (e.g., IEEE Std 603-1991 Section 4) for the system. The SRS does not include any documented evidence that it was ever independently reviewed in accordance with the 10CFR50 Appendix B Criterion III, "Design Control." (Note: It appears that the only Common Q or WBN2 PAMS document that was independently reviewed in accordance with 10 CFR 50 Appendix B requirements is the SysRS.)*

*Based upon the review of the SysRS and SRS, the staff finds that there is reasonable assurance that the systems fully conform to the applicable guidelines, except for the following open items:*

1. *TVA to produce an acceptable description of how the SysRS and SRS implement the design basis requirements of IEEE 603-1991 Clause 4.*

2. *TVA to produce a final SRS that is independently reviewed in accordance with 10 CFR 50 Appendix B, "Criterion III Design Control," requirements.*

**TVA Partial Response to NRC Request:**

1. Attachment 7 contains the evaluation for how the Common Q PAMS SysRS and SRS implement the design basis requirements of IEEE 603-1991, Clause 4.

**13. NRC Request (Item Number 374)**

*By letter dated October 29, 2010 (ML103120711), TVA docketed a draft technical evaluation associated with an engineering design change (ML103120712) that states the Common Q PAMS will require changes in the technical specifications. The technical specifications (TS) have not been received yet for review. The TS will be reviewed once they are received.*

*1. Confirm/Verify Technical Specification changes associated with Common Q PAMS are acceptable.*

**TVA Response to NRC Request:**

1. The TS changes required by implementation of the Common Q PAMS were made in Revision B of TS Section 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," which were submitted in TVA letter to NRC dated February 2, 2010, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Developmental Revision B of the Technical Specifications (TS), TS Bases, Technical Requirements Manual (TRM), TRM Bases; and Pressure and Temperature Limits Report (PTLR)," ADAMS accession number ML100550326 (Reference 2).

**14. NRC Request (Item Number 375)**

*1. During the conference call held on 4/12, the staff requested TVA to provide a description of the differences in hardware and/or software design and implementation of the Incore Instrumentation System instrumentation between WBN2 and WBN1. This information was not included in the 4/15 letter. When will this be provided?*

*2. The response for item g provided by TVA does not describe how the regulatory requirements were met. It only listed the criteria and stated that it passed the test. Also, the criteria for IITA does not list criteria for environmental qualifications of safety-related equipment (e.g., RG 1.29, Environmental Equipment Qualifications). Please provide summary test reports.*

*3. Attachment 4 of the TVA letter 4/15 states that the CET and CET cable assembly, as well as mineral insulated cables and IITA connectors, are EQ and class 1E qualified. Please provide the qualification summary test report for these components.*

*4. Attachment 5 of the TVA letter 4/15 provides the hardware description for the WINCISE (WEC document NO-WBT-002). Does this document include a section for Software Description? If so, please provide a copy.*

*5. Attachment 7 of the TVA letter 4/15 describes the functionality of the IIS for Watts Bar unit 2 and the IIS used in AP-1000. The description provided only describes the similarity for the core exit thermocouple (CET) and the PAMS system. However, this document does not describe the other components of the IIS (e.g. IITAs). Please clarify if the only similarity between Watts Bar unit 2 and AP-1000 is for the CETs and PAMS, and that there is not similar for the IITAs.*

6. *The WCAP-12472-P-A for the BEACON system describes that the system has three operational levels: on line monitoring, tech spec monitor (TSM), and direct margin monitor. For Unit 1, TVA requested approval of the Beacon TSM to be only used as a tech spec monitor for present peaking factor limits. Please confirm that the functionality to be implemented in Unit 2 is the same than the one requested and approved for unit 1. Note Attachment 5 states that the Beacon servers run the Beacon TSM, but it is not clear that this is the only level operating for the IIS.*

7. *The SE for use of the Beacon System in Unit 1 states that the BEACON system will be used when thermal power is greater than 25% RTP. Page 129 of Attachment 4 states that "the WINCISE system will be capable of performing its required core monitoring functions at or above 20%RTP." Please clarify what the intent is for the Beacon system in Unit 2.*

8. *The technical evaluation provided for the Beacon System for unit 1 states that "the movable incore detectors (MIDs) are used for periodic calibration of the PDMS when thermal power is greater than 25% RTP. Additionally, the MIDs are used whenever the PDMS is inoperable or whenever power distribution is below 25%." Please explain how this function will be performed with the fix incore detectors and the Beacon system for unit 2.*

9. *In the NRC SE for WCAP-12472-P-A for the BEACON system, the staff accepted this system but subject to three conditions. In the TVA submittal for use of the Beacon system in unit 1, TVA described how they met these conditions for Unit 1. Please describe how TVA will meet these conditions for Unit 2.*

10. *Please clarify the following statement provided in Attachment 4, Page 25: "During certain accident scenarios, it is possible for the CETs to see temperatures up to 20 deg F different from Unit 1."*

11. *Attachment 4 and 5 explained that the Mineral Insulation cable allows the isolation of the core exit thermocouples (1E) and self-powered neutron detector (non-1E) signals. Please provide the analysis that evaluated this separation, as well as the evaluation that show that failure of the non-1E signal won't affect the 1E signal.*

12. *Page 129 of Attachment 4 states that a minimum of three thermocouples are operable in each quadrant. Table 7.5-2 of the SSER (R.G. 1.97) states that 4 thermocouples should be operable in each quadrant. Please explain if TVA is deviating from the requirements in R.G 1.97, and how this is justified.*

13. *Please provide information regarding the effects of a software common cause failure (SWCCF) on the IIS.*

14. *The FMEA provided by TVA on 4/15 has not been updated. Also, the FMEA provided focus on failures during installation and commissioning and it does not identify measures for failures during operation. Last, this FMEA does not address software failures, only component failures and installation failures. Please provide an updated and complete version of the FMEA.*

15. *Attachment 4, TVA document "Incore Instrumentation System" describes the system requirements. Therefore, provide a complete system description of the IIS for the staff to evaluate the IIS to be installed in Watts Bar Unit 2. Also, the description for the incore thermocouple system in this TVA document is inconsistent with the description provided in Westinghouse WINCISE Hardware Description (Attachment 5). For example, Section 1.2 of the TVA document states that there are 65 incore thermocouples and Section 2.2.9 describes that the incore thermocouples provide an input signal to the Inadequate Core Cooling Monitor.*

16. *TVA attachment 4 of the 4/15 letter show modifications to the DBE design criteria. Please provide detailed explanation about these modifications.*

17. *Please explain if new penetration and routing were required for IIS' signals. If new penetrations are required, explain how these were qualified. Also, explain the criteria used to route the power/control cables.*

18. *Questions on Technical Specification:*

    *(1) The TVA package states that TS 3.1 and TS Bases 3.1 were modified due to WINCISE. Please provide detailed information to evaluate the modifications to the TS.*

    *(2) The TVA mark up does not define the operating limits in the TS for the reactor power distribution. Please provide detailed information on how the IIS may impact the Technical Specification.*

19. *Redundancies are designed and built into the signal processing system to avoid impacting operation in the event of the loss of some SPD signals. The master signal processing rack data interface card provides the output data stream to the Application server. Each cabinet master signal processor rack contains redundant data interface cards. Loss of one data interface card will not result in a loss of data output from the cabinet. Provide detailed description on how this works (e.g., is the switchover software based?)*

20. *The Application Servers receive information from Signal Processing System (SPS Cabinets), Integrated Computer System (ICS), and BEACON. The WINCISE IP Switches provide the main hub for traffic flow from the SPS cabinets, BEACON servers, Application Servers, and ICS. Provide detailed description of the communication among the Integrated Computer System (ICS) and the Beacon System and the WINCISE's Application servers.*

21. *Attachment 4, TVA document "Incore Instrumentation System" describes that the WINCISE system includes a Domain server, which provides a supportive function and is not required for the PDMS to receive needed information from the Application Server. However, the domain server provides an environment for the development and maintenance of application and system software. Please explain how this domain server will be configured and used for WINCISE in WBN2. Note that the domain server is not part of the Westinghouse WINCISE Hardware Description (Attachment 5)*

22. *Page 52 of Attachment 4, question 1.5 was answered yes, but the I&C calculation to be provided in Sections 4 and 5 is not included. Please explain if this calculation was performed, and if so provide a description.*

23. *Page 52 of Attachment 4, Section 6 does not include the block diagram of the proposed modification to WBN2. Please provide a block diagram of the system, including power sources.*

**TVA Partial Response to NRC Request:**

1. System differences are described in Engineering Document Construction Release (EDCR) 52321-1 Excerpts (Attachment 4 of TVA letter to NRC dated April 15, 2011 (Reference 1) pages 2 and 3, 7 through 9, and 60 through 113.

2. Please see the response to EQ report request item 3 below. Only the safety-related portion of IITA (namely the CETs and CET cable assemblies) are safety significant and fall under the cited regulatory guide.

3. Please refer to Westinghouse report DAR-ME-09-10, Revision 0, Qualification Summary Report for the WINCISE Cable and Connector Upgrade at Watts Bar Unit 2 (proprietary) (TVA Document Number: 25402-011-V1A-MG00-01949-001-WBT-D-1464) (Attachment 8) for qualification of the associated cable assemblies. The non-proprietary version of DAR-ME-09-10, Revision 0, Qualification Summary Report for the WINCISE Cable and Connector Upgrade at Watts Bar Unit 2 and the affidavit for withholding will be submitted within two weeks of receipt from Westinghouse.

   The qualification report for the IITAs has not been completed. The proprietary and non-proprietary versions and the affidavit for withholding will be submitted within two weeks of receipt from Westinghouse.

5. The IITA are composed of the CET and the self-powered neutron detectors (SPDs). The WBN Unit 2 and AP1000 IITAs have the same function, but are a slightly different design. These differences are necessary because the WBN IITAs are bottom mounted and the AP1000 IITAs are top mounted. Additionally, the IITA are sized appropriately for WBN and AP1000 because the fuel assemblies are different sizes. The WBN IITA design includes 5 self-powered neutron detectors (SPDs) of sequentially increasing length, up to a maximum length of 12 feet. The AP1000 IITA design includes 7 SPDs of sequentially increasing length, up to a maximum of 14 feet.

6. Unit 2 has only been provided with the BEACON TSM function.

7. The BEACON topical report states that BEACON PDMS will be inoperable below 25% RTP. The electrical equipment operability requirements are set below the core power distribution monitoring requirements to ensure that the electronics are operable when needed to support core monitoring.

8. Periodic flux maps using the MIDs (Unit 1) have been replaced by continuous analysis of the permanently installed fixed incore detectors (Unit 2). Data from these fixed incore detectors will periodically be used to generate a set of calibration factors for the BEACON PDMS. The following description was provided in response to an

RAI for Addendum 1 of the BEACON topical report:

"The basic concepts and methodologies used for determining the detector uncertainties and limitations are the same between a BEACON system for a typical Westinghouse plant and a plant that is using SPDs. However, since the basic hardware is different, the actual uncertainties, limitations and restrictions associated with fixed incore detectors are different from the corresponding values associated with the use of incore movable detectors. The prime purpose of the BEACON system is to continuously measure the core peaking factors with high accuracy. In the standard Westinghouse BEACON plant, the incore movable detectors provide periodic (180 EFPD) calibration input to the BEACON System with thermocouple and excore detector readings providing data for continuous power distribution monitoring. The plant specific analysis used to determine the uncertainties in this measurement are described in Section 5 of WCAP-12742-P-A. The fixed incore detector functionality replaces the functionality of the core exit thermocouples, excore detector axial power shape information, and periodic incore movable detector inputs used by the BEACON System continuous monitoring process in Westinghouse design plants. The fixed incore detector uncertainties are analyzed for a specific plant detector configuration using the methodology described in Section 5.0 of Addendum 1 to WCAP-12472-P-A.

Generally speaking, the more fixed incore detectors are installed, and the higher each detector's measurement accuracy is (smaller measurement variability), the smaller the measured core power peaking factor uncertainty becomes. As described in response to Question 8, the SPD detector design and layout are different for the different NSSS vendors. Furthermore, there are some basic differences in the application of the SPD and moveable detector systems. These include:

- As plant operation continues, neutron irradiation depletes the detector sensor material and increases the measurement variability. The measurement variability of the incore movable detectors effectively does not change during operation because the movable detector measurements are not present in the core for sufficiently long times to undergo any appreciable depletion of the detector material.

- Some of the fixed incore detectors may fail during operation, which requires that the power distribution measurement uncertainty be adjusted during plant operation. If an individual incore movable detector fails, the core locations measured by the failed detector can be accessed using one of the other movable detectors, so no uncertainty adjustment is required.

- If an incore movable detector location access thimble becomes blocked, then the power distribution measurement uncertainty associated with the BEACON calibration data generated from the incore movable detector input is automatically adjusted by the BEACON System. Should the thimble become usable at a later time, BEACON automatically adjusts to this situation. If a FID string cannot be inserted into the thimble during the refueling, the entire string is left out of the core and the uncertainty is adjusted accordingly for the entire cycle.

The BEACON power distribution uncertainty methodology is designed to determining the power peaking factor measurement uncertainty for a wide range of the SPD detector operating conditions. The measure peaking factor uncertainty is defined as a function of the fraction of inoperable detectors and the detector measurement variability as given by Equation 3 and Equation 4 of Addendum 1 to WCAP-12472-P-A. The methodology of the power peaking factor uncertainty determination is described in Section 5 of Addendum 1 to WCAP-12472-P-A.

The constants, variabilities, and coefficients used in the equations described in Section 5 of Addendum 1 to WCAP-12472-P-A are specific for a given reactor core geometry, detector configuration, and installation layout, and can be obtained as described in Section 5. The equations are applicable for a wide range of detector conditions anticipated during the reactor operation.

The behavior of the measured peaking factor uncertainties as a function of the incore detector variability and composite random detector loss levels are shown in Figure 4 and Figure 5 of Addendum 1 to WCAP-12472-P-A for a representative plant. It is seen that the higher the SPD measurement variability and fraction of inoperable detector are, the higher the peaking factor measurement uncertainty becomes.

In most cases, the upper bound of the SPD measurement variability and fraction will be determined for a specified peaking factor measurement uncertainty. Alternatively, the BEACON methodology can be used to support an existing or requested availability requirement for a specific plant."

10. "The CETs are included in the IITA at Unit 2. This means that the Unit 2 CETs are physically located in different areas (radically and axially) than the Unit 1 thermocouples." In other words, this statement points out that a direct comparison of CET readings from Unit 1 and Unit 2 will be of little value. The Unit 2 CETs are located at the top of the active fuel inside the fuel assembly instrument thimble, instead of at the bottom of the upper core plate, so differences in temperature are to be expected between the units. Please note that these differences have been specifically considered in the applicable post-accident monitoring procedures.

12. To clarify, page 129 states that "the WINCISE system shall support two divisions of CET with a minimum of three thermocouples provided in each core quadrant for each division." In other words, there are at least three thermocouples per division per quadrant, or a minimum of six thermocouples per quadrant which exceeds the minimum required by RG 1.97.

13. The IIS software functions are non-safety-related and have no impact on any safety function. Therefore software common mode failure analysis is not required.

15. There are two design changes that impact this system description. The responsible engineers agreed that the WINCISE change package (EDCR 52321) would address everything except the CETs and that the Common Q PAMS change package (EDCR 52351) would address the changes related to the CETS. As previously committed in TVA letter to NRC dated October 29, 2010 (Reference 4), the final Common Q PAMS EDCR 52351-B excerpts will be submitted within two weeks after the package is

issued. Currently the package is scheduled to be issued May 12, 2011.

16. Attachment 4 of TVA letter to NRC dated April 15, 2011, is excerpts from the approved engineering design change package that authorizes a change to the plant (in this case the installation of WINCISE) and provides the detailed basis for the change. It includes the approved document change notices for the impacted documents. Based on prior agreement with the NRC, only excerpts of EDCRs are provided. What is not normally included are the indices, drawing change notices, changes to the Master Equipment List, etc. For this specific item, we included the change paper for the system description and design bases documents as it was felt these were important to the NRC understanding the scope of the change. The Description of Revision for Revision 13 of the design criteria document on Page 115 of the attachment provides the change summary for the document in question. Pages 2 and 3 of the attachment provide the overall change description.

**15. NRC Request (Item Number NA)**

*Provide a non-proprietary description of the Common Q PAMS datastorm test and a summary of the test results.*

**TVA Response to NRC Request:**

**Data Storm Test Description**

WBN Unit 2 PAMS went through a Data Storm Test to verify that the safety-related functions of the system driven by the Advant Controller 160 (AC160) and the safety-related indications monitored on the Operator Module (OM) located in the Main Control Room (MCR) are not affected when the Ethernet network interface of the Maintenance and Test Panel (MTP) is under data storm conditions. This test was requested by TVA.

The purpose of the data storm test was to test the ability of the MTP to handle the possible volume of traffic generated by a broadcast storm without impacting the safety functions. A broadcast storm occurs when a large number of broadcast packets are received. Forwarding these packets can cause the network to slow down or to time out.

Another objective of the data storm test was to test the ability of the MTP to handle malformed packets possibly generated by a data storm without impacting the safety functions.

The following pass/fail criteria were used to evaluate the success of the data storm test results:

1. During the data storm test, the OM shall continue trending the selected input signal smoothly on the data trend display. The smooth trending was verified by creating a data trend of the point being monitored and comparing it to the data trend observed during the data storm.

2. During the data storm test, the OM shall respond to screen touches (navigation) normally. This was determined by navigating several different screens during the

execution of the test.

3. During the data storm, the AC160 user-selectable analog output channel shall generate the analog signal without interruption. The output of the analog channel was captured using a calibrated recording device. A recording of the analog output point being monitored was created before the data storm, and this recording was compared to a recording observed during the data storm.

During the data storm, it was acceptable to have the MTP stop responding because it does not perform a safety function. When this occurred, the following pass/fail criteria were used:

1. The System Trouble Annunciator (digital output from the AC160) to alarm (open contact).

2. The System Trouble Alarm Block on the OM display to indicate alarm (turn to red).

3. The MTP icon on the OM System Health page to indicate alarm or a failure (turn to red or turn to magenta) depending on the type of failure of the MTP.

**Test Execution and Test Results**

After collecting baseline data, the broadcast storm was applied to the system. While the broadcast storm was in progress the following was observed:

- The OM was operational throughout the broadcast storm. The trend signal was smooth and all screens were navigational from the directory via touches on the touch screen.

- The MTP stopped responding for several minutes, and then returned to operational status. While the MTP was inoperable, the system trouble alarm occurred on the OM and annunciator output, and the MTP status was red on the OM. Once the data storm was halted, the MTP began to respond again.

- The analog output from the AC160 remained operational during the broadcast storm.

The results of the testing determined that the system met the acceptance criteria outlined above.

**Enclosure 2**
**TVA Letter Dated May 6, 2011**
**Responses to Licensee Open Items to be Resolved for SER Approval**

## List of Attachments

1. TVA white paper: "Comparison of Regulatory Guide (RG) 1.180, "Guidelines For Evaluating Electromagnetic and Radio-Frequency Interference In Safety-Related Instrumentation and Control Systems," Revision 1 and Tennessee Valley Authority (TVA) Standard Specification (SS) E18.14.01, "Electromagnetic Interference (EMI) Testing Requirements For Electronic Devices," Revision 3, dated April 21, 2011 (Letter Item #1/340)

2. GA-ESI Procedure OP-7.3-240, "Safety-Related Commercial Grade Item Parts Acceptance," Revision I (Letter Item #3/353)

3. TVA Procedure NPG-SPP-12.7, "Computer Software Control," Revision 0, dated December 17, 2010 (Letter Item #5/363)

4. Westinghouse document "WBT DMIMS-DX™ Seismic Evaluation of the Digital Metal Impact Monitoring System (DMIMS-DX™) for Watts Bar Unit 2," EQ-QR-33-WBT, Revision 0 (proprietary) (Letter Item #4/362 [Item 1])

5. Westinghouse non-proprietary white paper WBT-D-2782, "Westinghouse DMIMS-DX In-Containment equipment environmental specifications" (Letter Item #4/362 [Item 1])

6. Evaluation for Common Q PAMS for conformance with RG 1.152 Revision 2 (Letter Item #10/368)

7. Evaluation for how the Common Q PAMS SysRS and SRS implement the design basis requirements of IEEE 603-1991 Clause 4 (Letter Item #12/372)

8. Westinghouse report DAR-ME-09-10, Revision 0, Qualification Summary Report for the WINCISE Cable and Connector Upgrade at Watts Bar Unit 2 (proprietary) (TVA Document Number: 25402-011-V1A-MG00-01949-001-WBT-D-1464) (Letter Item #14/375 [Item 3])

**Enclosure 3**
**TVA Letter Dated May 6, 2011**
**Responses to Licensee Open Items to be Resolved for SER Approval**

## List of References


1. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated April 15, 2011 (Letter Item #14/375 [Item 1]), (Letter Item #3/353)

2. TVA letter to NRC dated February 2, 2010, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Developmental Revision B of the Technical Specifications (TS), TS Bases, Technical Requirements Manual (TRM), TRM Bases; and Pressure and Temperature Limits Report (PTLR)," ADAMS assession number ML100550326 (Letter Item #13/374)

3. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated February 25, 2011 (Letter Items #4/362 and #9/367)

4. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Instrumentation And Controls Staff Information Requests," dated October 29, 2010 (Letter Item #14/375 [Item 15])

**Enclosure 4**
**TVA Letter Dated May 6, 2011**
**Responses to Licensee Open Items to be Resolved for SER Approval**

## List of New Commitments

1. The non-proprietary version of Westinghouse document "WBT DMIMS-DX™ Seismic Evaluation of the Digital Metal Impact Monitoring System (DMIMS-DX™) for Watts Bar Unit 2," EQ-QR-33-WBT, Revision 0 and affidavit for withholding will be submitted within two weeks of receipt from Westinghouse. (Letter Item #4/362 [Item 1])

2. FSAR Table 7.1-1 will be updated to reference IEEE Std 603-1991 for the Common Q PAMS. (Letter Item #6/34 [Item 2])

3. The Common Q PAMS and RM-1000 radiation monitors comply with IEEE 344-2004 and with RG 1.100 Revision 3 with the exception of testing above 30Hz. Table 7.1-1 will be updated to reflect conformance. (Letter Item #8/366)

4. The Common Q PAMS will meet the cyber security requirements for the WBN Unit 2 Nuclear Security Program as mandated by 10 CFR 73.54 via WBN Unit 2 Procedure 25402-3DP-G04G-00508, "Cyber Security Program." (Letter Item #10/368)

5. Common Q PAMS is designed in accordance with RG 1.168, Revision 1, IEEE 1012-1998 and IEEE 1020-1997. These references will be added to FSAR Table 7.1-1. (Letter Item #11/370)

6. The non-proprietary version of Westinghouse report DAR-ME-09-10, Revision 0, Qualification Summary Report for the WINCISE Cable and Connector Upgrade at Watts Bar Unit 2 and the affidavit for withholding will be submitted within two weeks of receipt from Westinghouse. (Letter Item #14/375 [Item 3])

7. The Westinghouse qualification report for the IITAs has not been completed. The proprietary and non-proprietary versions and the affidavit for withholding will be submitted within two weeks of receipt from Westinghouse. (Letter Item #14/375 [Item 3])