WBN2Public Resource

From: Clark, Mark Steven [msclark0@tva.gov]
Sent: Thursday, April 07, 2011 3:53 PM
To: Poole, Justin
Cc: Hilmes, Steven A; Knuettel, Edward Terry; Smith, James D
Subject: NRC Requested Information

Justin:

Below are the responses to the questions that were requested at the meeting today. Please have the WINCISE/BEACON reviewed by Monday morning and let me know if we need to submit the Technical Manual. If so, we can add it to the letter.

1. NRC Request (Item Number 358)

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

TVA Response to NRC Request:

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

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

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

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

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

General Atomics "Qualification Test Report for RM-1000 Processor Module and Current-To-Frequency Converter" (04508905-QR) refers to both Wyle Reports 41991 and 41991-1 included in report 04508903-1TR. It is recognized that the five TRS Plots versus the RRS where the TRS were below the RRS is an exceedance that must be justified. From Wyle report 41991 it can be determined that these five TRS versus RRS plots are for the seismic response in the front to back panel direction. The RRS used in the Wyle test reports envelopes the TVA standard RRS shown in Fig 3.1 of CEB-SS-5.10 below 33 Hz. This TVA standard RRS conservatively envelopes the in panel seismic demand for most TVA applications. For specific cases when required the actual in panel RRS can be developed. Calculation WCG-ACQ-0766, "In-Cabinet Required Response Spectra for RM-1000 Radiation Monitors in MCR Panel 2-M-30," Revision 0, (Attachment 3) has been issued to generate the 5% RRS for these safety related RM-1000 monitors, I/F converters and NIM bins for the WBN2 panel (2-M-30) where they will be installed. As can be seen from the RRS plots in calculation WCG-ACQ-0766 the front to back 5% RRS broad band peak is 9.76 g which is lower than the front to back 5% TRS shown in the subject five (5) plots.

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

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

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

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

2. <u>NRC Request (Item Number 360)</u>

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

(a) Provide a brief system description of IIS and its regulatory compliance. In your discussion include the discussion of WINCISE and BEACON system which are part of the IIS. Also provide the differences between the system used at WBN Unit vs. at Unit 2, e.g. Movable vs. fixed IIS. For WINCISE provide the basis for acceptance.
(b) If this system has been accepted by the staff previously at some other plant then provide the reference to that SE.

(c) If this has not been evaluated by the staff previously, then provide the effect of CCF of this system and its effect on safety system or chapter 15 analysis.
(d) Does this have any interconnection with safety system?
(e) For BEACON provide the acceptability of this system. I believe that this system was accepted at WBN Unit 1. If that is the case then provide the reference to that review. Also provide any differences of this system to the one at WBN Unit 1 system.

TVA Response to NRC Request:

(a) The Watts Bar Unit 2 In-core Instrumentation System (IIS) replaces all of the functionality provided by the Movable Incore Detector System (MIDS) used at Watts Bar Unit 1. The IIS to be used at Watts Bar Unit 2 is a **W**estinghouse **INC**ore **I**nformation, **S**urveillance, and **E**ngineering (WINCISE™) System that is functionally described in Section 7.7.1.9 of the Watts Bar Unit 2 Final Safety Analysis Report (FSAR). The WINCISE™ -style IIS used at Watts Bar Unit 2 is essentially the same as the in-core power distribution measurement systems used at most Combustion Engineering style of operating reactors that use a type of in-core neutron sensors commonly called "Fixed In-core Detectors (FID)". The Watts Bar Unit 2 IIS is functionally identical to the IIS used in the Westinghouse AP1000™ reactor design. The Watts Bar Unit 2 IIS includes the FIDs, Core Exit Thermocouples (CET), FID and CET signal cables, the FID signal processing hardware, and the FID signal processing software. This hardware and software is required to provide the measured signals to the associated BEACON™ System to periodically determine whether the reactor is operating within design core peaking factor limits. A detailed description of the Watts Bar Unit 2 IIS hardware is provided in the document titled, "Westinghouse Incore Information Surveillance & Engineering (WINCISE™) System Technical Manual", NO-WBT-002, Revision 0 supplied by Westinghouse to TVA in September of 2010.

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

(b) The WINCISE™ -style IIS used at Watts Bar Unit 2 is essentially the same as the in-core power distribution measurement systems used at all Combustion Engineering style of operating reactors that use a type of in-core neutron sensors commonly called "Fixed In-core Detectors (FID)". The Watts Bar Unit 2 IIS is also functionally identical to the IIS used at the Seabrook plant. The Watts Bar Unit 2 IIS is functionally identical to the" IIS used in the Westinghouse AP1000™ reactor design.

(c) The IIS includes the 1E qualified CET and CET signal cables required to allow the CET signals to be used in the Common Q Post Accident Monitoring System (PAMS). There is no other interface to safety systems. The usage of the IIS has no impact on any Safety Analysis documented in Chapter 15 of the Watts Bar Unit 2 FSAR.

(d) The IIS includes the Class 1E qualified CET and CET signal cables required to allow the CET signals to be used in the Common Q Post Accident Monitoring System (PAMS). The CET devices, electrical connectors, and signal cables are functionally identical to those currently in operation in most operating PWRs in the world. The CET signals are electrically isolated from signals output from the non-1E FID signals and signal processing electronics.

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

The specific differences between the Unit 1 and Unit 2 core power distribution measurement systems are too numerous to simply list. A detailed description of the Watts Bar Unit 2 IIS hardware is provided in the document titled, “Westinghouse Incore Information Surveillance & Engineering (WINCISE™) System Technical Manual”, NO-WBT-002, Revision 0 supplied by Westinghouse to TVA in September of 2010.

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

Regards,

Steve

Steve Clark
Bechtel Power Corp.
Control Systems
Watts Bar 2 Completion Project
Phone: 423.365.3007
e-mail: msclark0@tva.gov

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"Hilmes, Steven A" <sahilmes@tva.gov>
Tracking Status: None
"Knuettel, Edward Terry" <etknuettel@tva.gov>
Tracking Status: None
"Smith, James D" <jdsmith@tva.gov>
Tracking Status: None
"Poole, Justin" <Justin.Poole@nrc.gov>
Tracking Status: None

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