UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 21, 2011

Mr. Ashok S. Bhatnagar
Senior Vice President
Nuclear Generation Development
and Construction
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING SUPPLEMENTAL SAFETY EVALUATION REPORT OPEN ITEM 80 (TAC NO. ME0853)

Dear Mr. Bhatnagar:

By letter dated April 15, 2011, Tennessee Valley Authority (TVA) responded to requests for additional information (RAI) relating to the review of the Final Safety Analysis Report for Watts Bar Nuclear Plant (WBN). This RAI remained as Open Item 80 in Supplement Safety Evaluation Report 23. The U.S. Nuclear Regulatory Commission (NRC) staff has been reviewing the information provided by TVA in support of the operating license application for WBN Unit 2.

After reviewing the response provided by TVA, the NRC staff has determined that additional information is needed to complete its review.

A response is required within 15 days of receipt of this letter as agreed to by your staff. If you cannot provide your response within the required time, please provide a letter to the NRC staff with the reason and a new date for your response.

If you should have any questions, please contact me at 301-415-2048.

Sincerely,

Justin C. Poole, Project Manager
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure: RAI

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFROMATION

WATTS BAR NUCLEAR PLANT, UNIT 2

SAFETY EVALUATION REPORT

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-391

CONTAINMENT HIGH RANGE RADIATION MONITORS

As noted in Supplement 23 of the Safety Evaluation Report, for the high range radiation monitors it was not clear how they meet the electromagnetic interference and radio frequency interface (EMI/RFI) requirement. After reviewing Tennessee Valley Authority (TVA) standard specification SS-E18-14.1, the staff requested actual test information pertaining to EMI/RFI. TVA provided EMI/RFI test reports by April 15, 2011, submittal. Attachment 1 of this report contained the test data with two sets of test reports; one by Nemko and the other by TUV. Nemko report is 89 pages and it addresses the updated RM-1000 monitors whereas the TUV report tested the older RM-1000 and I/F converter models. After review, the staff requests the following clarifications and additional information.

1. TVA to provide the EMI/RFI test report for the updated I/F converter.

2. The following clarifications apply to Nemko test report 04509050 (89 pages):

   i) TVA to confirm that the power supply part number, 04502250-001, and the line filter/surge suppressor part number, 50015670-001, are applicable to Watts Bar Nuclear Plant (WBN) Unit 2 (page 4 of 89). The test setup used two RM-1000 units and labels them as Channel 1 (Type I) and Channel 2 (Type II). TVA to confirm that both channels are the same because they both reflect part number 04501200-002 and that this part number is used for WBN Unit 2.

   ii) Low Frequency Conducted Susceptibility Test: Please note that the current revision of Regulatory Guide (RG) 1.180 (Revision 1), Figure 4.1, requires a frequency range from 30 Hz to 150 kHz. Since the tested range for this test is from 30 Hz to 50 kHz, TVA is requested to justify the lower range or provide additional test data to cover the entire range. TVA to note that military standard (MIL-STD)-461E also shows a range of 30 Hz to 150 kHz.

   iii) High Frequency Conducted Susceptibility Test: International Electronic Commission (IEC) 1000-4-6 has been used. TVA to justify the equivalency between IEC 1000-4-6 and other approved test methods noted in RG 1.180 or Electric Power Research Institute (EPRI) TR-102323 (e.g., IEC 61000-4-6). TVA also to explain how this test meets EPRI TR-102323, Revision 2, or RG 1.180, Revision 1. TVA to note that Nemko report (page 65 of 89) does not provide the test curves nor does it explain how the 10 Vrms is equivalent to the test levels required by EPRI 102323. TVA to clarify the range limits and provide test curves/data.

Enclosure

iv) Low Frequency Radiated Susceptibility Tests: According to the Nemko test description (page 30 of 89 of the Nemko report), this test is to be conducted per RS101 with frequency ranges from 30 Hz to 100 kHz. The Nemko test results (page 53 of 89) for the RS101 test indicate frequencies from 3 Hz to 10 kHz. Test data results on page 31 of 89 states that the test results were in compliance with RS101 requirements of MIL-STD-461E. TVA to explain why the test data shown on the Nemko report (page 53 of 89) shows a range from 3 to 10,000 Hz as opposed to the required range of 30 Hz to 100 kHz (see test description on page 30 of 89). In addition the test should be conducted to the ranges specified in RG 1.180 or EPRI TR-102323 but the test data (page 53 of 89) shows test range 18 to 11 dBp. Please clarify how this test limit meets RG 1.180, Revision 1 or EPRI TR-102323 (Revision 2) for the range of 180 to 110 dBpT.

v) Surge Withstand Capability: RG 1.180 and EPRI TR-102323 provide the guidance for surge withstand capability tests. Both permit use of IEC 61000-4-5, Level 3 for this test. Nemko test report indicates that tests were conducted to IEC 1000-4-5 (page 64 of 89). Tests were performed to criterion B for 2kV common mode and 1kV differential mode surges in the AC power supply configuration using the combination wave method. RG 1.180 Table 22, for combination wave for Category B Low Exposure, notes that the surge level is 2 kV / 1 kA. Nemko test report states compliant testing between neutral and ground for common mode at 2 kV, between line and ground for common mode at 2 kV, and between neutral and line for differential mode at 1 kV. TVA to explain the equivalency between IEC 1000-4-5 and other approved test methods noted in RG 1.180 or EPRI TR-102323 (i.e., IEC 61000-4-5). Further, TVA to clarify how both parts of the combination wave form tests were conducted. RG 1.180, Revision 1, requires an open circuit voltage and a short circuit test with surge current of 1 kA (see Figures 5.2 and 5.3). The test data (page 64 of 89) reflects that only the voltage test was conducted.

vi) Electrical fast Transients Tests: RG 1.180 and EPRI TR-102323 provide the guidance for electrical fast transient tests. Both permit use of IEC 61000-4-4, Level 3, for this test. The Nemko test report states that the guidance of test method IEC 1000-4-4 was used (page 40 of 89). The equipment was tested as Category B, low exposure power line. The Nemko test results (page 63 of 89) for electrical fast transients, state that the basic standard is EN-61000-4-4. Is TVA taking any credit for this test for WBN Unit 2? If so then please explain the equivalency between the actual test method used (i.e., IEC 1000-4-4 or EN 61000-4-4) and other approved test methods noted in RG 1.180 or EPRI TR-102323 (i.e., IEC 61000-4-4).

vii) Low Frequency Conducted Emissions Tests: Purpose of the CE-101 test is to prove that the low frequency conducted emissions do not exceed the specified limits. EPRI TR-102323, Figure 5-4, for AC and DC source voltages above 28 volts specify a range of 110 dBμA from 30 Hz to 1 kHz and then linearly decreasing to 90 dBμA at 10 kHz. The Nemko test results (page 45 of 89) show very similar test requirements. However, the Nemko test data (page 45 of 89) starts from about 120 Hz as opposed to 30 Hz. TVA to justify why the test data did not start from the lower limit of 30 Hz.

viii) Low Frequency Radiated Emissions Tests: Per the Nemko report (page 52 of 89), this test was conducted per MIL-STD-461E RE101 method. RG 1.180 also agrees

with RE101 method and shows test requirements, which are very similar to the Nemko test. The test passed with respect to the requirements. However, the margin at 64,180 Hz is only 3.1 dBpT. This margin is very small. NRC safety evaluation for EPRI TR-102323, dated April 17, 1996, suggested a safety margin of 8 dB, which was eventually incorporated in Revision 1 of EPRI TR-102323. TVA is requested to justify why this small margin of 3.1 dBpT is acceptable for WBN Unit 2.

ix) High Frequency Radiated Emissions Tests: Per the Nemko report (page 48 of 89), this requirement is to perform this test from 30 MHz to 230 MHz at 40 dBμV/meter with frequency range from 230 MHz to 1 GHz at a level varying linearly from 40 dBμV/meter to 47 dBμV/meter using EN 55022, Class A method with an antenna distance of 10 meters for open area test site. The test data graph shows actual tests from 30 MHz to 320 MHz with acceptable results. However, the EPRI recommended curve in Figure 5-7 of EPRI TR-102323 shows limit values varying from 95 dBμV/meter to 66 dBμV/meter. It also states that EN 55022 Class A or B is acceptable if the highest clock frequency is 200 MHz. EPRI TR-102323 also states that this test should be performed up to 1 GHz or 5 times the highest internal generated frequency within the test unit. Further RG 1.180 Section 3.6 states, "Figure 3.5 shows all of the acceptable testing programs and notes that the alternative programs are acceptable only when the conditions for exemption are satisfied. Thus, when the identified conditions for exempting low frequency emissions testing are met, any of the three alternative emissions testing programs may be selected. However, regardless of the emissions testing program selected, it is intended that each be applied in its entirety, without selective application of individual methods (i.e., no mixing and matching of test methods) for emissions testing." The baseline group in Figure 3.5 lists CE101, CE102, RE101, and RE102 as test methods. TVA uses CE101, CE102, and RE101 but not RE102. RG 1.180, as noted above, states that mixing and matching of these methods should not be used. TVA to justify why RE102 has not been used for this test. TVA also to explain why the EN 55022 test is acceptable and how it meets the guidance of EPRI TR-102323 or RG 1.180.

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DISTRIBUTION:
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ADAMS Accession No. ML112590046 *per memo dated September 7, 2011

OFFICE	LPWB/PM	LPWB/LA	EICB/BC	OGC - NLO	LPWB/BC
NAME	JPoole	BClayton	GWilson*	DRoth	SCampbell
DATE	9/16/11	9/16/11	9/7/11	9/19/11	9/21/11

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