NRR-PMDAPEm Resource

From: Miernicki, Michael
Sent: Friday, November 07, 2014 2:14 PM
To: garent@tva.gov; rhbryan@tva.gov; Stroud, Russell Allen (rastroud@tva.gov)
Cc: Quichocho, Jessie; Poole, Justin; Zimmerman, Jacob; Mathew, Roy; Matharu, Gurcharan; Lingam, Siva
Subject: FW: Watts Bar 2 - RAIs - Degraded Voltage Relay Issue
Attachments: EEEB RAI Watts Bar DVR Open Item 30 2014-10-7.docx

Based upon the information provide by TVA, and discussions with the TVA staff during the audit conducted 11/4-5/14 on this topic, the attached questions regarding the Degraded Voltage Relay setpoint for WBN-2, are no longer relevant, and are being withdrawn by the NRC staff. These questions had been placed in ADAMS under ML14286A030.

Mike

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From: Miernicki, Michael
Sent: Wednesday, October 08, 2014 3:30 PM
To: garent@tva.gov; rhbryan@tva.gov
Cc: Quichocho, Jessie; Poole, Justin; Zimmerman, Jacob; Mathew, Roy; Matharu, Gurcharan; Lingam, Siva
Subject: Watts Bar 2 - RAIs - Degraded Voltage Relay Issue

Attached please find RAIs from the Electrical Engineering Branch regarding the Watts Bar 2 Degraded Voltage Relay issue. Please acknowledge receipt of these questions, and that they contain no proprietary information. Please provide your responses within 30 days.

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Hearing Identifier: NRR_PMDA
Email Number: 1686

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Subject: FW: Watts Bar 2 - RAIs - Degraded Voltage Relay Issue
Sent Date: 11/7/2014 2:14:20 PM
Received Date: 11/7/2014 2:14:00 PM
From: Miernicki, Michael

Created By: Michael.Miernicki@nrc.gov

Recipients:
"Quichocho, Jessie" <Jessie.Quichocho@nrc.gov>
Tracking Status: None
"Poole, Justin" <Justin.Poole@nrc.gov>
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Tracking Status: None
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Tracking Status: None

Post Office:

Files	**Size**	**Date & Time**
MESSAGE	1098	11/7/2014 2:14:00 PM
EEEB RAI Watts Bar DVR Open Item 30 2014-10-7.docx	26303	

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

Requests for Additional Information - Degraded Voltage Issue
(SSER 22, Appendix HH Open Item 30)

The design basis of WBN is that one 161 kV transmission line and CSSTs A and D, or the other transmission line and CSSTs B and C, shall be capable of starting and running all required safety-related loads and powering all running BOP loads for a design basis accident in one unit and concurrent safe shutdown of the other unit . The following staff questions are related to the Design Basis configuration of the plant as described above.

QUESTION 1:

Confirm that the analyses in Appendix H of Calculation: STUDY-EEB-WBN-12-001, R2 assumes that at the onset of the event in one unit, all operating loads are transferred to one offsite power source for both units concurrent with start of ECCS loads.

QUESTION 2:

a. Clarify that the analyses in Appendix H was performed with the Phase A Start Sequence which evaluates a Safety Injection Initiation without receipt of a Phase B Containment Isolation (High Containment Pressure) as this is considered the most limiting case.

b. For the analyses performed in Appendix H, explain why a large pipe break requiring SI with containment isolation and actuation of containment spray imposes a lower loading on the offsite power system at the onset of the event. Provide a summary analyses of loads and corresponding limiting bus voltages (6.9kV, 480V and 120V) considered for Phase A and Phase B loads at the ONSET of the event. .

QUESTION 3:

a. For CSST C & D confirm that after adjusting the voltage at the shutdown boards at a value equal to the trip setpoint of the degraded voltage relays, no more voltage adjustments were made by the load tap changers.

b. Detailed evaluation was performed for 6.9kV Shutdown Board 1A-A only (aligned to CSSTs A, B, C, or D) as the results are considered to be representative of the other Shutdown Boards for the purposes of these analyses. Clarify that the loading and system impedances for Shutdown Board 1A-A provide the limiting case for all shutdown boards. Provide a summary of the analyses that was performed to establish the limiting case for Shutdown Board loadings.

c. Provide a summary of the loading (kW and kVAR) for each of the transformers connected to the offsite power source for the following conditions:
    1. prior to event
    2. at the onset of the event
    3. a few seconds after the event (e.g. 4 seconds)

d. Provide the corresponding loads and voltages at the switchyard bus, the 6.9kV shutdown boards, 480V and 120V system busses. NOTE: The tabulated format used in Appendix A of calculation Calc. STUDY-EEB-WBN-12-001 or a marked up single line diagram is acceptable.

QUESTION 4

a. To illustrate that the outcome of Appendix H is not affected by the assumptions in the study cases, provide a comparison of voltage drop and motor starts for the design basis configuration and the limiting case for the various studies that have been performed. Confirm that the simulation assumes a block loading of plant emergency core cooling loads.

   The staff notes that the motor starting studies were performed with the 6.9kV shutdown boards disconnected from all offsite power source(s) and a dedicated fixed voltage source was added to each 6.9kV shutdown board. The source voltage was set to the DVR dropout setting of 6555V (Section 5.2).Using the load configuration in the existing Unit 1 & 2 ETAP model, the following analyses were performed:
   - Dynamic Motor Starting -Safety Injection Signal Phase A (SIA)
   - Dynamic Motor Starting- Safety Injection Signal Phase B (SIB)
   - Static Motor Starting (starting individual motor): This analysis is performed with SIA since this provides the worst case voltages on the 480V system. For this analysis, motor starting study case is generated to individually start each Class 1 E motor. Resolutions to loads requiring additional review are annotated in Appendix A

b. For the Protective Device Analysis (Start-Start scenario) the board voltages at the onset of the event are considered normal (i.e. no preheat). The degraded voltage condition presumes that the voltage does not recover but remains below the degraded voltage relay setpoint. The design calculated worst-case transient voltage dip during the accident loading sequence is used. This is considered conservative, because a lower voltage would produce less starting current for the motors. Confirm that the case studies for protective devices assuming Appendix H configuration, block loading the station buses with design basis configuration will not result in a lower voltage and consequential stalling of the plant motors.

c. Starting Voltage Analysis
   Appendix A for summary of the results concludes that all safety related loads have adequate starting voltage during DVR conditions and the existing setpoints for the degraded voltage relay are considered acceptable. Confirm that block loading the plant busses with Appendix H configuration and design basis alignment of the buses, has the same conclusion.

d. The study notes that ERCW Screen Wash Pumps are not assured to have adequate voltage as analyzed. However per N3-67-4002 this load is not required to be manually placed into service until12 hours into a design basis event. Please provide the corresponding accident analyses reference in the Final Safety analyses Report.

e. Control Circuit Voltage Drop (CCVD) Analysis
   With respect to the contactors, relays and solenoid valves, adequacy of pickup voltage for these control components (contactors, solenoid valves, relays) were performed as part of the Control Circuit Voltage Drop (CCVD) analysis. This analysis was performed considering a steady state minimum voltage of 432V. Please confirm that the minimum voltage for the Appendix H analyses yielded a minimum voltage of 432V.

f. The analyses notes that The MCC transient bus voltage under degraded voltage conditions (at DVR dropout voltage of 6555V) drops below 432V due to starting of large motors on the 480V switchgear. This voltage, however, recovers to a value of >432V within 4 seconds. Please confirm that the Appendix H analyses for a similar transient, results in voltage recovery within 4 seconds and the Westinghouse evaluation for an additional five second delay for the startup of the safety injection pumps and an additional five second delay in the closure of the feedwater isolation valve is valid.

g. Confirm that all protective devices were evaluated for a maximum overload conditions lasting for 12 seconds i.e. the duration of degraded bus voltage conditions for Appendix H scenario when the DVR may not be reset.

h. The purpose of Appendix B attachment is to demonstrate that any possible voltage transient caused by motor starting during a DBE (SI with Phase A or Phase B isolation), including drop to the LOV setpoint, will also result in successful recovery above DVR reset within 5 seconds.It has the following assumptions:
   - The offsite power LTCs (CSST C & D) are not allowed to correct the voltage during the motor starting event. However, they are allowed to adjust the voltage prior to the event. This is conservative because it will result in the worst-case voltage transient with no voltage recovery from the L TCs.

   - The auxiliary power system is assumed to be in normal alignment prior to the event (Unit Boards and RCP Boards on USSTs, Common Boards on CSSTs NB, Shutdown Boards on CSSTs CID). This is conservative, because it puts the least amount of load on the offsite power source prior to the event and thereby results in a "stiffer" offsite power source impedance (i.e. less recovery). In addition, aligning the Shutdown Boards to CSSTs NB would result in even greater recovery due to the Unit Board load shed feature.

   - The 161 kV Switchyard voltage is assumed to be at the minimum operable voltage prior to the event. This is conservative, because it will also result in a "stiffer" offsite power source impedance (i.e. less recovery).

   Considering that the degraded grid conditions may not recover in five seconds, please provide an explanation as to how the above assumptions are in alignment with the staff guidance provided in RIS 2012-11 and should therefore be considered for compliance with DVR setpoint analyses.