

NRC RAIs Regarding GGNS PRNM System LAR

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GE Hitachi Nuclear Energy

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Purpose of the Meeting

- Discuss RAIs
 - Ensure RAIs are understood
 - Discuss approach to responses



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PRNM System Overview

- A digital upgrade to the current APRM subsystem of the Neutron Monitoring System (NMS)
 - Results in greater instrument accuracy, redundancy, improved response times, and scram avoidance.
 - No setpoint drift
- System design and associated TS changes documented in PRNM LTR (NEDC-32410P-A); approved by NRC



PRNM System Overview (cont'd)

- Supports plant operation at higher power levels

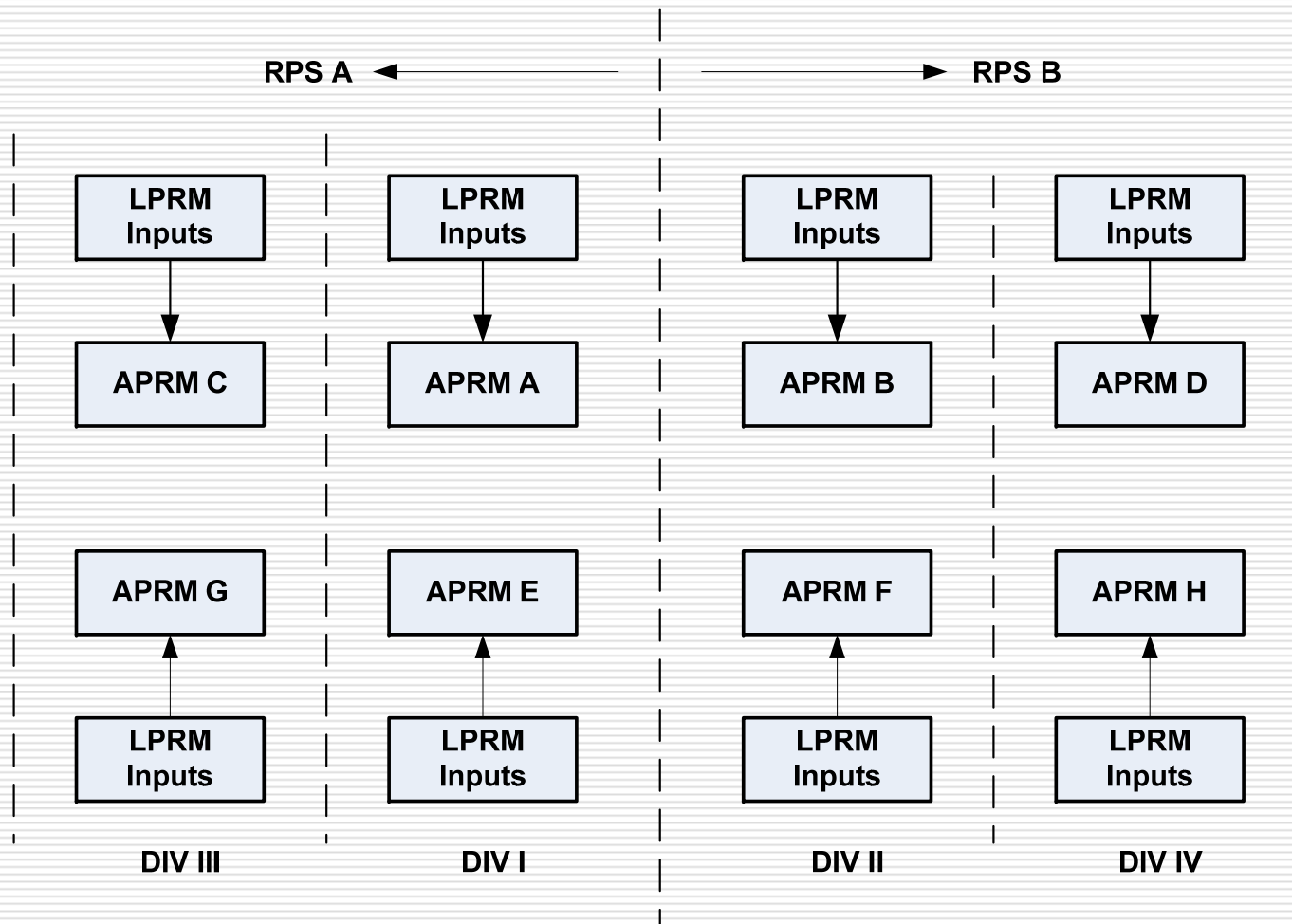
- Supports a different core stability solution needed for extended power uprate conditions
 - Changing from Option E-I-A to Option III



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Current APRM Configuration



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PRNM Configuration

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GEH PROPRIETARY INFORMATION

PRNM System – GGNS Block Diagram

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2-Out-Of-4 Voter Logic

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NMS-to-PRNM Comparison

Current NM System

- LPRM Subsystem
 - 44 LPRM strings, 176 LPRM signals
- APRM Subsystem
 - 8 APRM channels
 - 22 LPRM input signals to each APRM channel
 - 8 outputs to RPS

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PRNM System

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NMS-to-PRNM Comparison (cont'd)

Current NM System

- Flow Subsystem
 - 4 channels, 8 transmitters
- Option E-I-A Subsystem
 - Period-Based Detection System (PBDS)

PRNM System

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RAI Nos. 1 & 6

- Changes to GGNS PRNM System platform from PRNM LTR
 - BWR/6 design platform described in the PRNM LTR
 - Describe PRNM System platform
 - Identify differences between platform described in the PRNM LTR and GGNS-specific platform and reconcile



BWR/6 PRNM Panel Layouts

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RAI No. 2

- Confirm plant requirements are met
 - Review UFSAR to identify requirements for current APRM subsystem
 - Compare to codes and standards specified in the PRNM LTR
 - Revise Attachment 2 to reflect information (similar to MNGP approach)



RAI No. 3

- Address software common-cause failure
 - PRNM software currently licensed for use via PRNM LTR
 - GGNS application same as other plants with PRNM System
 - Over 90 reactor-years of safe operation
 - Software functions thoroughly tested during the Factory Acceptance Test prior to installation



Plants with PRNM System

Domestic

- Hatch 1, 2
- Browns Ferry 1, 2, 3
- Nine Mile Point 2
- Fermi 2
- Peach Bottom 2, 3
- Limerick 1, 2
- Brunswick 1, 2
- Susquehanna 1, 2
- Monticello

Foreign

- Laguna Verde 1, 2
- KKM
- Santa Maria de Garona
- Chinshan 1
- Forsmark 1, 2, 3



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RAI No. 4

- Define data communications
 - Developed compliance matrix per ISG-04; to be provided in the response
 - Architecture diagram depicts data communication



PRNM System Architecture Diagram

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RAI No. 5

- ❑ Document equipment EQ activities and confirm
 - Document EQ conditions in Attachment 2
 - ❑ Compare GGNS parameters with PRNM LTR
 - Equipment qualification performed as part of the Engineering Change process
 - ❑ Performed after fabrication and prior to installation (~ 4th quarter 2010)
 - ❑ Documented in a “Qualification Summary Report”
 - Propose a License Condition to provide the report to NRC prior to startup from the 2012 refueling outage



RAI No. 7

- Human Factors – “Maintain current interface feel”
 - PRNM data to be presented on flat screen monitors currently used by control room operators
 - Human Factors Evaluation (HFE) to be performed following design completion (~ 4th quarter 2010)
 - Propose a License Condition to provide the report to NRC prior to startup from the 2012 refueling outage



RAI No. 8

Failure Rate Data

- Updating Table F.2 of the PRNM LTR to specifically reflect BWR/6 design; to be included in the response



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RAI No. 9

□ Administrative Controls

- Access to GGNS Control Room granted via keycard
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- Considering physical barriers (e.g., locking bars covering module controls)
- Will develop a procedure to address access controls



RAI No. 10

□ Setpoint Methodology

- Setpoint calculations based on GEH methodology approved by NRC

- Establishes:

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- Representative calculation available for review



Closing Remarks



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