AmerGen/NRC
TMI-1 Pre Submittal Meeting
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Control Rod Drive Control System Upgrade and Elimination of Axial Power Shaping Rods

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Acronyms

- APSR Axial Power Shaping Rod
- DCRDCS Digital Control Rod Drive Control System
- DNB Departure from Nucleate Boiling
- DSS Diverse Scram System
- LAR License Amendment Request
- LOCA Loss of Coolant Accident
- PIDC Power Imbalance Detector Correlation
- RTB Reactor Trip Breaker
- SCR Silicon Controlled Rectifier
- TS Technical Specifications

Key Messages

- Requesting approval for TS Changes associated with:
  - Adding Zone Reference Switch Position Indication
  - Removing Relative Position Calibrations
  - Removing Patch Panel
- Requesting approval for the new RTB Configuration Change
  - The RTB Configuration Change is not Digital
  - Similar to approved Oconee system
- Requesting approval to remove APSRs permanently from reactor core
- DCRDCS upgrade will be performed under 50.59

DCRDCS - What

- TMI will install the AREVA-designed DCRDCS to replace existing CRDCS
- The Triple Modular Redundant base system is the same as that installed at Oconee Nuclear Station
  - Replaces Group Power Supplies with Single Rod Power Supplies
  - Replaces relay based logic with digital logic
  - Replaces analog modules with digital processing
  - Provides In-Limit Lights that are independent of DCRDCS
- The DCRDCS does not perform any Safety Related Function

DCRDCS - Why

- Resolve obsolescence and age related degradation issues
- Benefits
  - Resolves single point vulnerability
  - Simplified Operator Interface (no transfers)
  - Improved monitoring and diagnostics
  - Improved Position Indication
  - Improved circuit protection
  - Simplified maintenance

RTB - What

- Replaces 6 RTBs and electronic trips with 4 Reactor Trip Breakers
- Utilizes SquareD MasterPact breakers qualified by Nuclear Logistics Inc
- RTBs do not utilize digital components
- Reactor Trip Function is not dependent on the DCRDCS

RTB - Why

- Control System change requires new RTB configuration
- Simplified RTB configuration requires fewer components
- New RTBs require less maintenance to maintain high reliability

DCRDCS - Differences from Oconee

- TMI Control System does not include Group 8 (Axial Power Shaping Rods)
- TMI will install a Flat Panel Display for Control Rod Position Indication
- TMI will display zone reference switch status and LAR will request use to verify rod position
- DSS Actuation will be modified to match Oconee
  - DSS presently trips upstream breakers at TMI
  - DSS will trip electronic trips in DCRDCS
  - DSS is independent of the Reactor Protection System

DCRDCS / RTB - TS Impact

- Delete calibration requirement for Relative Position Indication
- Delete requirement to lock patch panels
  - Replace with commitment for patch verification
- Add use of Zone Switches for Position Indication
- Change to reflect new RTB configuration
  - Removes non-safety SCRs from Reactor Protection System function
- Revise the corresponding TS Bases (for information only)

APSRs - What

- APSRs were originally designed for axial power control in less stable rodded cores
- TMI transitioned from rodded cores to stable non-rodded feed and bleed operation in Cycle 4 (1978)
- Since 1994 APSRs have not been used for axial power control
- Axial power imbalance can be controlled with Group 7 Regulating Rods and with planned borations or dilutions

APSRs - Why

- Prevent possibility of future end of cycle fuel rod defects due to pellet clad interaction during APSR withdrawal maneuvers
- Eliminate unnecessary control components
- Eliminate the need for scheduled APSR replacement
- Eliminate the need to provide for Group 8 controllers in the DCRDCS Upgrade

APSRs - Technical Evaluation

- Suppression of Axial Oscillations
- Power Imbalance Detector Correlation Test
- Safety Analysis
- Core Operating Limits

APSRs - Technical Evaluation

- Safety Analysis
  - No credit for APSRs in any events
  - Increased Bypass Flow
    - DNB analysis
    - Core hydraulic lift analysis
    - LOCA analysis

APSRs - TS Impact

- Delete APSRs from Control Rod Group and Power Distribution Limits
- Delete APSRs for controlling Axial Power Imbalance
- Delete APSRs from Reactor Control Rod System Tests
- Remove APSRs as a Reactor Design Feature
- Revise the corresponding TS Bases (for information only)

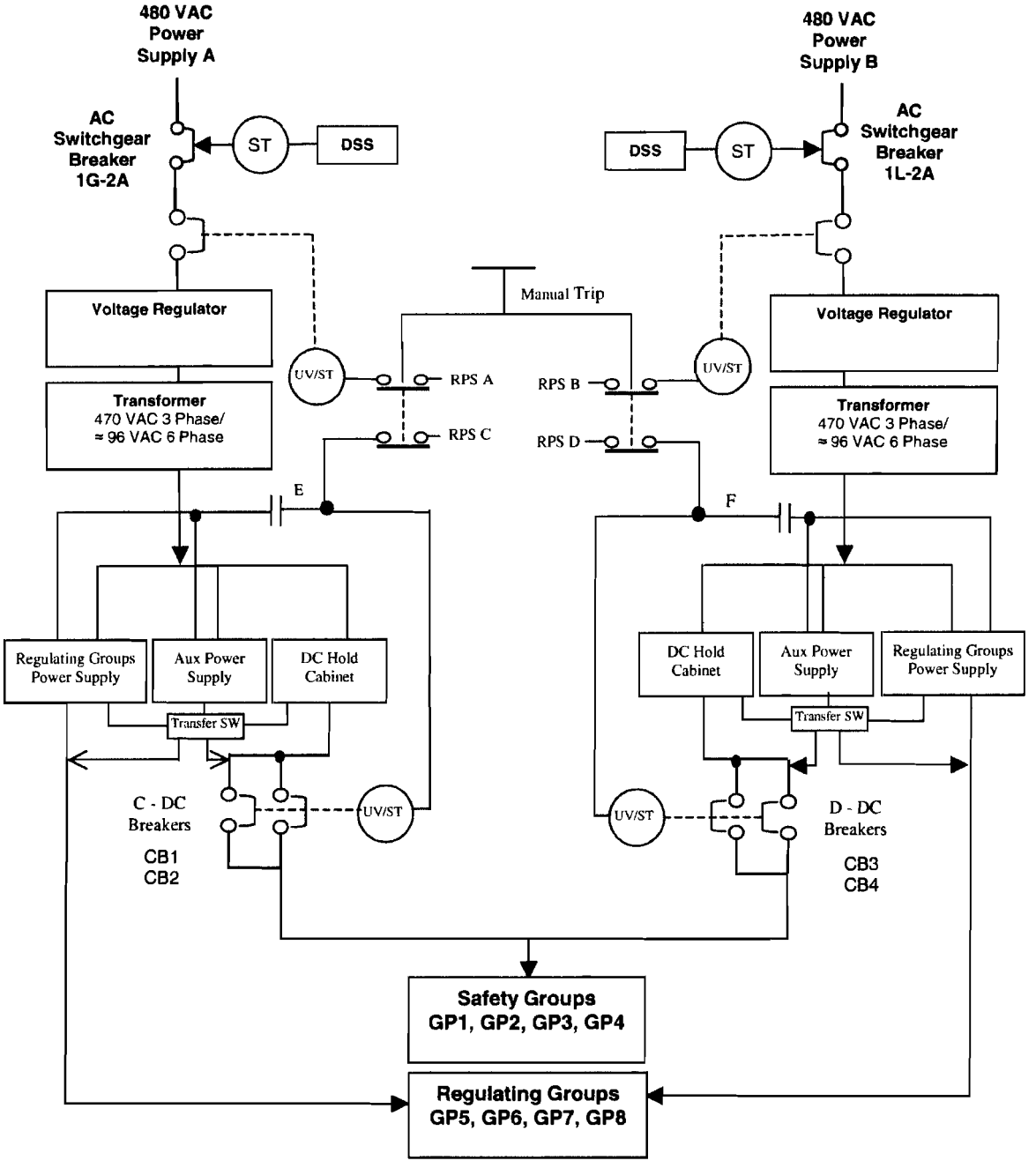

Figure 1

Existing Control Rod Drive Control System and Reactor Trip Breaker Configuration

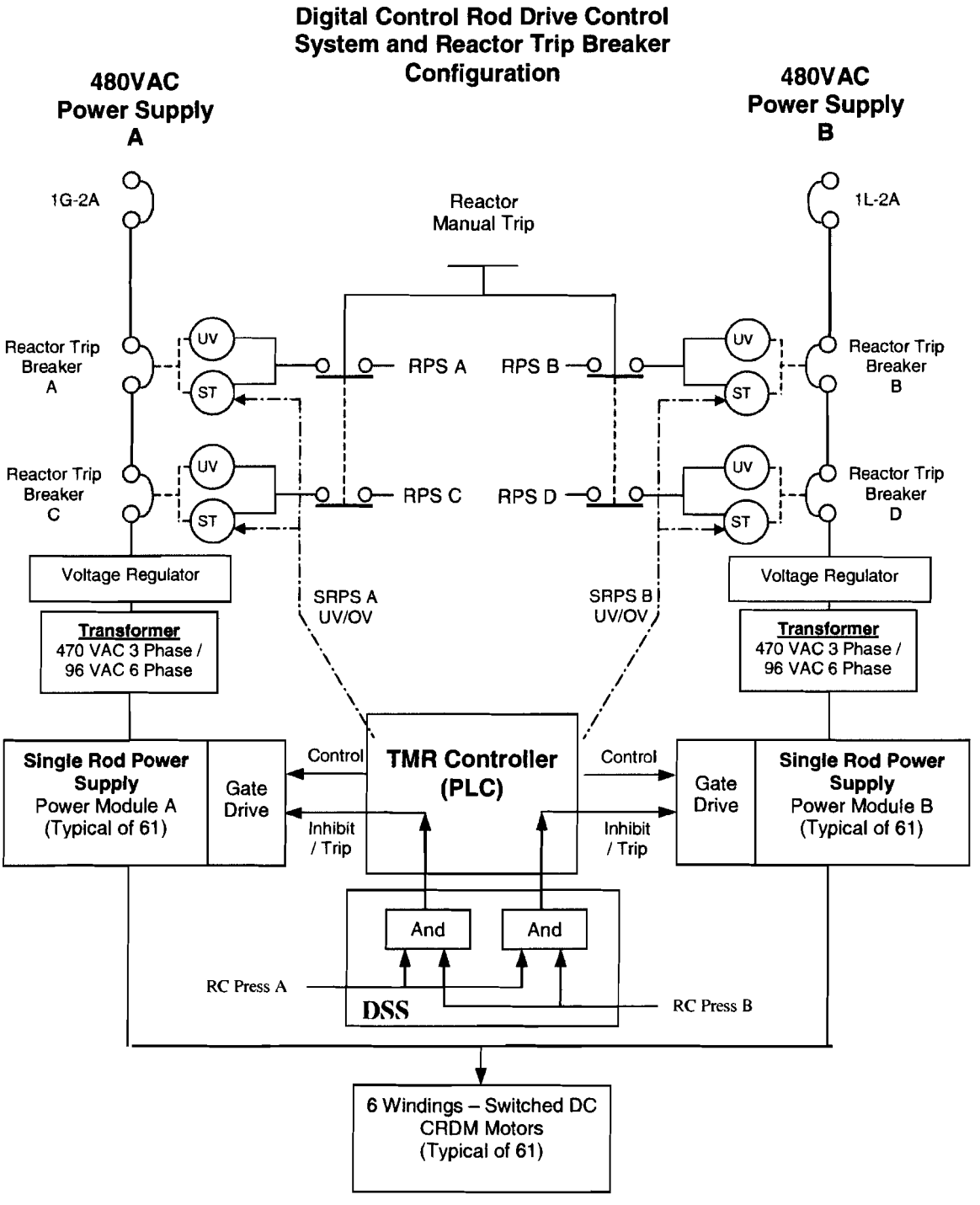

Figure 2

New Digital Control Rod Drive Control System and Reactor Trip Breaker Configuration