

# Implementation of STAR Program and Replacement of the 2/3 Cycle MTC Measurement

Pre-Submittal Presentation to the NRC  
Date: 07/11/2013



# Purpose

- Present and discuss with the NRC planned licensing changes
  - Implementation of the Startup Testing Activity Reduction (STAR) Program at PVNGS
  - Replacement of the 2/3 Cycle Moderator Temperature Coefficient (MTC) Measurement

# Topics

- STAR
- Replacement of the 2/3 Cycle MTC Measurement
- Licensing Approach
- Conclusion and Discussion

# STAR

- Objectives
  - Alternate method to validate core design
  - Minimize the time the plant is in an abnormal configuration

# STAR

- Overview
  - Approved by NRC in WCAP-16011-P-A
    - Participating plants only
    - Successfully implemented at 8 CE units
  - Incorporated into Improved Standard TS
    - NUREG-1432, Rev 4
    - TSTF 486



# STAR

- Overview
  - Adds
    - Credits Pre-Operational Checks
    - New Beginning of Cycle (BOC) Hot Zero Power (HZP) MTC surveillance methodology
    - Applicability Requirements
  - Replaces
    - BOC HZP Isothermal Temperature Coefficient (ITC) Measurement
    - CEA Worth Measurement



# STAR

- Current Methodology
  - CEA worth measurement
    - Require operation outside the normal TS LCOs
    - Presents operational challenges
      - Unit 3 LER 2012-001
      - Unit 1 LER 2011-005
  - Measure ITC at HZP with use of reactivity computer



# STAR

- Proposed Methodology
  - Replacement of CEA Worth Measurements
    - Use applicability requirements
    - Replacement will reduce the occurrence of problems associated with testing and minimize time in abnormal operating configuration



# STAR

- Proposed Methodology (cont.)
  - Alternate MTC verification
    - Adjust predicted HZP MTC based on measured Critical Boron
    - Increase availability of the control channels
    - Align PVNGS with Improved Standard TS



# STAR

- Applicability Requirements
  - Found in Table 3-4 of WCAP-16011-P-A
  - Compliance evaluated on a reload cycle-specific basis
  - STAR only applied to cycles when compliance verified
  - Maintain the effectiveness of the STAR Program in problem identification



# STAR

- Applicability Requirements (cont.)
  - Core design methods have a defined set of uncertainties based on a benchmark of predictions to actual plant measurements
  - Core, fuel, CEA design are similar to that of a benchmarked core
  - Cycle specific predictions independently verified by
    - Comparison of 2 independent neutronics codes



# STAR

- Applicability Requirements (cont.)
  - Implementation of CEA Lifetime Program
    - Limit CEA life within operation experience base
  - Pre-operational checks verify core and CEA loading are consistent with design
  - CEA Coupling checks performed during reactor restack
    - Many favorable PVNGS unique design feature



# STAR

- Benefits
  - Minimize the time the plant is in an abnormal operating configuration
  - Increase the availability of the control channels
  - Operationally focused improvement

# STAR

- WCAP 16011-P-A approach
  - Compare STAR Program to Generic Program
    - Generic Program based on ANSI/ANS 19.6.1-1997
    - Identify set of core problems
      - Design Predictions
      - As-Built Core
      - Test Performance

# STAR

- WCAP 16011-P-A approach (cont.)
  - Concluded STAR Program is as effective in detecting the Problems as the Generic Program
  - STAR is an NRC approved and implemented alternative to current testing methodology.

# STAR

- PVNGS Application
  - Compared
    - Design differences between PVNGS and original participating plants
    - Differences in current PVNGS startup program and Generic Program
    - Operating Experience since original STAR
      - NRC and INPO
      - PVNGS
      - Implementing plants





# STAR

- Results of Evaluations
  - Contained in plant specific justification
  - CASMO/SIMULATE as applied at PVNGS is acceptable for STAR
  - The PVNGS STAR Program is as effective as the approved STAR Program and is an acceptable alternative to the current PVNGS startup testing program.

# Replacement of 2/3 Cycle MTC Measurement

- Objective
  - To replace the 2/3 cycle MTC measurement with alternate verification
- Overview
  - Approved for all CE plants in CE NPSD-911-A and Amendment 1-A (TSTF 406)
  - No measurement at 2/3 cycle if 40 EFPD measurement is within acceptance criteria
  - Already implemented at many PWRs

# Replacement of 2/3 Cycle MTC Measurement

- Current Topical only applicable for ROCS & ANC
- PVNGS will demonstrate applicability of SIMULATE
- Conclusions
  - SIMULATE is acceptable for use
  - Replacement of the 2/3 cycle MTC measurement is acceptable at PVNGS including STAR Cycles

# Licensing Approach

- Submit one LAR
  - Application of STAR to PVNGS
  - Replacement of 2/3 cycle MTC Measurement

# Licensing Approach

- Technical Specification 3.1.4 MTC
  - SR 3.1.4.1 (HZP verification)
    - Add note allowing use of alternate BOC HZP MTC surveillance method (TSTF 486)
  - SR 3.1.4.2 (At power verifications)
    - Add note allowing replacement of 2/3 cycle at power MTC Measurement (CE-NPSD-911 & TSTF 406)

# Licensing Approach

- Proposed Schedule
  - Submit November 2013
  - Requesting NRC Approval in November 2014
  - First use in Spring of 2015



# Conclusion and Discussion

- Acceptable to implement the STAR Program at PVNGS
- Acceptable to replace the 2/3 cycle at power MTC measurement
- Submit both under a single LAR November 2013
- Requesting NRC approval November 2014

