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Turkey Point Nuclear Plant Meeting with NRC Extended Power Uprate (EPU)

July 22, 2010

Agenda

- Introduction
- Purpose
- EPU Overview and Schedule
- EPU Parameters
- Unique Features
- Plant Modifications
- Proposed Technical Specification Changes
- RS-001 Matrix Review
- Closing Discussion

Introduction

- Turkey Point (PTN) Team Attendees
  - Liz Abbott (FPL) – Licensing Director, Power Uprates
  - Steve Franzone (FPL) – Licensing Manager, PTN EPU
  - Carl O'Farrill (FPL) – Manager, PTN Fuels
  - Philip Tiemann (FPL) – Licensing Supervisor, PTN EPU
  - Mike Watson (Westinghouse) – EPU Project Manager
  - Kris Cummings (Westinghouse) – Fuels Manager

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Purpose

- Provide Staff with an overview of the proposed Turkey Point Unit 3 & 4 Extended Power Uprate
- Identify FPL actions to strengthen overall license amendment request (LAR) submittal
- Agree on communication plan going forward

Encourage active dialog between FPL and Staff to gain most benefit from the meeting

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Uprate Team Experience

- Extended Power Uprate Team
  - Dedicated engineering team on-site
    - Senior, experienced Turkey Point design engineers in key positions
    - Direct interface with site and fleet engineers for technical and licensing evaluations
  - Corporate office support with extensive nuclear experience
    - Specific experience with Uprate LARs
    - Uprate implementation experience
- Experienced Shaw and Westinghouse Teams
  - Have implemented over 40 successful uprates
  - Members with specific involvement with several uprates

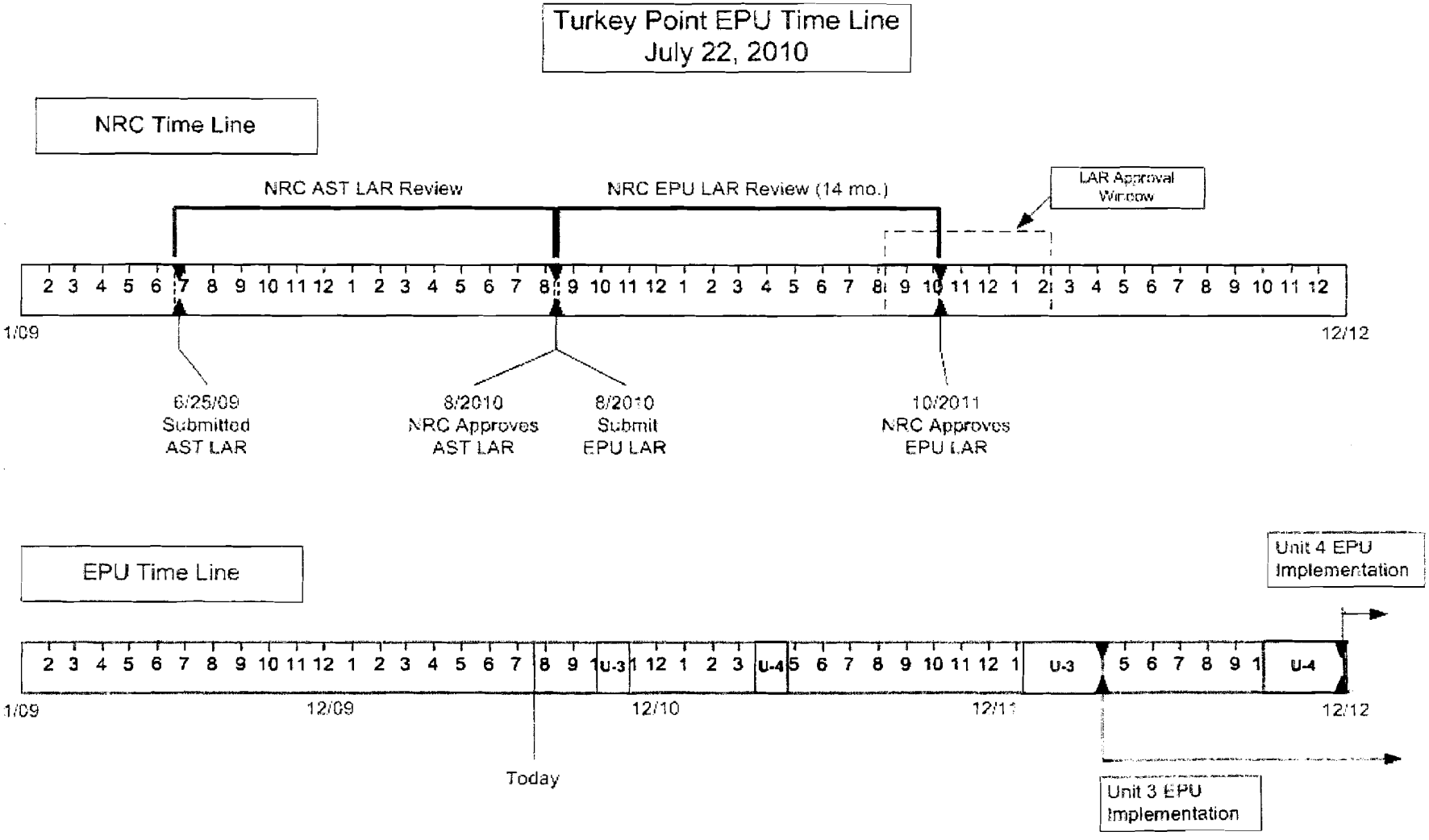
LAR Process

- Benchmarking against other successful uprate LARs (specifically Ginna, Beaver Valley, Comanche Peak and Millstone)
- Review and incorporation of previous RAIs, SEs and industry OE
- Integrated LAR review by senior team including subject matter experts and independent industry experts
- Detailed review by plant team members including over 25 meetings of the plant safety committee sub-committee

Uprate Team – Key Players

- Westinghouse
  - Fuel design and safety analyses
  - Unit 3 & 4 NSSS system & component analyses
- Areva
  - Reactor Vessel Head and CRDM analyses
- Shaw Stone & Webster
  - BOP analyses
- Siemens
  - Turbine Generator modifications
- Bechtel
  - Engineering, Procurement & Construction of modifications
- Zachry
  - Engineering support

EPU Schedule



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Turkey Point EPU Specifics

- EPU will increase licensed reactor power from 2300 MWt to 2644 MWt or by 15% (~ 104 MWe per unit)

- The PTN EPU will incorporate a Measurement Uncertainty Recapture (MUR) of 1.7%

- 2nd uprate: A 4.5% (100 MWt each) stretch power uprate (SPU) was authorized by amendment to Operating Licenses in September 1996

Uprate Parameters

Parameter	Current Licensed Power (MW_t)	Power Uprate (MW_t)
Licensed Reactor Core Rated Thermal Power (RTP)	2300	2644
NSSS Power (8 MWt RCP heat)	2308	2652
Analyzed NSSS Power with Uncertainty	2316	2660

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Uprate Parameters

Parameter	Current AOR	EPU Value
Thermal Design Flow (gpm/Loop)	85,000	86,900
RCS Tavg (°F)	571.2 to 577.2	570.0 to 583.0
SG Tube Plugging (%)	0 to 20	0 to 10
SG Outlet Pressure (psia)	736 to 832	701 to 822
Feedwater Temperature (°F)	432 to 443	405 to 440
Steam Generator Outlet Moisture, (% max)	0.25%	0.25%

Uprate Parameters

- Six parameter cases developed to establish design parameters
  - Case 1: Tavg = 570°F at 0% SGTP
  - Case 2: Tavg = 570°F at 10% SGTP
  - Case 3: Tavg = 583°F at 0% SGTP
  - Case 4: Tavg = 583°F at 10% SGTP
  - Case 5: Tavg = 577°F at 0% SGTP
  - Case 6: Tavg = 577°F at 10% SGTP

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EPU Unique Features

- Dose analysis provided in AST LAR currently under staff review
- MUR included with the EPU submittal
  - Licensing Report Section 2.4.4 addresses MUR
- A proposed extension of the Leak Before Break (LBB) criteria, at EPU conditions, to the limiting auxiliary lines including the pressurizer surge line, accumulator lines, and residual heat removal (RHR) line to improve margin
- TSTF-493 implemented for RTS & ESFAS setpoints that are changed by EPU

SFP Criticality Analysis

- Considering separate submittal which addresses fuel storage criticality and fuel enrichment
- Criticality Analysis Performed
  - Replaces the previous licensing basis analysis for spent fuel and new fuel storage
  - Includes all fuel, including fuel depleted under EPU conditions
  - Main codes are PARAGON & KENO-V

SFP Criticality Analysis

- Highlights
  - Allows storage of fuel assemblies with a maximum enrichment of 5.0 wt % U-235
  - Credits Metamic™ inserts, RCCAs and empty cells for reactivity control
  - No credit for Boraflex
  - Addresses issues raised by NRC on industry LARs through the time of analysis, including:
    - Includes depletion uncertainty in unborated calculations
    - Code benchmark includes HTC criticals
    - Target keff values reduced by 0.005 Δk

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Application of 10CFR50.59

- 10 CFR 50.59 will be applied to determine when prior NRC review is required
- Most modifications do not require prior NRC review for implementation
- Several examples where NRC review is required:
  - Increase maximum fuel enrichment to 5%
  - Leading Edge Flow Meter (LEFM)
  - Various Reactor Trip setpoints and ESFAS settings
  - Pressurizer Safety Valve and MSSV setpoints

Plant Modifications

- Fuel
  - Enrichment increased to a maximum of 5%
  - PTN will start transition to the Westinghouse 15 X 15 UPGRADE Fuel prior to EPU
    - Currently use 15 X 15 seven-grid Debris Resistant Fuel Assembly (DRFA)
    - UPGRADE Fuel Design currently used at Indian Point Units 2 & 3 and DC Cook Unit 1
  - Key Features of UPGRADE fuel include:
    - Debris-filter bottom nozzle (DFBN) with protective bottom grid and ZrO_2 coating on lower part of fuel rods
    - Tube-in-Tube ZIRLO® guide thimbles
    - Enhanced Intermediate Flow Mixer (IFM) grids
    - I-Spring mid grids with balanced vane pattern

Plant Modifications

- NSSS & Containment
  - Pressurizer Safety Valve setpoint and tolerance change
  - Normal Containment Cooler (NCC) replacement
  - RTS & ESFAS Setpoints and Scaling changes

Plant Modifications

- Balance of Plant
  - Leading Edge Flow Meter - Measurement Uncertainty Recapture
  - Feedwater Regulating Valve Upgrade
  - No. 5 & No. 6 Feedwater Heaters Replacement
  - Addition of Fast Acting Feedwater Isolation Valves
  - Main Condenser Tube Bundle Replacement
  - Turbine Plant Cooling Water Modifications
  - Isolated-phase Bus Duct Replacement

Plant Modifications

- Balance of Plant
  - Moisture Separator Reheater Replacement
  - Feedwater Pump Rotating Element Replacement
  - Main Steam & CCW Pipe Support Modifications
  - Main Steam Safety Valves Set Point Change
  - MSIV/MSCV Replacement
  - Removal of Main Steam Piping Flow Elements
  - Plant Runback and Staggered Trip Signals
  - Auxiliary Feedwater Pump Modifications
  - Secondary Plant Instrumentation

Plant Modifications

- Balance of Plant
  - Condensate Pumps and Motors
  - Simulator Upgrades
  - Jet Impingement and Whip Restraint Modifications
  - Modify Technical Support Center (TSC) for Dose Reduction
  - Spent Fuel Pool Cooling Upgrade (2011)
  - Turbine Gantry Crane

Plant Modifications

- Turbine Generator
  - Generator Rotor Replacement
  - Generator Stator Rewind
  - High Pressure Turbine Controls
  - Turbine High Lift Valve Modification
  - Generator Exciter Modifications
  - Generator Hydrogen Cooler Upgrade
  - Generator Exciter Cooler Modification
  - Current Transformers & Bushings

Plant Modifications

- Switchyard
  - Upgrade switchyard disconnect switches
  - Add power stabilizers
  - Installation of two new 5 Ohm inductors and 90 nF capacitor assemblies to reduce the available fault current

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Proposed Tech Spec Changes

- Maximum licensed reactor core thermal power increased from 2300 MWt to 2644 MWt
- Maximum allowable fuel enrichment increased from 4.5 wt% U-235 to 5.0 wt% U-235
- RTS & ESFAS Limiting Safety System Settings Modified
  - Application of TSTF-493, Rev 4 Setpoint Methodology to affected RTS & ESFAS Allowable Values (AV) and Nominal Trip Setpoints (NTS) in Tables 2.2-1 & 3.3-3

Proposed Tech Spec Changes

- Table 2.2-1 RTS Instrument Setpoints
  - Power Range, High Neutron Flux (AV↓)
  - OTΔT AV & NTS Formulation Modified
  - OPΔT AV & NTS Formulation Modified
  - Reactor Coolant Flow-Low (AV↑)
  - Steam Generator (SG) Water Level-Low-Low (AV↑/NTS↑)
  - Steam/Feedwater Flow Mismatch (AV↓) Coincident with SG Water Level-Low (AV↑/NTS↑)
  - Turbine Trip, Emergency Trip Header Pressure (AV↑/NTS↑)

  - Notes added to address as-found and as-left values

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Proposed Tech Spec Changes

- Table 3.3-3 ESFAS Instrument Setpoints
  - Steam line Flow-High (AV↓) Coincident w/Steam Generator Pressure-Low (AV↑)
  - Steam Line Isolation-High (AV↓)/NTS↓) Coincident w/Steam Line Pressure-Low (AV↓)
  - Feedwater Isolation, SG Water Level High-High (AV↓)
  - Auxiliary FW, SG Water Level-Low-Low (AV↑/NTS↑)
  - Notes added to address as-found and as-left values

Proposed Tech Spec Changes

- Moderator Temperature Coefficient
- RCS P-T limits for heatup and cooldown;
- Pressurizer operating level;
- PORV lift settings for low temperature overpressure protection;
- Pressurizer safety valve settings;
- Feedwater Isolation new LCO, Applicability, Action and Surveillance Requirements

Proposed Tech Spec Changes

- Demineralized water storage and boric acid tank volumes;
- Boron concentrations in the RCS and refueling canal, spent fuel pit, accumulators, boric acid storage tanks and refueling water storage tank;
- Boration Systems temperature limits
- Main steam safety valve (MSSV) lift settings and maximum power levels with inoperable MSSV's;

Proposed Tech Spec Changes

- Reduce Emergency diesel generator (EDG) voltage and frequency tolerances
- Design or cyclic transient limits
- Spent fuel storage patterns.
- Containment Leakage Rate Test Program peak calculated containment internal pressure for design basis LOCA
- Steam Generator Program new requirements
- COLR Migration

Other Changes

- Examples of COLR changes
  - Power/pressurizer pressure/T_{avg} Curve (Fig 2.1-1)
  - Some OverpowerΔT and Overtemperature ΔT input parameters (Table 2.2-1)
  - DNB parameters: T_{avg}, Pressurizer Pressure (3.2.5a)
  - RWST Boron concentration (3.5.4b)
  - RCS and Refueling Canal Boron concentration during refueling (3.9.1b)
- MUR/LEFM
  - Add the actions to be taken when the LEFM is degraded or out-of-service to the UFSAR

Other Changes

- The methodologies and computer codes that are being applied at PTN for the first time are identified below:
  - GOTHIC
    - Containment response following a postulated main steam line break and LOCA and long-term post-reflood releases
  - VIPRE-01
    - The thermal-hydraulic DNB analysis of the fuel
  - RETRAN
    - Selected analyses of the transient responses
    - Loss of offsite AC Power and the loss of normal feedwater flow analyses including the RETRAN thick metal mass heat transfer model.
    - Replaced LOFTRAN in the analysis of the mass and energy releases from steam line breaks inside containment

Other Changes

- The methodologies and computer codes (continued):
  - The main steam line break from full power for core response is analyzed at PTN for the first time
  - BE LOCA/ASTRUM
    - ASTRUM statistical approach methodology to develop the Peak Cladding Temperature and oxidation results at the 95the percentile
  - WCOBRA/TRAC
    - For the large break LOCA, the cold leg recirculation interruption time is modeled in the thermal-hydraulic code using 10 CFR 50 Appendix K decay heat
  - PTN applies the interim boric acid precipitation model consistent with the guidance authorized by the NRC

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Conformance with RS-001

- Application will follow RS-001 template
- Turkey Point Unit 3 & 4 not licensed to the Standard Review Plan
  - Licensed prior to the GDCs and the SRP
  - Designed/constructed based on proposed GDCs published in 1967
  - CP issued in 1967; GDCs issued in 1971
  - AEC concluded plant meets the intent of the GDCs

RS-001 Matrix 1

Materials and Chemical Engineering

- RV Material Surveillance Program
  - Analysis performed to address EPU fluences – no changes
- P-T Limits & Upper-Shelf Energy
  - Limits revised to address EPU fluences, increasing EFPY for extended period of operation
- Pressurized Thermal Shock
  - Analysis performed to address EPU fluences – criteria met
- Reactor Internal & Core Support Materials
  - Evaluation performed to address the impact of EPU conditions on aging effects – no modifications required
- RCPB Materials
  - Assessment performed to address EPU temperature increases – no impact
- Leak-Before-Break
  - Current analysis acceptable for EPU conditions
  - Additionally analysis included auxiliary lines to RCS (pressurizer surge line, accumulator lines, and residual heat removal (RHR) line)

RS-001 Matrix 1

Materials and Chemical Engineering

- Protective Coating Systems
  - Evaluation performed to address EPU conditions - no changes
- Flow-Accelerated Corrosion
  - Program updated to address changes in flow, pressure, temperature and steam quality; some selected replacements
- SG Tube Inservice Inspection
  - Evaluation performed to address EPU conditions - no changes
- SG Blowdown System
  - Evaluation performed to address EPU conditions - no changes
- Chemical & Volume Control System
  - Evaluation performed to address EPU conditions
    - Modified BAS Tank requirements

RS-001 Matrix 2

Mechanical and Civil Engineering

- Pipe Rupture Locations & Associated Dynamic Effects
  - Evaluation performed to address EPU conditions – no changes
- Pressure-Retaining Components & Supports
  - NSSS Components
    - Evaluations performed to address EPU conditions
    - Includes piping, supports, reactor vessel, CRDMs, reactor coolant pumps, steam generators and pressurizer
    - No changes
  - BOP Components
    - Evaluations performed to address EPU conditions
    - Several BOP component replacements required
    - Piping rerated or replaced, some support modifications

RS-001 Matrix 2

Mechanical and Civil Engineering

- RPV Internals & Core Supports
  - Evaluation performed to address EPU conditions – no modifications required
- Safety-Related Valves & Pumps
  - Evaluations performed to address EPU conditions – modifications required (AFW Pump & Change oil for HHSI pumps)
- Seismic & Dynamic Qualification
  - Evaluation performed to address EPU conditions – no modifications required
- NSSS Design Transients
  - Evaluations performed to address EPU conditions – minor changes to selected transients
- Bottom-Mounted Instrumentation Guide Tubes & Flux thimble
  - Evaluation performed to address EPU conditions – no modifications required

RS-001 Matrix 3

Electrical Engineering

- Environmental Qualification of Electrical Equipment
  - EQ equipment evaluated for changes in normal and accident conditions
  - No equipment replacement required
- Offsite Power System
  - Grid stability and system impact has been evaluated at EPU conditions
  - Results indicate, with a combination of system upgrades, thermal, voltage and stability performance not degraded by EPU
  - Studies will be provided under separate cover at the time of EPU LAR submittal
- AC Onsite Power System
  - Evaluation performed to address EPU conditions using ETAP model
  - No modifications required to support EPU
- DC Onsite Power System
  - Evaluation performed to address EPU conditions
  - No modifications required
- Station Blackout
  - Evaluation performed to address EPU conditions
  - No modifications required

RS-001 Matrix 4

Instrumentation and Controls

- RP, Safety Features Actuation, & Control Systems
  - Evaluations performed to address EPU conditions
  - Some changes to RTS or ESFAS setpoints
  - Some control system changes required
- Plant Operability
  - Detailed transient modeling performed
  - Some control system changes for improved operation
- Pressurizer Component Sizing
  - Evaluation performed to address EPU conditions
  - No modifications required

RS-001 Matrix 4

Instrumentation and Controls

- MUR/LEFM
  - Content and format of MUR LR section consistent with RIS 2002-03
  - References/links to related EPU LR sections provided where appropriate
  - MUR based on Cameron (Caldon®) LEFM CheckPlus System and Cameron Topical Reports ER-783, 748 and 752
  - Flow elements have been calibrated at Alden Labs using plant specific piping models
  - Alden Research Lab Test Reports (Calibration of Unit 3 & 4 LEFM meters) provided as attachment to LAR

RS-001 Matrix 5

Plant Systems

- Flood Protection
  - Evaluation performed to address EPU conditions
  - No modifications required
- Missile Protection (Internally Generated & Turbine Generator)
  - Evaluations performed to address EPU conditions
  - No modifications required
- Pipe Failures
  - Evaluation performed to address EPU conditions
  - No modifications required
- Fire Protection
  - Evaluation performed to address EPU conditions
  - No modifications required

RS-001 Matrix 5

Plant Systems

- Pressurizer Relief Tank
  - Evaluation performed to address EPU conditions
  - PRT water level setpoint modified to provide increased operating margin
- Fission Product Control
  - Fission Product Control Systems & Structures
    - Evaluation performed to address EPU conditions
    - No modifications required
  - Main Condenser Evacuation System
    - Evaluation performed to address EPU conditions
    - No modifications required
  - Turbine Gland Sealing System
    - Evaluation performed for EPU conditions
    - Upgrade system for new turbine design

RS-001 Matrix 5

Plant Systems

- Component Cooling & Decay Heat Removal
  - Evaluations performed for increased EPU heat loads on the following systems:
    - Spent Fuel Pool Cooling & Cleanup System
      - Full core off-load and partial core off-load cases analyzed
      - Supplemental heat exchanger added
      - Acceptance criteria met
    - Station Service Water System (ICW)
      - No modifications required
    - Reactor Auxiliary Cooling Water Systems (CCW)
      - CCW Surge Tank Relief valve setpoint increase
    - Ultimate Heat Sink
      - No modifications required
    - Auxiliary Feedwater System
      - Pump refurbishment and FCV Travel Stop Removal

RS-001 Matrix 5

Plant Systems

- Balance-of-Plant Systems
  - Evaluations performed and modifications required for:
    - Main Steam – MSIV/MSCV replacement, MSR replacement
    - Replacement of FW Heaters #5 & 6
    - Main Condenser – tube bundle replacement
    - Condensate & Feedwater
      - LEFM installation
      - Feedwater pump & Heater Drain pumps upgrades
      - High pressure Feedwater heater
      - Valve upgrades (Feedwater control and heater drain)
      - Condensate Pump & Motor refurbishment/upgrade
- Waste Management Systems
  - Evaluations performed to address EPU conditions
  - No modifications required (Gaseous, Liquid & Solid Waste Management Systems)

RS-001 Matrix 5

Plant Systems

- Additional Considerations
  - EDG Engine Fuel Oil Storage & Transfer System
    - Evaluations performed to address EPU conditions
    - No modifications required
  - Light Load Handling System (Related to Refueling)
    - Evaluations performed to address EPU conditions
    - No modifications required

RS-001 Matrix 6

Containment Review

- Primary Containment Functional Design
  - Containment response evaluated to address EPU conditions using GOTHIC (method change)
  - Containment design pressure and temperature limits are met
- Subcompartment Analyses
  - Containment subcompartments evaluated to address EPU conditions - no changes
- Mass & Energy Release
  - EPU releases calculated for LOCA and secondary system pipe ruptures
  - Accounts for increase in MFW & AFW flows
  - Addition of fast-acting actuators & backup valve in bypass line
- Combustible Gas Control in Containment
  - Not required based on limited exemption to 10CFR50.44

RS-001 Matrix 6

Containment Review

- Containment Heat Removal
  - Analyses performed to address EPU heat loads
  - NCC replacement
- Pressure Analysis for ECCS Performance
  - Minimum containment pressure analysis performed at EPU conditions and 10 CFR 50.46 acceptance criteria met
  - Containment overpressure not credited

RS-001 Matrix 7

Habitability, Filtration and Ventilation

- Evaluations performed to address EPU conditions for the following systems - no modifications required:
  - Control Room Habitability System
  - ESF Atmosphere Cleanup
  - Spent Fuel Pool Area Ventilation System
  - Auxiliary, Radwaste & Turbine Areas Ventilation Systems
  - Containment Ventilation Systems
- Technical Support Center will be modified to account for additional dose due to EPU conditions

RS-001 Matrix 8

Reactor Systems

- Fuel System Design
  - Westinghouse 15 X 15 seven grid UPGRADE fuel assembly design
  - Fuel analyzed at EPU conditions
  - Acceptance criteria met
- Nuclear Design
  - Analyzed at EPU conditions
  - Fuel design limits not exceeded
- Thermal & Hydraulic Design
  - Analyzed at EPU conditions
  - Acceptance criteria met

RS-001 Matrix 8

Reactor Systems

- Emergency Systems
  - Functional Design of Control Rod Drive System
    - Evaluation performed to address EPU conditions
    - No modifications required
  - Overpressure Protection During Power Operation
    - Analyses performed to address EPU conditions
    - Pressurizer Safety valves setpoints will be modified
    - Main Steam Safety setpoints will be modified
  - Overpressure Protection During Low Temperature Operation
    - Evaluation performed to address EPU conditions
    - OMS setpoint will be modified
  - Residual Heat Removal System
    - Evaluation performed to address EPU conditions
    - No modifications required

RS-001 Matrix 8

Reactor Systems

- Non LOCA Analysis Codes
  - TWINKLE
  - VIPRE
  - RETRAN
  - LOFTRAN
  - ANC
  - FACTRAN

RS-001 Matrix 8

Reactor Systems

- Non LOCA Analyses
- All events analyzed/evaluated at EPU conditions and specific acceptance criteria met
  - Increase in Heat Removal by the Secondary System
    - Decrease FW Temp, Increase Feedwater Flow, Increase Steam Flow, & Inadvertent Opening of Steam Generator Relief or Safety Valve
  - Steam System Piping Failures Inside & Outside Containment
    - Analyzed Hot Zero Power (HZP) and Hot Full Power (HFP)
  - Decrease in Heat Removal by the Secondary System
    - Loss of External Load
  - Loss of AC Power to the Station Auxiliaries
  - Loss of Normal Feedwater Flow
  - Loss of Forced Reactor Coolant Flow
  - RCP Rotor Seizure

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RS-001 Matrix 8

Reactor Systems

- Non LOCA Analyses (continued)
  - Uncontrolled RCCA Withdrawal from Subcritical or Low-Power Startup Condition
  - Uncontrolled RCCA Withdrawal at Power
  - Control Rod Misoperation
  - CVCS Malfunction
  - Spectrum of Rod Ejection Accidents
  - Inadvertent Opening of Pressurizer Power Operated Relief Valve
  - Steam Generator Tube Rupture
  - Anticipated Transients Without Scram

RS-001 Matrix 8

Reactor Systems

- Large Break Loss of Coolant Accident (LOCA)
  - Performed using ASTRUM LB BELOCA methodology
  - All acceptance criteria met
- Small Break Loss of Coolant Accident (LOCA)
  - Performed using the NOTRUMP and SBLOCTA methodology
  - All acceptance criteria met
- Post-LOCA Long-term Cooling
  - Performed using Westinghouse post-LOCA LTC model
  - LBLOCA scenario, the CL recirculation interruption time is modeled in the thermal-hydraulic code Westinghouse COBRA/TRAC (WC/T), using Appendix K decay heat
  - EOPs will be revised to credit 2 HHSI pumps (i.e. flow to 2 out of 3 cold legs)

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RS-001 Matrix 8

Reactor Systems

- Fuel Storage
  - Considering separate submittal which addresses fuel storage criticality and fuel enrichment
  - New Fuel Storage
    - Analyzed at 5 weight percent enrichment
    - All acceptance criteria met
  - Spent Fuel Storage
    - Analyzed at 5 weight percent enrichment
    - All acceptance criteria met
  - Analyses available
- Additional Reactor Systems
  - Natural Circulation Cooldown
    - Analyzed at EPU conditions to revised criteria (SRP BTP 5-4)
    - All acceptance criteria met
  - Loss of Residual Heat Removal at Reduced Inventory
    - Evaluated for higher EPU decay heat load
    - Plant can continue to operate safely at reduced inventory

RS-001 Matrix 9

Source Term and Radiological Consequences

- Source Terms for Radwaste Systems Analyses
  - AST Source Term used EPU conditions (LAR 196)
- Radiological Consequences Analyses Using Alternate Source Terms
  - Events analyzed for EPU under AST (LAR 196)
- EPU LAR references AST LAR 196

RS-001 Matrix 10

Health Physics

- Occupational & Public Radiation Doses
  - Doses determined at EPU conditions
  - Results acceptable
- Post Accident Vital Area Accessibility
  - Operator doses remain within limits
  - One modification

RS-001 Matrix 11

Human Performance

- Programs, procedures, training and plant design features related to operator performance evaluated to address EPU conditions
- Evaluation responds to NRC questions regarding changes to:
  - Emergency & Abnormal Operating Procedures
  - Operator Actions Sensitive to Power Uprate
  - Control Room Controls, Displays and Alarms
  - Safety Parameter Display System
  - Operator Training Program and Simulator

RS-001 Matrix 12

Power Ascension and Testing Plan

- Approach to EPU Power Level & Test Plan
  - Test plan includes:
    - Augmented start-up testing from hot zero power to current 100% power level
    - Incremental power ascension from current 100% power level to EPU conditions
    - Post modification testing
    - Additional testing (e.g., vibration monitoring)
  - Compared EPU testing plan to original start-up testing
  - Numerous transients evaluated using LOFTRAN model
  - Consistent with SRP 14.2.1, Generic Guidelines for EPU Testing Programs
  - Plant analysis used in lieu of some large transient testing to preclude unnecessary challenges to the plant

RS-001 Matrix 13

Risk Evaluation

- Internal events CDF Baseline for PTN is one of the lowest in the U.S
- Existing Model was updated prior to EPU risk analysis
- Elective changes made to reduce risk
- Unique features exist which reduce risk:
  - opposite unit's RWST for continued injection
  - 4 HHSI pumps all of which start on an SI signal from either unit
  - Crosstie to the other unit's EDGs in event of station blackout
  - Only 1 of 4 EDGs is necessary to provide sufficient power to both units to safely shut down.
  - Diesel-driven standby steam generator feedwater pump capable of supplying both units with sufficient feedwater for cooling.
- Additional EOP changes made to reduce EPU effects

RS-001 Matrix 13

Risk Evaluation

- CDF for EPU
  - Pre-EPU Baseline CDF[LERF]: ~4.4E-07 [~1.3E-08]
  - Post-EPU CDF[LERF] w/ elective changes: ~4.8E-07 [1.7E-08]
- Delta CDF w/ changes: ~5E-08 [~4E-09]
- Requested EPU poses a "very small" and acceptable risk change

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Questions??