Exelon Nuclear

Peach Bottom Atomic Power Station

Pre-Application Meeting
Extended Power Uprate

April 5, 2012

Introductions

- **Kenneth Ainger – Project Management Director, EPU**
- **Kevin Borton – Power Uprate Licensing Manager**
- **John Rommel – Power Uprate Engineering Director**
- **Todd Wickel – Power Uprate Sr. Engineering Manager**
- **Jenna Lichtenwalner – Power Uprate Engineering Manager**
- **Tony Hightower – Peach Bottom Senior Reactor Operator**

Agenda and Meeting Purpose

- **Status of EPU Submittal Schedule**
- **Describe Key Aspects of Preliminary Technical Evaluations**
  - **Piping Modifications**
  - **Power Ascension Testing**
- **Update on Steam Dryer Evaluation**
- **Future Pre-Submittal Meetings**

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EPU Schedule Overview

EPU Projected Power Uprate level of 3951 MWt (increase ~12.4% of current licensed power or 120% of original licensed power)

EPU Implementation Schedule

- **Submit LAR:** **September 2012**
- **LAR Approval:** **May 2014**

- **Unit 2 Implementation:** **October 2014 (Following Outage P2R20)**
- **Unit 3 Implementation:** **October 2015 (Following Outage P3R20)**

Piping Modifications

Kevin Borton / Todd Wickel

Piping Modifications

Purpose:

Provide project plan regarding the design level of detail for piping and pipe support modifications

Precedent submittals and RAIs:

- **Turkey Point –** staff questioned if pipe support design and analytical details of modifications for welds, structural members, integral welded attachments (IWA), base plate, anchor bolts, rods, U-bolts, and new snubbers were completed or still in progress.

- **St. Lucie –** staff requested assurance that all structural modifications and/or additions have been identified and designed and that all structural evaluations and required design calculations to show that SSCs credited to and/or affected by the proposed EPU have been completed and that all controlled documentation exists which finds the applicable SSCs structurally adequate to perform their intended design functions under EPU conditions. Upon such assurance, the staff will accept the EPU application.

- **Crystal River –** staff requested assurance that all structural modifications and/or additions have been identified and designed and that all structural evaluations and required design calculations to show that SSCs credited to and/or affected by the proposed EPU have been completed and that controlled documentation exists which finds the applicable SSCs structurally adequate to perform their intended design functions under EPU conditions.

Piping Modifications

PBAPS Project Plan:

- EPU analysis results that confirm pipe stress analysis are acceptable at EPU with modifications will be included in submittal
- Design details for individual piping support modifications will be performed under 10CFR 50.59 and not included in submittal
  - Support modifications performed under Design Control Process
    - Documentation is controlled
    - Revision 0 modification analysis complete
    - Modifications will continue to be refined after submittal
- Safety related design calculations/drawings for pipe support evaluations associated with SSCs credited in the EPU safety analysis will be complete at time of submittal
  - SSCs are structurally adequate

Power Ascension Testing

Jenna Lichtenwalner

Purpose: Review Power Ascension Testing Plan for EPU

Basis for Testing Plan

- RS - 001 Review Standard for Extended Power Uprates
- NRC Standard Review Plan 14.2.1
- GEH EPU CLTR Guidance
- PBAPS Stretch and MUR Uprate Testing
- Industry Operating Experience
- PBAPS Specific Operating Experience

Testing Plan

- Normal power ascension to 100% CLTP
- Reduce to 90% CLTP to set rod pattern
- Increase power in increments of ~4.5% power
- All testing under control of a comprehensive test procedure
- Tests will be performed and results evaluated at each power level
- Predict results for the next power level prior to increasing power
- All test results and predictions will be presented to Plant Operations Review Committee for approval prior to increasing power to the next level
- Key tests include:
  - Steam Dryer Acoustic Monitoring
  - Piping Vibration
  - Tech Spec required surveillances
  - Feedwater and Reactor Level Control
  - Core Performance

Plant-Specific Evaluation of Large Transient Testing

- Addresses the criteria in SRP 14.2.1 for elimination of EPU power ascension tests
- Includes a plant specific evaluation of large transient testing
- Compares MSIV Closure and Load Reject Transient OE:
    - Industry Operating Experience
    - PBAPS Plant Specific Operating Experience

Large Transient Testing Not Recommended

Large transient testing:

- Will not provide any additional plant response information beyond that documented by OE
- Imposes a significant transient
- Increases the probabilities of core damage and large early release

- EPU analyses maintain margin to pertinent safety criteria
- PBAPS simulator fidelity is verified
- For the transients evaluated, EPU does not change:
  - the component or system responses
  - any plant operations and procedures

LAR content

- Attachment 10 to the LAR contains the power ascension test plan
  - Follows the guidelines of SRP 14.2.1
  - Compares tests performed for initial startup, stretch and MUR uprates and the proposed testing for EPU
  - Contains information of actual plant transients which occurred at 100% CLTP

Update on Steam Dryer Evaluation

Kenneth Ainger / John Rommel

Update on Steam Dryer Evaluation

Purpose: Update NRC on steam dryer decision, schedule and regulatory approach for Peach Bottom, LaSalle

Decision:

- Analyzed current steam dryers
- Decision to proceed with Westinghouse Replacement Steam Dryers (RSD)

EPU Schedule:

- Replacement Steam Dryer driving EPU submittal date
- Installation sequence is:
  - Peach Bottom Unit 2: September 2014
  - Peach Bottom Unit 3: September 2015
  - LaSalle Unit 2: February 2015
  - LaSalle Unit 1: February 2016

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Replacement Steam Dryers

Regulatory Approach:

- RG 1.20, Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing
- RS-001, Review Standard for Extended Power Uprates
- BWRVIPs
  - BWRVIP-181, Steam Dryer Repair Design Criteria
  - BWRVIP-182, Guidance for Demonstration of Steam Dryer Integrity for Power Uprate
- Industry Precedent

Replacement Steam Dryers

- **RG 1.20 Classification Strategy**
  - Peach Bottom Unit 2 designated as prototype
  - Subsequent units designated non-prototype, category I
    - Peach Bottom Unit 3
    - LaSalle Unit 1
    - LaSalle Unit 2

- **Peach Bottom Unit 2 Prototype RSD**
  - Vibration and Stress Analysis Program to be performed
  - Vibration and Stress Measurement Program to be performed
  - Inspection Program to be performed
  - Documentation of results to be submitted

Vibration and Stress Analysis Program

- **Main Steam Line Instrumentation Program**
  - Strain gages installed on Main Steam Lines (MSL)
  - MSL data collected through CLTP
- **Determination of Scaling Factors**
  - Four-line (1/8th) subscale testing will be performed with PBAPS geometry
  - Impact of replacement steam dryer on subscale test results also studied
- **Acoustic Circuit Model (ACM) and Structural Analysis**
  - ACM 4.1 to be utilized
  - Minimum alternating stress ratio (SR) > 2.0 at EPU

Vibration and Stress Measurement Program

- Dryer will be instrumented with accelerometers, pressure transducers and strain gages at selected locations
- Strain gages will be installed on the MSLs
- Data collection will be performed during EPU power ascension
  - Limit curve methodology to be utilized

Inspection Program

- Inspection at completion of first operating cycle in September 2016
  - Inspection will focus on accessible welds at critical locations

- Dryer configurations have similar design, size and operating conditions
- Unit specific subscale testing will be performed
- Unit specific acoustic circuit modeling and structural analysis will be performed
- Vibration measurement program using MSL strain gauges
- Unit specific power ascension plans and power ascension limit curves will be generated
- Inspection program will be incorporated into existing dryer inspection program and will focus on critical weld locations

EPU LAR RSD Supporting Documents

- Discussion of RG 1.20 Classification
- Acoustic Circuit Model (Load Definition) Report
- High Cycle Fatigue Stress Report
- ASME Section III Stress Report
- Power Ascension Plan with Limit Curves
- Subscale Testing Report
- Signal Processing (MSL Plant Data) Report
- Instrumentation Package
- Reactor Internal Pressure Differential Report
- Moisture Carryover Report

Future Pre-Submittal Meetings

- Next meeting target July 2012
  - Topics (tentative list)
    - Update on CAP Credit Elimination
    - Technical Specifications Changes

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Acronym List

- ACM – Acoustic Circuit Model
- ASME – American Society of Mechanical Engineers
- BWRVIP – Boiling Water Reactor Vessel & Internals Project
- CAP – Containment Accident Pressure
- CLTP – Current Licensed Thermal Power
- CLTR – Constant Pressure Power Uprate License Topical Report
- EOP – Emergency Operating procedure
- EPU – Extended Power Uprate
- GEH – General Electric Hitachi
- ISI – In Service Inspection
- IWA – Integral Welded Attachments
- LAR – License Amendment Request
- MSIV – Main Steam Isolation Valve
- MSL – Main Steam Line
- MUR – Measurement Uncertainty Recapture
- MWt – Megawatts Thermal
- NRC – Nuclear Regulatory Commission
- OE – Operating Experience
- PBAPS – Peach Bottom Atomic Power Station
- RSD – Replacement Steam Dryer
- RS – Review Standard
- SR – Stress Ratio
- SRP – Standard Review Plan
- SSC – Structures Systems and Components

Meeting Close