



# **Peach Bottom Atomic Power Station**

**Pre-Application Meeting  
Extended Power Uprate**

**December 7, 2011**

# Introductions

## Exelon Team:

- **Kenneth Ainger – Project Management Director, EPU**
- **Kevin Borton – Power Uprate Licensing Manager**
- **John Rommel – Power Uprate Engineering Director**
- **Todd Wickel – Power Uprate Engineering Manager**
- **Steve Minnick – Power Uprate Project Manager**
- **Mike Weidman – Site Senior Engineering Manager**
- **Jim Armstrong – Site Regulatory Assurance Manager**
- **Jenna Lichtenwalner – Power Uprate Licensing**
- **Jessica Krejcie – Power Uprate Engineer**
- **Jason Murphy – Site Reactor Engineering Manager**
- **Tracy Siglin – Power Uprate Environmental Specialist**

- Status of EPU Submittal Schedule
- Update on Steam Dryer Evaluation
- Describe Key Aspects of Preliminary Technical Evaluations and Obtain Feedback
  - Spent Fuel Pool Criticality
  - AST Approach
  - I&C – Setpoint Changes
  - Environmental Overview
- Open Items and Future Pre-submittal Meetings

# Schedule Overview

## NRC Communication Schedule

- 3<sup>rd</sup> Pre-Submittal Meeting: Target February 2012
- 4<sup>th</sup> Pre-Submittal Meeting: Target April 2012
- Final Pre-Submittal Meeting: Target June 2012

## EPU Implementation Schedule

- Submit LAR: Target 3<sup>rd</sup> QTR 2012
- LAR Approval: Target 1<sup>st</sup> QTR 2014 (20 months)
  
- Unit 2 Implementation: 3<sup>rd</sup> QTR 2014 (Outage P2R20)
- Unit 3 Implementation: 3<sup>rd</sup> QTR 2015 (Outage P3R20)

**Steam Dryer Evaluation could impact above schedule**

# **Update on Steam Dryer Evaluation**

**Todd Wickel**

# Update on Steam Dryer Evaluation

**Purpose: Provide an update from our June 14, 2011 meeting**

- Analysis followed BWRVIP-182-A and BWRVIP-181-A guidance
- Preliminary Analysis Results for EPU Conditions
  - Various subcomponents of the dryer have acceptable stress ratios
  - Some welds do exhibit high stresses (SR < 2.0)

- Options considered:
  - Modify dryer to eliminate  $SR < 2.0$
  - Add acoustic side branches to minimize modifications
  - Modify standpipes or replace SRVs with different acoustic properties
  - Replace steam dryer
  
- Currently evaluating replacement Steam Dryers
  - Bid evaluation in progress
  - Steam Dryers are critical path to LAR submittal

# Spent Fuel Pool LAR

Kevin Borton



**Purpose: Discuss November 3, 2011 Neutron Absorber Insert LAR relative to EPU**

- Submitted November 3, 2011 Rack Insert LAR
  - Resolve non-conservative Technical Specification
  - Requested 12 month NRC review and approval
- EPU Submittal expected 3<sup>rd</sup> quarter 2012
  - Proposing 20 month NRC review and approval
- EPU can be accepted for review independent of the absorber insert LAR
  - Sufficient time exists for NRC to approve Rack Insert LAR prior to EPU approval
  - Current degraded condition addressed in CAP
  - Actions docketed to permanently resolve issue
  - Interim actions in place to ensure compliance

# **Alternative Source Term Approach**

**Jessica Krejcie**

**Exelon.**

## **Purpose: Verify Methodology and Approach to the Revised Radiological Analyses & Provide Preliminary LOCA Dose Results**

### ▪ Methodology

- Used RG 1.183 Rev. 0, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000
- Started with existing approved AST analyses and modified for EPU core source term and power level
  - RADTRAD re-run
- In order to meet regulatory dose limits with EPU, a change to the allowable MSIV leakage was required in the LOCA analysis
  - Change to TS 3.6.1.3

- Re-analyses performed for LOCA, FHA, MSLBA, CRDA, Post-LOCA suppression pool pH, Post-LOCA Vital access area and Post-LOCA TSC using EPU core inventory
- All analyses are consistent with previously approved AST analyses with changes as necessary for EPU
  - Core inventory, power level, post-LOCA temperatures, etc
- Continued use of RG 1.183 Rev. 0
- Only major input change for all calculations is change to MSIV allowable leakage for LOCA analysis

- Key Assumptions for LOCA analysis
  - Core inventory re-established with EPU power level using ORIGEN
  - Reduction in MSIV leakage rates required (Change in TS 3.6.1.3 )
    - 170 cfh at 25 psig total, currently 204 cfh total
    - 85 cfh at 25 psig max per one line, currently 116 cfh
  - Other minor changes with minimal impact
    - no longer assumed a reduction in MSIV and La leakage after 36 hours
    - elemental iodine removal efficiencies reestablished per JE Cline methodology
    - post-LOCA maximum temperature increased

## ■ Results

- All analyses re-performed meet applicable limits with EPU
- Revision to MSIV Technical Specification required to meet LOCA regulatory criteria
- With EPU and change to MSIV leakage, LOCA dose meets regulatory limits with similar margin to limit as current analysis

LOCA Radiological Consequences

	TEDE Dose (REM)		
	Receptor Location		
	CR	EAB	LPZ
Calculated Dose CLTP	4.69	10.70	8.99
Calculated Dose EPU	4.80	9.04	9.59
Allowable TEDE Limit	5.0	25.0	25.0

# I&C – Setpoint Changes

**Todd Wickel**

## I&C Setpoint Changes

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### **Purpose: Verify Methodology and Approach to Instrument Setpoint Changes**

- Methodology
  - Current - GEH Setpoint Methodology
  - EPU – Maintain Utilization of GEH Setpoint Methodology
- Conformance with NRC Guidance
  - Follows EPU RS-001 Guidance
  - Current Basis does not include TSTF-493
  - For Changing Setpoints – TSTF 493 Implemented
- LAR sample calculation necessity



- Results

## Comparison of CLTP to EPU T.S. Setpoint Changes

APRM	CLTP Value		EPU Value	
	AV	NTSP	AV	NTSP
STP F-B Scram (TLO)	0.65W + 63.7	0.65W + 63.2	0.55W + 63.3	0.55W + 61.3
STP F-B Scram (SLO)	0.65(W-ΔW) + 63.7	0.65(W-ΔW) + 63.2	0.55(W-ΔW) + 58.2	0.55(W-ΔW) + 55.4
STP F-B Rod Block (TLO)	0.65W + 54.5	0.65W + 54.0	0.55W + 53.7	0.55W + 51.7
STP F-B Rod Block (SLO)	0.65(W-ΔW) + 54.5	0.65(W-ΔW) + 54.0	0.55(W-ΔW) + 48.6	0.55(W-ΔW) + 45.8
STP F-B Scram Clamp (TLO and SLO)	118.0	117.6	118.0	116.0
STP F-B Rod Block Clamp (TLO and SLO)	108.4	108.0	108.4	106.4

STP F-B Simulated Thermal Power Flow Bias

MSL Flow	CLTP Value		EPU Value	
	AV	NTSP	AV	NTSP
High Flow (psid)	123.3	122.1	174.07	172.77

MSL Main Steam Line

NOTE – No Instrument Replacements Expected due to T.S. Setpoint Changes

# **Environmental Overview**

**Kevin Borton**

**Exelon.**

## **Purpose: Provide Preliminary Conclusions from the Supplemental Environmental Report**

- Supplemental Environmental Report
  - Evaluated based on changes resulting from EPU
  - Followed Supplemental Environmental Report Guidance
    - Regulatory Guide 4.2 - Preparation of Environmental Reports for Nuclear Power Stations, Revision 2
    - Regulatory Guide 4.2, Supplement 1 - Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses, September 2000
  - The minor changes in plant operation and discharges will be managed in accordance with requirements of the State issued permits and USNRC requirements
  - Preliminary Conclusion – there are no significant environmental impacts due to EPU implementation

- Preliminary Terrestrial Assessment

- No planned new or temporary construction outside of current facility foot print, therefore no land disturbance or impact to cultural or historic artifacts
- No planned changes to the transmission lines or substations outside of current footprint
- No new sources of noise due to EPU
- The PBAPS Synthetic Minor Air Permit currently includes the potential emissions from cooling towers with total operations up to 21,000 hours

- Preliminary Aquatic Assessment
  - No increases in the rate of water withdrawal from the Conowingo Pond
  - No changes to the intake structures or the pumps
  - No change in the rate of impingement
  - The SRBC Docket modified on June 23, 2011 bounds consumptive use limit for EPU
  - Current NPDES permit
    - Requires a 316(a) Demonstration Study where the results will determine if any actions are required to manage the thermal discharge
    - Requires PADEP permission or a renewed or modified permit is required before the station may increase power
    - Requires PBAPS to undertake an entrainment study beginning in 2012 for one year

- **Gaseous Effluents Doses**
  - Off-site doses from gaseous effluents will increase in proportion to power increase and will remain well below allowable 10 CFR 50 Appendix I Limits
- **Liquid Effluents Doses**
  - The liquid radwaste off-site doses will increase in proportion to power increase and will remain well remain below allowable 10 CFR 50 Appendix I Limits
- **Design Basis Accident Doses**
  - The postulated post-EPU doses are consistent with the current licensing basis analyses and remain within allowable dose limits
- **Occupational Doses**
  - Some area radiation dose rates in the plant will increase proportionally with power

- Solid Radwaste Doses
  - Slight increase in volume of resin waste generated post-EPU
  - The doses from the resin are expected to be slightly higher
  - The dose rates and volumes of resin stored in the Low Level Rad Waste Storage Facility (LLRWSF) will remain within design parameters
  - The off-site LLRWSF doses will remain within the allowable regulatory limits
- Preliminary Conclusion – there are no significant environmental impacts due to EPU implementation

# **Open Item Close Out**

**Kevin Borton**

**Exelon.**



## June 14 Meeting Summary Open Item

The NRC staff requested that Exelon provide:

- Explanation of the current licensing basis for crediting containment accident pressure (CAP) for non-LOCA design-basis events,
  - And explain a potential discrepancy regarding an earlier SBO calculation indicating CAP credit was not needed
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- Clarification on Use of CAP LAR submitted August 11, 1999  
PBAPS requested approval of method for applying CAP credit for non-LOCA events. Credit no greater than DB-LOCA CAP credit value
  - SE for Clarification on Use of CAP LAR issued August 14, 2000  
The NRC found the following acceptable: “The licensee has proposed that, for any other design basis event, the maximum containment overpressure credit allowed is the MCPA associated with the event being analyzed, but not greater than the COPL described in the table above.”

## June 14 Meeting Summary Open Item

- PBAPS UFSAR

Section 5.2.4.3.2 “Emergency pumps that take suction from the suppression pool rely on some amount of containment pressure to provide for adequate net positive suction head (NPSH) at elevated suppression pool temperatures. The [bounding] event for containment overpressure required (COPR) is the design basis large break loss of coolant accident (LOCA)”

- PBAPS Current Licensing Basis includes methodology for applying CAP credit for all non-LOCA events

- SBO calculation discrepancy: Feb. 2011 PBAPS CAP Elimination presentation indicated CAP credit was required for SBO event; however, Calculation PM-1013 Rev. 3 indicated CAP credit was not needed.

There was no discrepancy; the calculation was subsequently revised utilizing the above approved method of applying CAP credit for the SBO event.

- Follow-up EPU Meetings
  - Topics (tentative list)
    - Steam Dryer Update
    - Power Range Neutron Monitor
    - Start-up Testing / Large Transient Testing
    - Pressure Retaining Piping and Support Analysis

Next meeting target February 2012

# Acronym List

- APRM – Average Power Range Monitor
- AST – Alternative Source Term
- AV – Allowable Value
- CAP – Containment Accident Pressure
- CLTP – Current Licensed Thermal Power
- COPL – Containment Overpressure Licensed
- COPR – Containment Overpressure Required
- CRDA – Control Rod Drop Accident
- EPU – Extended Power Uprate
- FHA – Fuel Handling Accident
- GEH – General Electric Hitachi
- I&C – Instrumentation & Controls
- LAR – License Amendment Request
- LLRWSF – Low Level Rad Waste Storage Facility
- LOCA – Loss of Coolant Accident
- MSIV – Main Steam Isolation Valve
- MSL – Main Steam Line
- MSLBA – Main Steam Line Break Accident
- MCPA – Minimum Containment Pressure Available
- NPDES – National Pollutant Discharge Elimination System
- NPSH – Net Positive Suction Head
- NRR – Nuclear Reactor Regulation
- NTSP – Nominal Trip Setpoint
- PADEP – Pennsylvania Department of Environmental Protection
- PBAPS – Peach Bottom Atomic Power Station
- RS – Review Standard
- SBO – Station Blackout
- SE – Safety Evaluation
- SFPC – Spent Fuel Pool Criticality
- SLO – Single Loop Operation
- SR – Stress Ratio
- SRBC – Susquehanna River Basin Commission
- SRVs – Safety Relief Valves
- STP F-B – Simulated Thermal Power Flow Bias
- TIA – Task Interface Agreement
- TLO – Two Loop Operation
- TS – Technical Specification
- TSC – Technical Support Center
- TSTF – Tech Spec Task Force
- URI – Unresolved Item