



Browns Ferry Nuclear Plant

Extended Power Uprate License Amendment Request NRC Public Meeting

Gerry Doyle

Director EPU

July 19, 2016

BFN EPU – Agenda

Introductions

G Doyle

Extended Power Uprate (EPU) Background

D Green

EPU Overview

P Donahue

License Amendment Request (LAR) Review

D Green

- Request for Additional Information (RAI) Status
- Audit Results
- Status of Safety Evaluation Input

Questions/Comments

G Doyle

BFN EPU – Introductions

Gerry Doyle – Director, EPU

Pete Donahue – EPU Engineering Manager

Dan Green – EPU Licensing Manager

Ed Schrull – Fleet Licensing Manager

BFN EPU – Background

- Browns Ferry is pursuing a power uprate
 - Current Licensed Thermal Power: 3458 MWt
 - Extended Power Urate Power: 3952 MWt
- Constant Pressure Power Urate
 - 1050 psia Steam Dome Pressure
- Maximum Extended Load Line Limit Analyses power/flow map is retained
- Feedwater and Steam Flow Increased

BFN EPU – Background

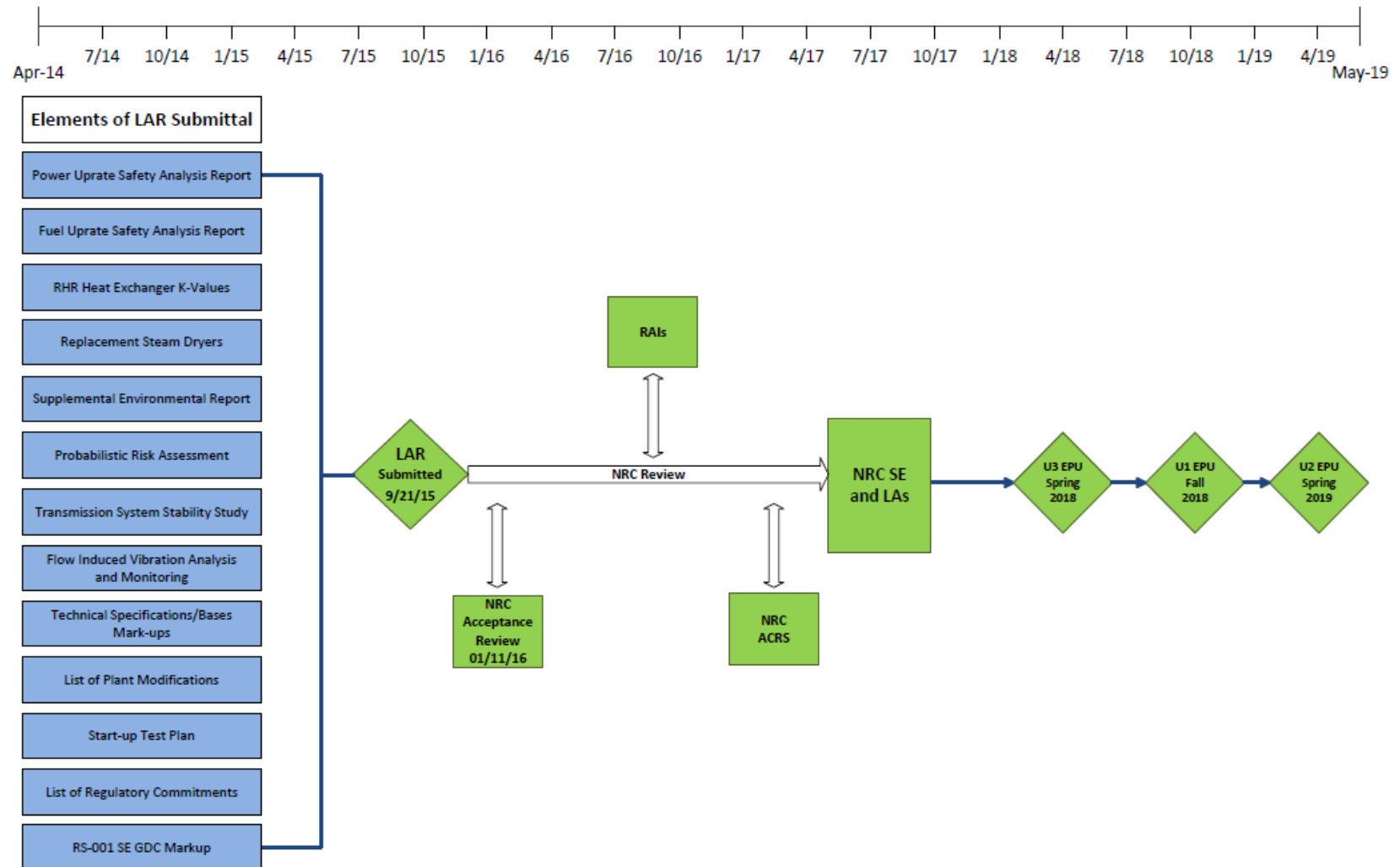
June 2004	<ul style="list-style-type: none"> TVA submits EPU LARs for BFN Unit 2 / 3 and Unit 1
July 2006	<ul style="list-style-type: none"> NRC first expresses concerns with structural integrity of Steam Dryers
February 2007	<ul style="list-style-type: none"> ACRS first raises concerns with BFN crediting Containment Accident Pressure (CAP)
September 2009	<ul style="list-style-type: none"> NRC determines additional time is needed to develop additional guidance to address EPU issues with CAP
September 2011	<ul style="list-style-type: none"> NRC informs TVA that due to age and complexity of LARs submittals, NRC will re-review entire request NRC requests TVA supplement BFN EPU LARs in their entirety
February 2013	<ul style="list-style-type: none"> TVA states plan to review CAP analysis, complete replacement steam dryer analysis, and revise the BFN EPU LARs, as necessary
February 2014	<ul style="list-style-type: none"> Due to lack of activity associated with BFN EPU LARs, NRC closes BFN EPU LAR TAC numbers
June 2014	<ul style="list-style-type: none"> Drop-in visit on June 26 with NRC <ul style="list-style-type: none"> Introduced New Project Team and discussed Strategy with BFN Project Manager, EPU PM and Branch Chief LAR to be submitted in RS-001 Format Request to submit prior to 10/1/2015 to ensure resources available to support U3 EPU outage
September 2014	<ul style="list-style-type: none"> Previous EPU LARs withdrawn on September 18, to be replaced by new consolidated EPU LAR in October 2015 Drop-in visit on September 23 with NRC - Status update
October 2014	<ul style="list-style-type: none"> Fuel Safety Analysis Report Pre-application meeting on October 14 with NRC
January 2015	<ul style="list-style-type: none"> Pre-application meeting for 10 CFR 50.46c on January 15
April 2015	<ul style="list-style-type: none"> Pre-application meeting for Startup Test Plan on April 7 Pre-application meeting for Replacement Steam Dryers on April 22
May 2015	<ul style="list-style-type: none"> Pre-application meeting for Containment Accident Pressure Credit Elimination on May 12 Pre-application meeting for PRA on May 21
June 2015	<ul style="list-style-type: none"> Pre-application meeting for Flow Induced Vibration Monitoring on June 9
September 2015	<ul style="list-style-type: none"> BFN EPU LAR submitted on September 21
January 2016	<ul style="list-style-type: none"> NRC acceptance letter issued on January 11

BFN EPU – Background

Browns Ferry EPU Project Team Goals

- Present NRC with high quality LAR consistent with NRC Review Standard RS-001, Review Standard for Extended Power Upgrades
- Receive a minimum number of NRC RAIs
- Resolve CAP credit issues
- Install RSDs on all three Browns Ferry Units
- Facilitate smooth transition to EPU for Plant Operations

BFN EPU – Overview

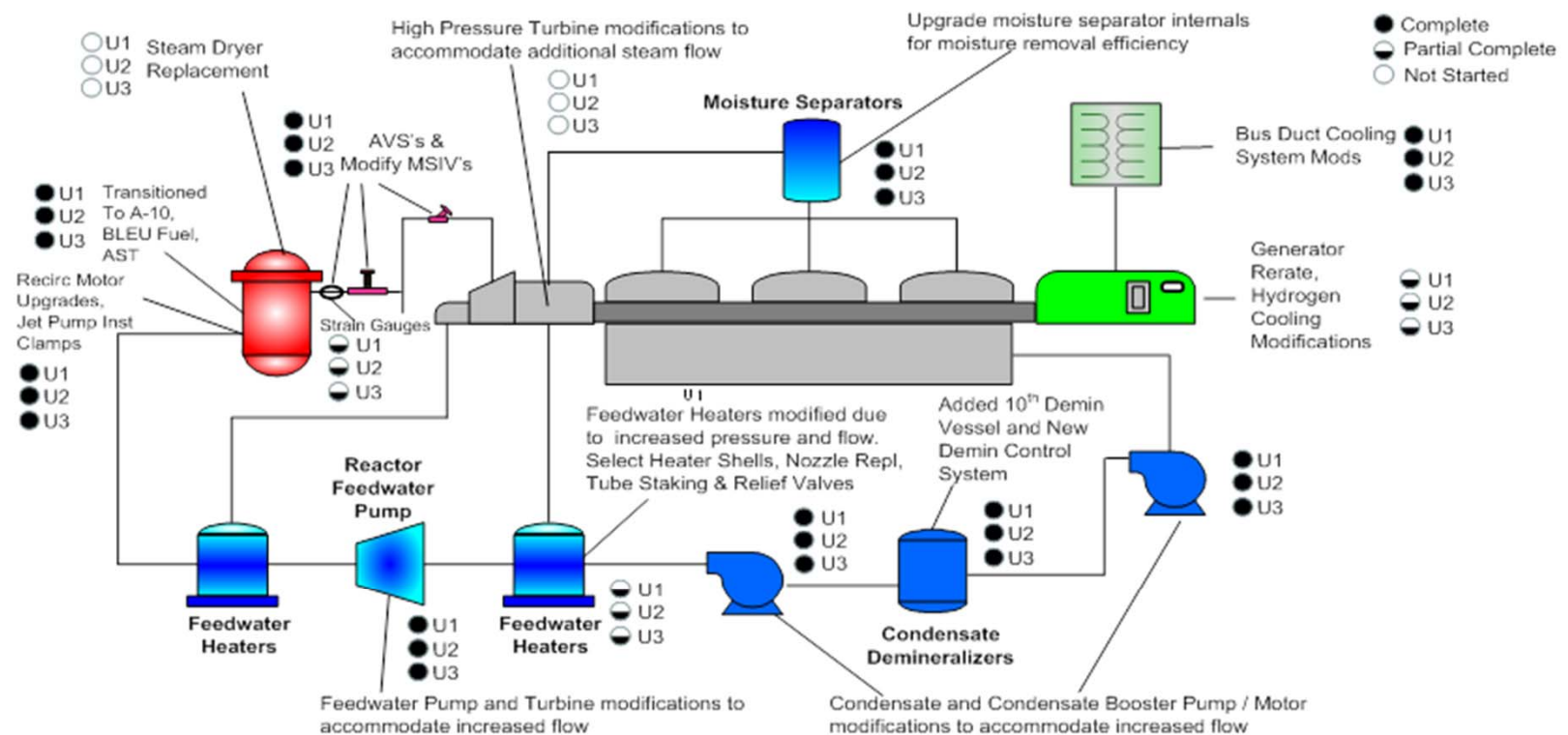


BFN EPU – Overview

SCHEDULE MILESTONE	TARGET
Submit New EPU LAR	COMPLETE - 09/21/15
U3 Delivery of FW Hx #3 Shell	COMPLETE - 01/06/16
Receive Acceptance Letter from NRC	COMPLETE - 01/11/16
NRC Requests for Additional Information (RAIs) - (Start)	COMPLETE
U2 Delivery of FW Hx #3 Shell	COMPLETE - 03/21/16
U3R17 Outage (FW Hx #3 Shell Replacement & Margin Modifications)	COMPLETE – 03/27/16
U2 Simulator Model Upgrade	COMPLETE
NRC Audit – Replacement Steam Dryers Design and Analysis (04/19/16 - 04/21/16)	COMPLETE
NRC Audit – Containment Accident Pressure Credit Elimination (05/03/16 – 05/05/16)	COMPLETE
NRC Audit – Spent Fuel Pool Criticality Analysis (05/10/16 - 05/11/16)	COMPLETE
U3 Simulator Model Upgrade	August 2016
NRC Requests for Additional Information (RAIs) - (Completion)	November 2016
Receive Draft Safety Evaluation	December 2016
ACRS Subcommittee (02/22/17)	February 2017
U2R19 Outage (FW Hx #3 Shell Replacement)	March 2017
ACRS Full Committee (04/06/17 - 04/08/17)	April 2017
Receive Safety Evaluation and License Amendments	July 2017
U3 RSD Delivered to BFN	October 2017
U3 FW Hx #4 Tube Bundles delivered to BFN (3 Bundles)	January 2018
U3R18 Outage (EPU Implementation)	March 2018
U1 RSD Delivered to BFN	July 2018
U1 FW Hx #4 Tube Bundles delivered to BFN (3 Bundles)	August 2018
U1R12 Outage (EPU Implementation)	October 2018
U2 RSD Delivered to BFN	October 2018
U2 FW Hx #4 Tube Bundles delivered to BFN (3 Bundles)	January 2019
U2R20 Outage (EPU Implementation)	March 2019

BFN EPU – Overview

Status of modifications required to implement EPU



BFN EPU – LAR Review

RAI Status

Total RAIs received – 205 Total RAI responses submitted - 159
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- Responses submitted for 159 RAIs
- Development of responses underway for the following RAIs
 - Forty-one NRC RAIs regarding RSDs (subject of NRC audit)
 - Responses to Group 2 RAIs to be submitted by 7/29/16
 - Responses to Group 3 RAIs to be submitted by 8/5/16
 - Spent Fuel Pool (SFP) Criticality Safety Analysis (CSA) RAIs (subject of NRC audit)
 - Nine additional NRC RAIs regarding SFP CSA received 3/22/16
 - Two additional NRC RAIs regarding the SFP Storage Racks Boron Monitoring Program received 3/22/16
 - One additional NRC RAI regarding SFP Criticality Technical Specification requirements received 5/12/16
 - Responses to all SFP CSA RAIs to be submitted by 7/29/16
 - Thirty-three NRC RAIs from the Containment Branch received 3/25/16 (subject of NRC audit)
 - Responses to Group 2 RAIs (including CAP Credit Elimination Supplement) to be submitted by 7/25/16
 - One additional NRC RAI regarding Dose Consequence Analyses received 6/27/16
 - Response to be submitted by 7/29/16
 - One additional NRC RAI regarding Probabilistic Risk Assessment received 7/1/16
 - Response to be submitted by 8/12/16

BFN EPU – LAR Review

NRC Audits

- Regulatory audits allow NRC to more efficiently conduct its review or gain insights on a licensee's programs or processes
- Regulatory audits are conducted for the NRC to gain understanding, to verify information, and/or to identify information that will require docketing to support the basis for the licensing or regulatory decision
 - Audits held to facilitate NRC review of EPU LAR
 - RSD Design and Analyses
 - April 19 – 21, 2016
 - CAP Credit Elimination Analyses
 - May 3 – 5, 2016
 - SFP CSA
 - May 10 – 11, 2016

BFN EPU – LAR Review

NRC Audits

- RSD Audit
 - Discussed/reviewed 42 RSD RAIs. Responses will be submitted in three groups related to complexity of issues
 - NRC deleted 2.5 RAIs, added one new RAI, and modified five RAIs
 - NRC will require revision to proposed License Condition for RSD power ascension testing and follow-on reporting
 - Follow-up meeting with NRC held 6/23/16 regarding Safety Relief Valve loading RAIs
- CAP Credit Elimination Audit
 - Discussed/reviewed 33 CAP RAIs. Responses will be submitted in two groups
 - NRC modified two RAIs
 - Clarification call with NRC reviewer regarding RHR Heat Exchanger Performance Testing uncertainty calculations held 6/16/16
- SFP CSA
 - Discussed/reviewed 12 RAIs related to SFP CSA
 - NRC added one new RAI associated with SFP Criticality Technical Specification requirements
 - NRC will require License Condition for periodic testing of Boron areal density

BFN EPU – LAR Review

Status of Safety Evaluation Input

- Draft input to Safety Evaluation due to NRC Project Manager by September 2016
- Draft input from two Technical Branches received by NRC Project Manager to date

BFN EPU – Acronym List

- AST – Alternative Source Term
- ACRS – Advisory Committee on Reactor Safeguards
- AVS's – Acoustic Vibration Suppressors
- BFN – Browns Ferry Nuclear Plant
- BLEU – Blended Low Enriched Uranium
- CAP – Containment Accident Pressure
- CSA – Criticality Safety Analysis
- EPU – Extended Power Uprate
- FW – Feedwater
- GDC – General Design Criteria
- Hx – Heat Exchanger
- LA – License Amendment
- LAR – License Amendment Request
- NRC – Nuclear Regulatory Commission
- RAI – Request for Additional Information
- RHR – Residual Heat Removal
- RSD – Replacement Steam Dryer
- SE – Safety Evaluation
- SFP – Spent Fuel Pool

BFN EPU – Questions/Comments