

Transition to Framatome ANP Fuel

Carolina Power & Light Company

Brunswick Steam Electric Plant, Units 1 and 2

March 10, 2006



Meeting Agenda

- Purpose
- Background
- Transition approach
 - ▶ Licensing
 - ▶ Analysis
 - ▶ Methodology
- Licensing submittals and schedule
- Summary

Purpose

- Describe the transition process from GNF to Framatome ANP fuel supply
- Communicate transition plan
- Discuss licensing activities and schedule

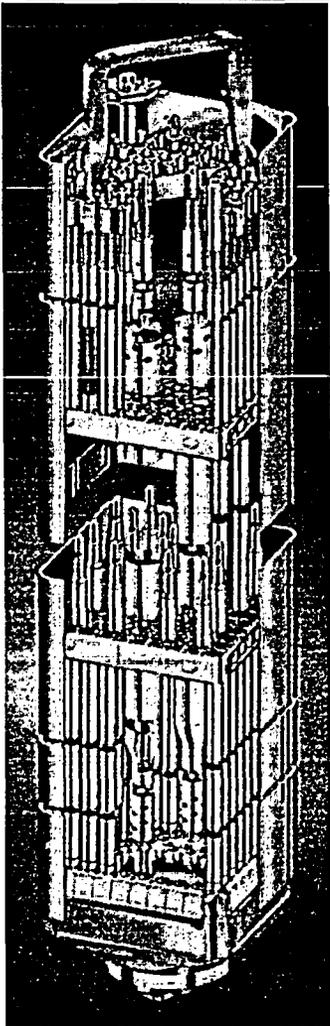
Background

Fuel supplier change

- Progress Energy fuel bid
 - ▶ Proposals requested Summer 2004
 - ▶ Bids received Winter 2004
- Framatome ANP awarded Brunswick fuel supply Fall 2005
- Transition to FANP fuel supply March 2008

Background

GE14

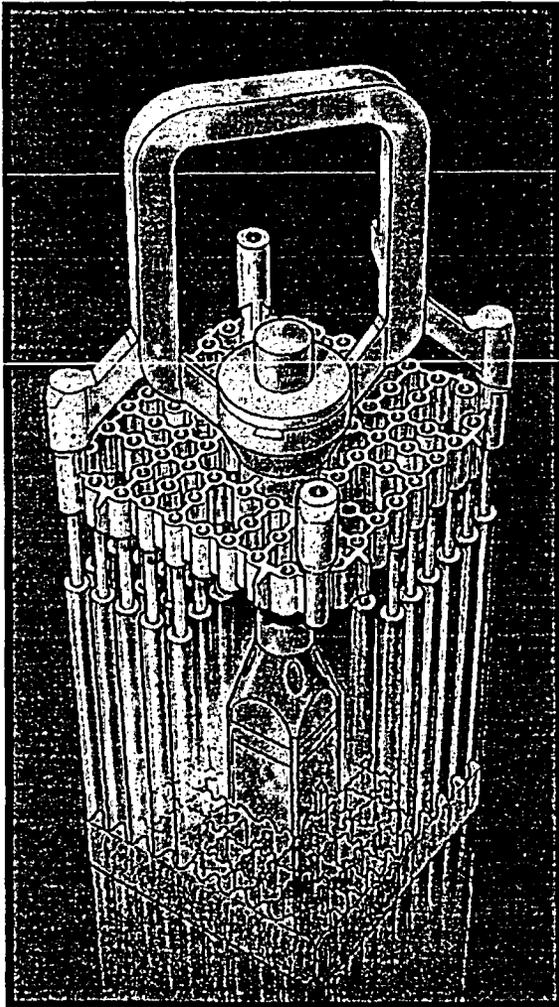


Key Features

- 10x10 lattice
- Large central water rods (2)
- 14 part length rods (~2/3 length)
- 8 spacers
- Debris filter lower tie plate
- 179 kgU
- Extensive operating experience

Background

ATRIUM-10



Key Features

- 10x10 lattice
- Square internal water channel
- 8 part length rods (~2/3 length)
- 8 spacers
- Debris filter lower tie plate
- 178 kgU
- Extensive operating experience

Background Brunswick Plant

- 24 month fuel cycles
- Extended power uprate to 120% of original license
 - ▶ Unit 1 Cycle 15; Spring 2004
 - ▶ Unit 2 Cycle 17; Spring 2005
- Current licensing basis fuel designs
 - ▶ GE13 9x9
 - ▶ GE14 10x10 (full core in each unit)
- ATRIUM™-10 lead use assemblies Unit 2 Cycle 14
- Transition to Framatome ANP ATRIUM™-10
 - ▶ Unit 1 Cycle 17; March 2008
 - ▶ Unit 2 Cycle 19; March 2009

Background

Core monitoring

- PPX-II in use since 1994
- PPX-III upgrade prior to fuel transition
 - ▶ CASMO-4
 - ▶ MICROBURN-B2
- Benchmark past cycles
 - ▶ EPUR operation
 - ▶ Methodology uncertainty validation
- Implementation under 50.59

Transition to ATRIUM™-10 Fuel

- Licensing approach
- Analysis approach
- Approved methodologies

Licensing Approach

- Minimize changes to the current plant licensing basis
- ATRIUM™-10 fuel evaluated in accordance with 10 CFR 50.59
- Technical Specification changes
 - ▶ Update references to NRC-approved methods
 - ▶ LHGR operating limit addition
 - ▶ SLMCPR, scram speed option changes
 - ▶ Remove vendor-specific criticality analysis methods (k-infinity)
 - ▶ Design features update
- Cycle specific submittals
 - ▶ COLR
 - ▶ SLMCPR
 - ▶ 50.46 annual report
 - ▶ Periodic FSAR updates

Licensing Approach

MELLLA+

- MELLLA+ separate from fuel transition
- Reload analyses will bound MELLLA+
- Operation contingent upon additional license approvals
 - ▶ MELLLA+ (NEDO-33006-P, Rev. 1)
 - ▶ Stability (ANP-10262)
- Schedule determined by methodology review and approval

Analysis approach

- Review all event analyses identified in FSAR
- Disposition analyses as:
 - ▶ Not impacted by the change in fuel design
 - ▶ Bounded by the consequences of another event
 - ▶ Potentially limiting
- Analyze potentially limiting events with NRC approved Framatome ANP methodology
- Current licensing basis retained for events not impacted by the change in fuel design

Approved Methodologies

COLR TS References – Mechanical Analysis

- XN-NF-81-58(P)(A), RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model.
- XN-NF-85-67(P)(A), Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel.
- EMF-85-74(P)(A), RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model
- ANF-89-98(P)(A), Generic Mechanical Design Criteria for BWR Fuel Designs

Approved Methodologies

COLR TS References – Neutronic Analysis

- ▶ XN-NF-80-19(P)(A) Volume 1, Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis.
- ▶ XN-NF-80-19(P)(A) Volume 4, Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology to BWR Reloads.
- ▶ EMF-2158(P)(A), Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2.
- ▶ XN-NF-80-19(P)(A) Volume 3, Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description

Approved Methodologies

COLR TS References – Transient Analysis

- ▶ XN-NF-84-105(P)(A) Volume 1, XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis.
- ▶ ANF-524(P)(A), ANF Critical Power Methodology for Boiling Water Reactors.
- ▶ ANF-913(P)(A) Volume 1, COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses.
- ▶ ANF-1358(P)(A), The Loss of Feedwater Heating Transient in Boiling Water Reactors.

Approved Methodologies

COLR TS References – CPR and LOCA

- ▶ EMF-2209(P)(A), SPCB Critical Power Correlation
- ▶ EMF-2245(P)(A), Application of Siemens Power Corporation's Critical Power Correlations to Co-Resident Fuel.
- ▶ EMF-2361(P)(A), EXEM BWR-2000 ECCS Evaluation Model.
- ▶ EMF-2292(P)(A), ATRIUM™-10: Appendix K Spray Heat Transfer Coefficients.

Licensing Submittals Schedule

- TS amendment request
 - ▶ Submit January 2007
 - ▶ Request approval by January 2008
- SLMCPR amendment request likely
 - ▶ Submit July 2007
 - ▶ Request approval by January 2008

Summary

- Established ATRIUM-10 transition process
 - ▶ Browns Ferry (2004)
 - ▶ Columbia Generating Station (2003)
 - ▶ River Bend and Grand Gulf (2001)
- NRC-approved methodology will be used for the transition
- Progress Energy and Framatome ANP are committed to support the NRC's review