FPL

NRC-FPL Meeting
Turkey Point
License Amendment Request
Spent Fuel Pool Boraflex Remedy
(Metamic Inserts and Storage Rules)

October 19, 2005

Enclosure 2

FPL Fuel Storage Organization

- Fuel Storage Projects
  - Carl Bible – Manager
  - Glenn Adams – Project Licensing
  - Yuan Kao – Project Engineer
  - Pete Sharp – Project Engineer, nuclear criticality
  - Carl O'Farrill - Supervisor, Nuclear Fuels
- Plant Staff
    - Paul Czaya - Turkey Point licensing
    - Bob Tomonto - Reactor Engineering

Spent Fuel Storage Status

Loss of Full Core Reserve (LOFCR)

	LOFCR	ISFSI	
	Date	Start Const	First Load
PSL Unit 1	2008	2006	2007
PSL Unit 2	2010	2006	2009
PTN Unit 3	2010	2007	2009
PTN Unit 4	2012	2007	2010
Seabrook	2009	2006	2008

Turkey Point Boraflex Remedy

- Meeting Objectives
  - Brief NRC Staff on license amendment request
    - Facilitate review
    - Preliminary Staff comments
    - Reduce RAIs, rules of engagement
    - Address current SFP Boraflex status
  - Staff concurrence on review schedule

Turkey Point Background

- Gamma-induced Boraflex degradation
  - Potential loss of reactivity hold-down
- 2nd Areal density (BADGER) test in 2004
  - Racks continue to meet design basis reqmts
  - Administrative controls to manage dose on high duty racks
- Next BADGER test in 2007
- New Cask Area Racks (Boral) not affected

Project Objectives

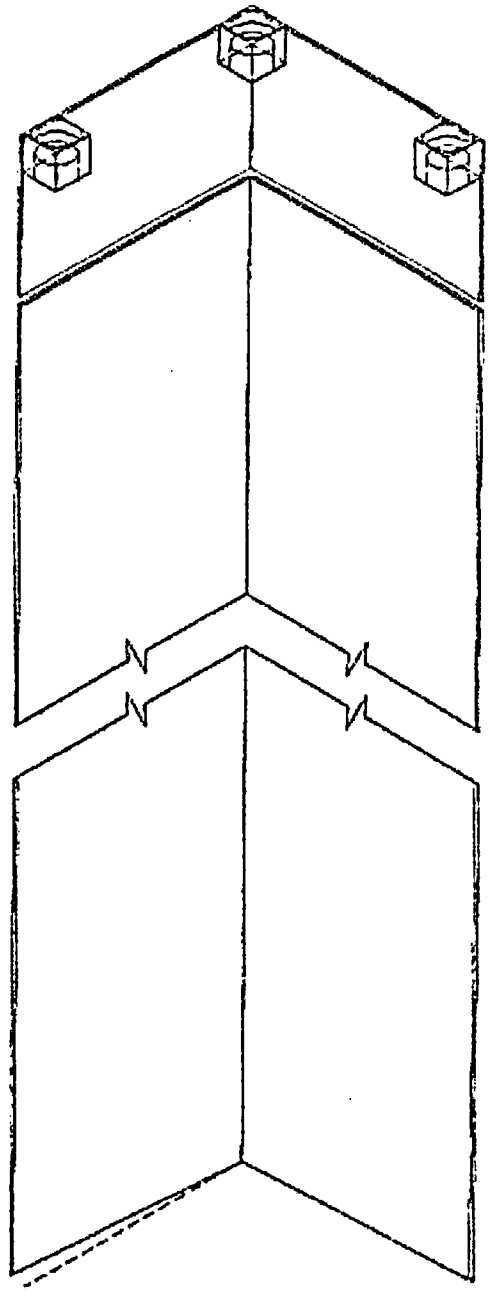
- Maintain spent fuel pool storage capacity
- Eliminate reliance on Boraflex
  - Ensure rack reactivity margin
  - Eliminate Boraflex surveillance testing
- Minimize fuel moves
  - Westinghouse fuel assembly top nozzle issue
- Flexibility in reactivity management
  - Variety of storage patterns, inserts

Project Scope

- License Amendment Request
  - New rack loading patterns
    - disperses high-reactivity fuel
  - Metamic inserts (neutron absorber)
  - TS Program to evaluate other configurations
- Fuel movement campaign
  - Several hundred fuel moves per pool
  - Approximately 500 Metamic inserts per pool

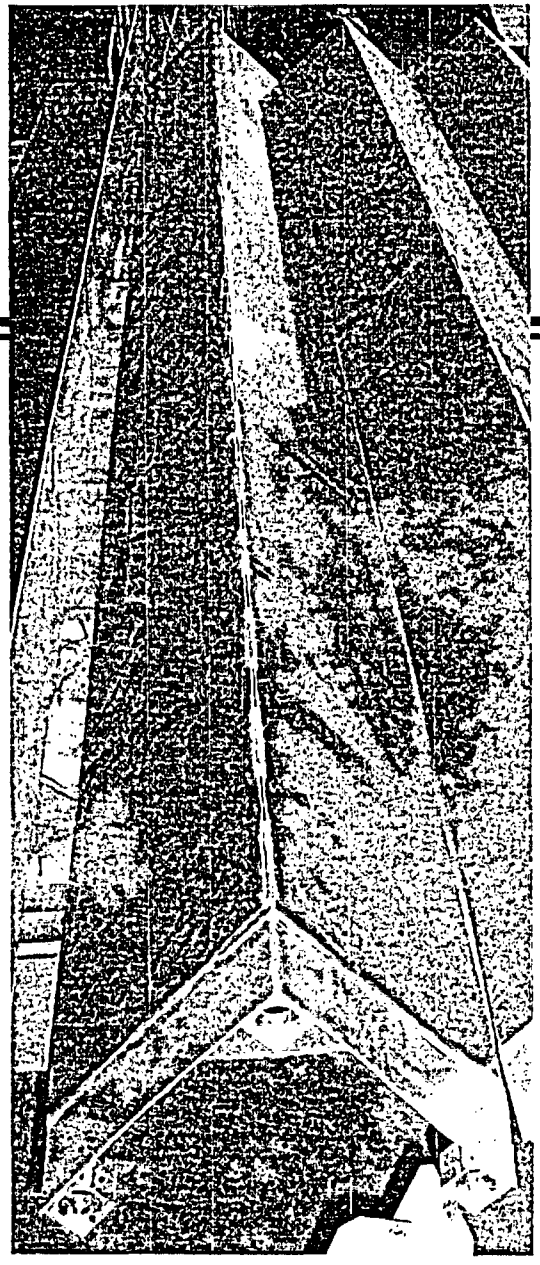
Metamic Inserts

- Metamic panels
  - formed or welded
  - chevron shape
- Aluminum head
- Full length
- 24 lbs each
- Inserted around fuel



Metamic Inserts

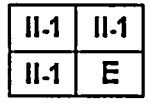
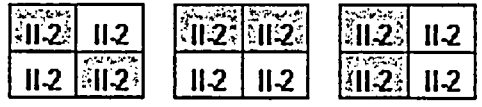
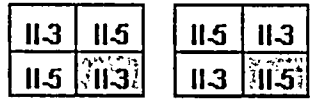
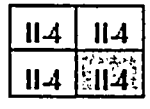
- Supplier Holtec
  - Metamic LLC
- Quality Assurance
- Mill oxidized finish



Fuel Loading Patterns

FIGURE 5.5-2

ALLOWABLE REGION II STORAGE PATTERNS

DEFINITION[1,4]	ILLUSTRATION[1,2,3,4]
Region II 2x2 Array II-A Category II-1 assembly in three of every four cells: One of every four cells is empty (water-filled).	
Region II 2x2 Array II-B Category II-2 assembly in every cell: Two of every four cells contain a Metamic insert (or full length RCCA in the assembly).	
Region II 2x2 Array II-C Checkerboard pattern of Category II-3 and II-5 assemblies: One of every four cells contains a Metamic insert (or full length RCCA in the assembly). Metamic inserts (or RCCAs) may be in either II-3 or II-5 cells.	
Region II 2x2 Array II-D Category II-4 assembly in every cell: One of every four cells contains a Metamic insert (or full length RCCA in the assembly).	

Schedule Objectives

- Timely restoration of SFP reactivity margin
  - Currently meets reqmts, but degrading
- Preclude next Boraflex test (2007)
  - If possible
- Continue to meet storage requirements
  - Not affecting full core reserve at this time

Schedule

Submit LAR	Early 2006
RAI (if needed)	8 mos after submittal
Amendment	12 mos after submittal
Implementation	During 2007 *

* Date negotiable. Interim configurations comply with old and new TS.

LAR Preparation

- Modeled after St. Lucie Boraflex Remedy
  - Unit 1 amendment 193 (9/23/2004)
- Applied other precedent
- RAI historical review
- Holtec – QA vendor
- NSHC compliant with RIS 2001-22

LAR Structure

- Wraparound Evaluation by FPL
  - Roadmap of evaluation, analysis
  - Information to supplement Holtec Report
    - FPL (non-Holtec) evaluations
    - Specific discussion of precedent
    - Specific discussion of related RAIs
- Holtec Report
- NSHC, EIC, TS Markup, Bases

Applicable Precedent

- Administrative controls - loading patterns
  - St. Lucie Unit 1, Unit 2
- Use of Metamic in Spent Fuel Pools
  - Topical Evaluation 6/17/2003
- Use of rack inserts in Spent Fuel Pools
  - ANO submittal review

Affected Tech Specs

- LCO – Refueling Boron Concentration
- LCO – Spent Fuel Storage
  - Establish new fuel loading reqmts per TS 5.5
  - Relocate max fuel enrichment to TS 5.5
  - Remove applicability of TS 3.0.3
- Design Features – Fuel Storage Criticality
  - Describe new fuel loading patterns
  - Describe use of rack and fuel inserts
  - Alternative loading patterns per NRC methodology

Physical Changes Evaluated

- More complex loading patterns
- Significant fuel movement campaign
- Metamic inserts reduce water inventory
- Metamic inserts reduce local convective flow
- Metamic inserts change seismic response
- Metamic potential for adverse chem reaction
- Metamic insertion may damage fuel
- Metamic surveillance requirements

Structural Evaluation

- Metamic inserts into racks
  - contribute < 0.1% of gross wt on slab
- Whole Pool Multi-Rack WPMR Analysis
  - (DYNARACK)
- Previously-NRC-accepted method

Thermal-Hydraulic Evaluation

- Bulk THA - displaced water within margins
- Local THA
  - Metamic insert blocks two side flow channels
  - Computational Fluid Dynamics analysis
  - Local water temp peak is 206ºF (<241ºF sat.)
  - Peak clad temp is 250ºF (>241ºF sat.)
    - insufficient heat flux for DNB

Criticality

- Experienced vendor (Holtec International)
- Acceptance criteria per 10 CFR 50.68(b)
  - Soluble boron credit for Keff 0.95 is 560 ppm or less
- Previously-accepted codes, uncertainty methods
  - Explicit 3D analysis of fuel/rack geometry (MCNP4a)
  - Fuel burnup isotopics calculated (CASMO-4)

Criticality Review

- Loading patterns, correlation table
- Previous RAIs incorporated:
  - Criticality criterion 10 CFR 50.68(b)
  - Sample Keff calculation
  - Quality controls on fuel, materials
  - Verification of calculated burnup
  - Integrity of RCCAs for neutron absorption
  - Configuration control on inserts
  - Unit differences
  - Managing new fuel types
- Boron Dilution Event (bounded)

Materials - Metamic Guidance

- Metamic Surveillance Program
- Inspect inservice inserts, not coupons
- B-10 composition, distribution assured by QA/QC
- Simulation of scratches (monitor actual scratches)
- Frequency (start within 48 mos. of service)
- Tests (visual)
- Mill oxidized finish, not anodized
- Cleaning technique – glass beading
- Limitation of 31 wt percent boron carbide

Proposed Rules of Engagement

- FPL extensive use of precedent
- FPL consideration of previous RAIs
- FPL points of contact for Staff questions
  - Example – Metamic insert tolerance
- One RAI within 8 months
  - LIC-101 threshold for formal questions

Summary

- Summary
  - Comprehensive analyses per guidance
  - Previously-approved methods, precedent
  - One-year review schedule
  - Potential for future TS Program for fuel storage
  - Proposed rules of engagement
- Questions / Followup Items