



FPL



Duke-FPL-NRC Meeting
RackSaver Licensing

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December 10, 2002

RackSaver Licensing

- Meeting Objectives
 - Update NRC staff on Boraflex remedies
 - Establish lines of communication
 - Communicate RackSaver licensing plans
 - Seek staff comments on licensing approach
 - Followup action items

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- Background

- Boraflex degradation (GL 96-04)
- Further degradation means lost cells
- McGuire
 - Boraflex test performed 1997, 2000, and July 2002
- Turkey Point
 - Inoperable cells (~70 waterholes)
 - Next Boraflex test 2004
- FPL-NRC Meeting 1-15-02 on RackSavers

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- Current Situation

	Duke – McGuire	FPL – Turkey Point
Quantity Boraflex cells	286 (Region 1) / 1177 (Region 2)	2808
Rack Design	Westinghouse	Westinghouse
Fuel Design	Westinghouse 17 x 17	Westinghouse 15 x 15
Soluble Boron Credit	Yes	Yes
Boraflex Credit	Partial	Partial
Solution	Rerack (Region 1) / Inserts (Region 2)	Rack Inserts
Submittal Date	7/03	10/03

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- Potential Boraflex Solutions
 - RackSaver inserts
 - Checkerboard - many fuel moves, lost cells
 - Guide tube inserts – expensive
 - disposal of existing inserts (BPs, TPs, CRs)
 - Rerack – expensive, many fuel moves
 - cask loadings (McGuire)

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- RackSaver_{TM} Inserts

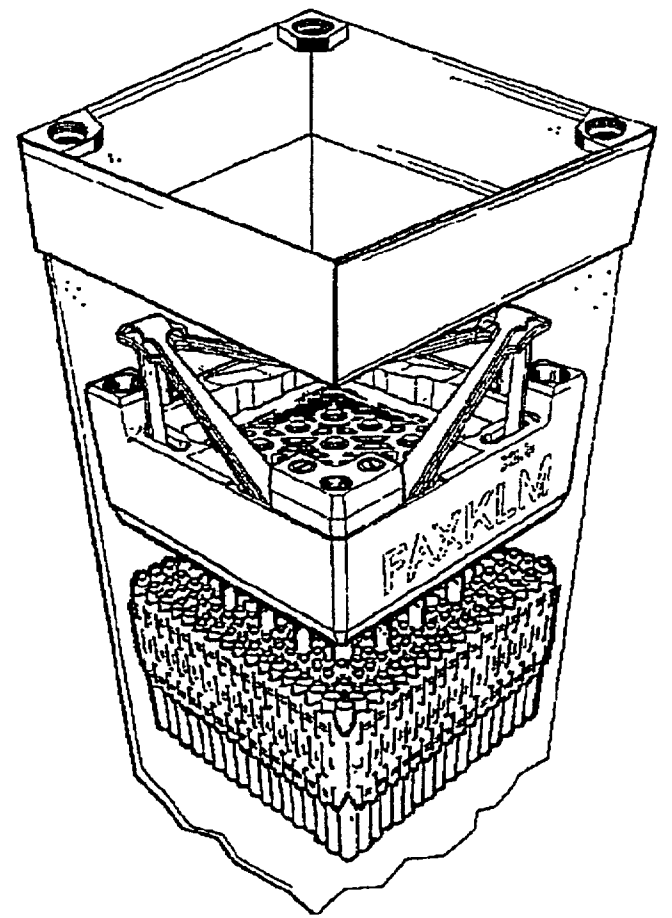
- Borated stainless steel
- Metamic - borated aluminum
- First-of-a-kind
- Inserted over a fuel assembly
 - minimize fuel moves (W top nozzles)
- Install incrementally as-needed
- Removable



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- Demonstrations

- PWR demo (EPRI)
- Turkey Point demo 2002
 - 100 mil Al 60% success
 - 80 mil Al 100% success
- McGuire demo 2002
 - 89 mil stainless 100% success



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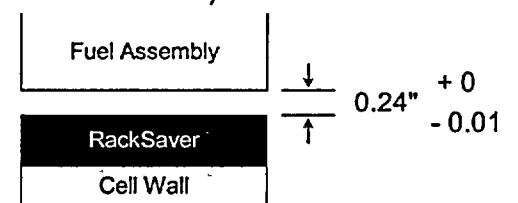
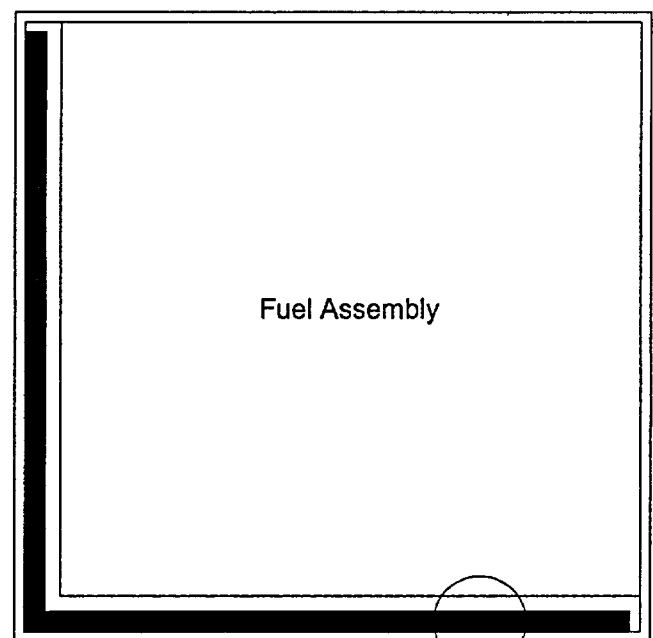
- Nominal Clearance

- Turkey Point

- 80 mil RackSaver
- Region 1 - 0.24 in.
- Region 2 - 0.29 in.

- McGuire

- 80 mil RackSaver
- Region 2 - 0.43 in.



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- License Amendment Content
 - TS Design Features
 - $K_{eff} < 1.0$ (unborated), ≤ 0.95 (soluble boron)
 - TS Administrative Controls
 - Fuel Storage Program
 - TS LCO: Meet design features
 - TS Action: Restore configuration
 - TS Action for fuel / component movement
 - Time restriction during fuel/ component movement
 - Verify pool boron concentration prior to movement and periodically

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- Bases for Fuel / Component Action Statement
 - Subcritical with soluble boron
 - Low probability of dilution during fuel movement
 - Ample time to re-insert RackSaver
 - Ample time to re-establish acceptable configuration

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- Fuel Storage Program
 - Precedent SONGs submittal (2/22/2002)
 - Program describes
 - Criticality codes
 - Methods to combine biases, uncertainties
 - RackSaver surveillance methods, criteria
 - Spent fuel pool storage loading rules
 - TS scope limited to 10 CFR 50.36 content
 - Licensee-controlled per 10 CFR 50.59

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- Supporting Analyses
 - Criticality analyses
 - Boron dilution analyses
 - Structural analyses with RackSavers installed
 - Thermal analyses with RackSavers installed
 - 10 CFR 50.36 review for Fuel Storage Program

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- Licensing Plans
 - Separate but similar submittals
 - Duke submit July 2003 (approximate)
 - FPL submit October 2003 (approximate)
- Differences Duke - FPL
 - Insert material
 - McGuire - borated stainless
 - Turkey Point - borated stainless, Metamic, or Boral
 - Fresh new fuel storage
 - McGuire - new Region 1 Boral racks
 - Turkey Point - new Boral Cask Area Rack

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- Metamic Parameters
 - Discussed previously with NRC staff 1/15/02
 - Boron density
 - Environmental performance
 - corrosion resistance
 - dimensional variations in service
 - structural integrity
 - Installation effects
 - potential material loss on insertion

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- Metamic LAR Content - Boron Density
 - Neutron transmission qualification testing
 - Chemical / spectrometric analysis
 - Macroscopic uniformity qualification testing
 - Manufacturing process controls
 - Surveillance testing
 - Combination of testing and process controls ensures acceptable poison performance

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- Comparison of Metamic Performance Requirements

	Metamic Performance Requirements	
	Dry Storage	Wet Storage
Functions		
Thermal Conductivity	☐	
Neutron Poison	☐	☐
Structural		
Environment		
Boric Acid	Hours	Years
High-Temp Dry	Hours	
Dry, Inert	Years	

- Metamic approved for use in dry storage cask
 - NUHOMS-61BT Safety Evaluation Report

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- Metamic Environmental Performance
 - EPRI test demonstrates acceptable environmental performance
 - Laboratory testing results (EPRI-1003137)
 - accelerated neutron and gamma radiation testing
 - accelerated corrosion testing
 - acceptable dimensional variations in service
 - acceptable structural integrity
 - Borated aluminum (e.g., Boral) has extensive operating history

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- Metamic Licensing
 - ANO Topical Report
 - EPRI Report
 - FPL evaluation of report applicability

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- Summary
 - Comprehensive analyses
 - Appropriate prototype demonstrations
 - TS Program for fuel storage
- Questions / Followup Items



McGuire Nuclear Station Spent Fuel Pool Boraflex Update

Meeting with NRC
December 10, 2002



12/11/2001 NRC – Duke Meeting re: MNS Boraflex

- Duke outlined the following initiatives:
 - Accelerated options for dry storage
 - Accelerated BADGER testing in pools
 - Pursue physical/long-term rack solutions
 - Region 1
 - Rerack or rack inserts
 - Region 2
 - Revised soluble boron credit TS Amendment
 - Rerack or rack inserts



McGuire Dry Storage Status & Acceleration

- 5 TN-32's loaded and on the pad
- 5 additional TN-32's delivered/being delivered
 - Scheduled loading 1st Q 2003
- Accelerated options for UMS system
 - 48 systems being fabricated
 - Deliveries have already begun
 - Transition to UMS planned in late 2003
 - Supports and provides flexibility in addressing Boraflex degradation

18 3 2



BADGER Testing of McGuire Racks

- Initial demonstration in 1997 (Unit 2)
 - First PWR demonstration
 - Previous BWR demonstration at Peach Bottom
- Testing of Unit 1 and 2 racks in 2000
- Soluble Boron TS Amendment committed to 3 year testing interval
 - Duke elected to accelerate next BADGER campaign into Summer 2002
 - Currently analyzing results



McGuire Region 1 Rack Solution

- Region 1 in each pool
 - Flux trap design—designed for storage of new and recently discharged fuel
 - 2 rack modules per pool
 - 286 cells per pool
- Rerack project initiated for Region 1
 - Contract signed with Holtec in May 2002
 - Fabrication of 4 Region 1 modules underway
 - Neutron poison material - Boral
 - Installation planned for April - July 2003
 - Region 1 rerack implemented under 50.59

McGuire Region 2 Rack Solution

- Region 2 in each pool
 - Egg-crate design—designed for long-term storage of burned fuel
 - 6 rack modules per pool
 - 1,177 cells per pool
- Near-Term Plan:
 - TS amendment to change threshold for Alpha to Bravo from 50% to 40%
 - Results in more restrictive storage requirements for Alpha cells
 - Reduces the number of Bravo cells (near-term)
 - Provides time needed to implement long-term solution
- Long-term Solution:
 - Cell inserts (RACKSAVER)
 - Accelerated dry storage loadings
 - Pu decay credit



McGuire Soluble Boron Credit TS Amendment

- Initially submitted April 1999—approved by NRC in November 2000
- Credit for soluble boron & partial Boraflex
 - Soluble boron credit of 730 ppm (COLR 2,675 ppm)
 - Partial Boraflex credit by “sub-region”

	<u>Region 1</u>	<u>Region 2</u>
• Alpha	25%	50%
• Bravo	0%	0%



Revised Soluble Boron Credit TS Amendment

- Submitted to NRC on April 18, 2002
 - Changes threshold for Region 2 Alpha to Bravo from 50% to 40% remaining Boraflex
 - All Region 2 cells remain >40% through December 2004
 - Avoids hundreds of fuel moves
 - Provides more reasonable timeframe for implementing long-term Region 2 solution
 - Needed to support Region 1 rerack effort in early 2003
 - Tech Spec Amendment submittal package is identical in all other aspects to recently approved McGuire submittal



McGuire Region 2 Long-Term Solution

- Duke evaluated numerous options for long-term solution for Region 2
 - Rerack (selected for Region 1)
 - Poison inserts
 - Pu Decay
- Inserts and Pu Decay credit selected for further evaluation
 - Integrated long-term solution may rely on both

Summary

- Duke continues to be proactive dealing with Boraflex degradation at McGuire
 - Accelerated order of dry storage systems (48 UMS)
 - Accelerated BADGER testing in pools
 - Issuing specification/POs for rerack/inserts
- Revised TS Amendment (50% to 40%) is essential
 - Provides time needed to implement long-term solutions (i.e., rerack and inserts)
 - Eliminates hundreds of fuel moves
 - Needed to support Region 1 rerack