



FPL

Turkey Point Spent Fuel Storage

January 15, 2002

Enclosure 2

Turkey Point Spent Fuel Storage

- Agenda
 - Objectives / Background
 - Spent fuel storage status
 - Cask pit racks
 - Poison insert material - Metamic_{TM}
 - Discussion
 - Summary

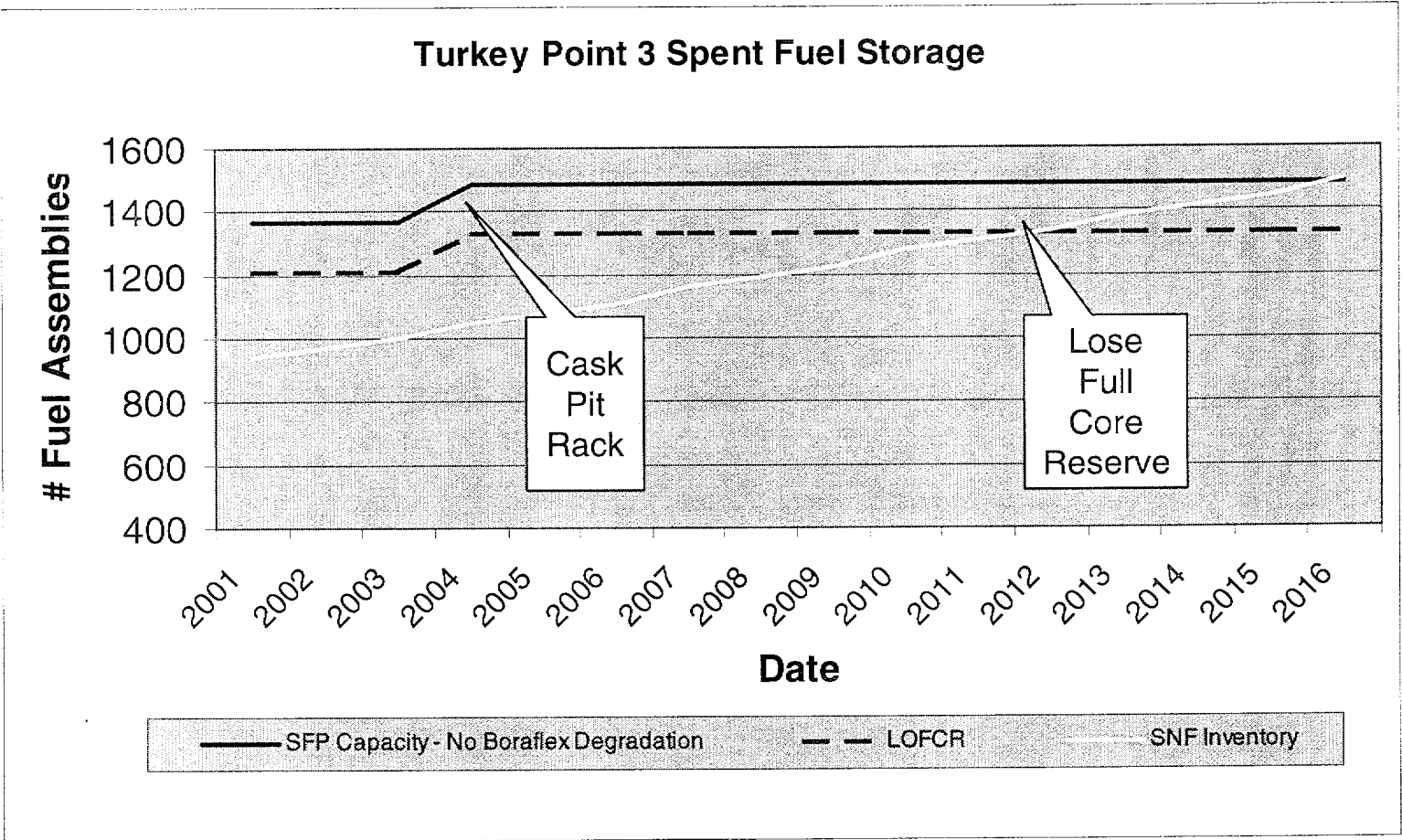
Turkey Point Spent Fuel Storage

- Objectives
 - FPL share information on:
 - Short-Term storage plans
 - Cask pit racks
 - Poison inserts
 - Schedule for license amendments, NRC reviews
 - Analysis methods
 - Metamic for neutron poison material
 - NRC-FPL discussion of these items

Turkey Point Spent Fuel Storage

- Background
 - High density Boraflex_{TM} storage pools for each unit
 - 1404 cells in each pool
 - 286 cells in Region I (fresh 4.5 wt% fuel)
 - 1118 cells in Region II (4.5 wt%, >36,746 MWD/MTU)

Turkey Point Spent Fuel Storage



Turkey Point Spent Fuel Storage

- Background
 - Current licensing bases
 - License Amendments 206 (Unit 3) and 200 (Unit 4)
 - Approved July 19, 2000
 - Criticality analysis uses partial credit for Boraflex

Turkey Point Spent Fuel Storage

- Background
 - Unit 3 Boraflex surveillance using BADGER
 - Test performed in Fall 2000, completed Jan 2001
 - Non-uniform axial degradation observed in Region II
 - Test results analyzed and corrective actions taken
 - FPL submitted report May 16, 2001 (L-2001-115)
 - Next Boraflex areal density test planned for 2004
 - FPL does not plan to rely on Boraflex for long-term

Turkey Point Spent Fuel Storage

- Spent Fuel Storage Strategy
 - Maintain nuclear safety margins
 - Eliminate reliance on Boraflex
 - Maintain current spent fuel storage capacity
 - Maintain full core offload reserve
 - Provide fiscally-responsible solutions
 - Commonality with St. Lucie
 - Predictable and acceptable regulatory solution

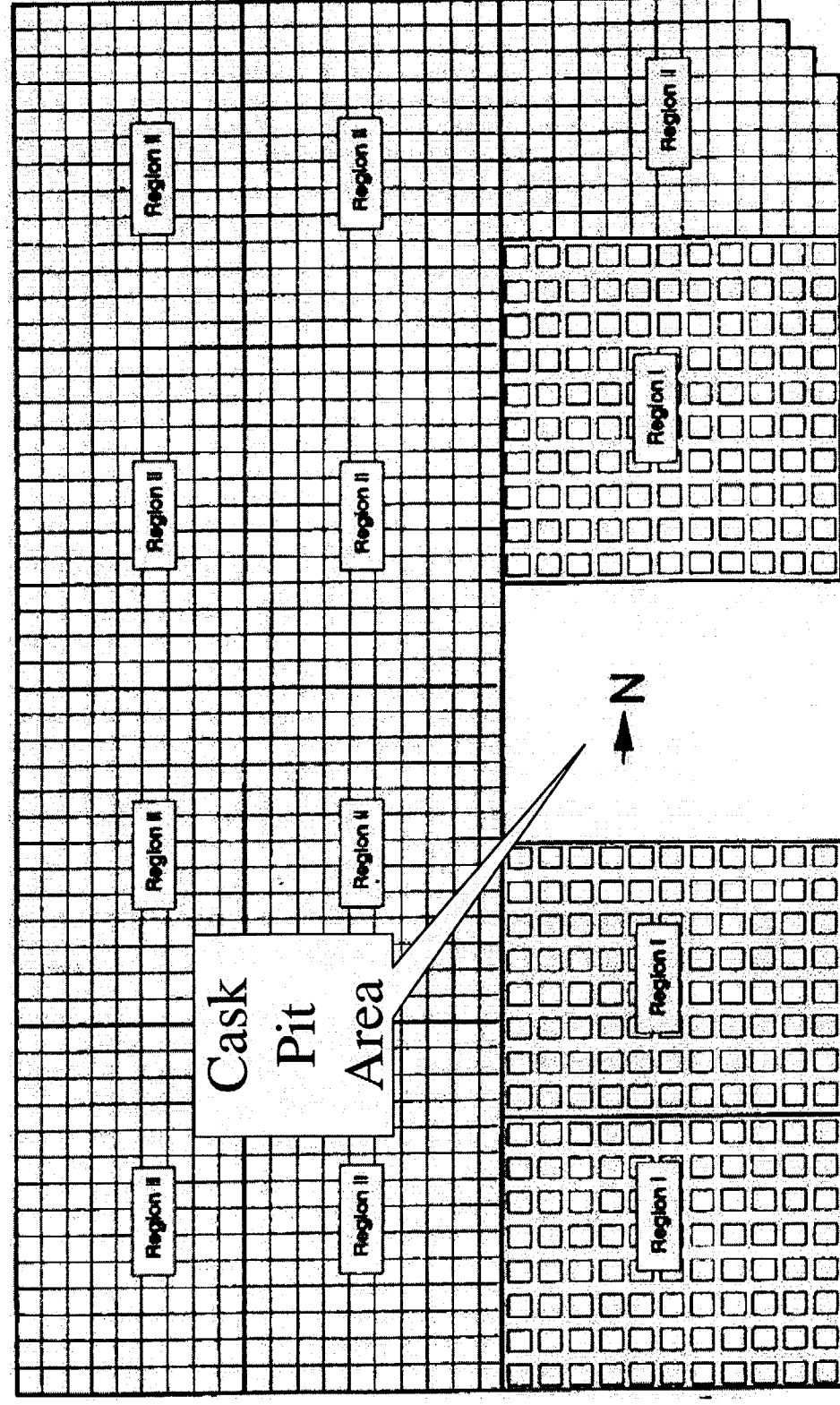
Turkey Point Spent Fuel Storage

- Spent Fuel Storage Proposed Plan
 - Evaluated options to maintain current spent fuel storage capacity
 - Selected option is:
 - Cask pit racks
 - Poison inserts
 - Preliminary analysis requires 550 rack inserts

Turkey Point Spent Fuel Storage

- Cask Pit Racks
 - Region I cask pit racks selected:
 - Accommodates full core discharges
 - Boral used as poison material
 - Prolongs life of Boraflex racks
 - Reduces scope of poison inserts
 - existing Region I will store twice-burned discharged fuel
 - will reduce poison requirements in Region II

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- Cask Pit Racks
 - Region I design (121 cells) for each rack
 - Extends loss of full core reserve by 2 cycles
 - Cask pit area can be restored for cask loading
 - Similar to Waterford cask pit racks
 - Licensed in 1998
 - Operational success loading fuel discharges

Turkey Point Spent Fuel Storage

- Cask Pit Racks

- Schedule targets

- Submit proposed license amendment (PLA) Fall 2002
 - FPL plans to proceed in parallel with NRC review
 - Request NRC approval by Fall 2003
 - Install both racks in Spring 2004

Turkey Point Spent Fuel Storage

- Cask Pit Rack PLA

- Analyses

- Criticality criteria per 10 CFR 50.68
 - Thermal-hydraulic analysis using 3-D modeling
 - Radiological analyses - standard methods, criteria
 - Seismic using stand-alone cask pit rack
 - Decoupled from existing racks

- Comparable to Improved Standard Tech Specs

- Maximum initial enrichment
 - $K_{eff} < 0.95$ in unborated water
 - Burnup / enrichment curve for Region II racks
 - Nominal rack cell pitch

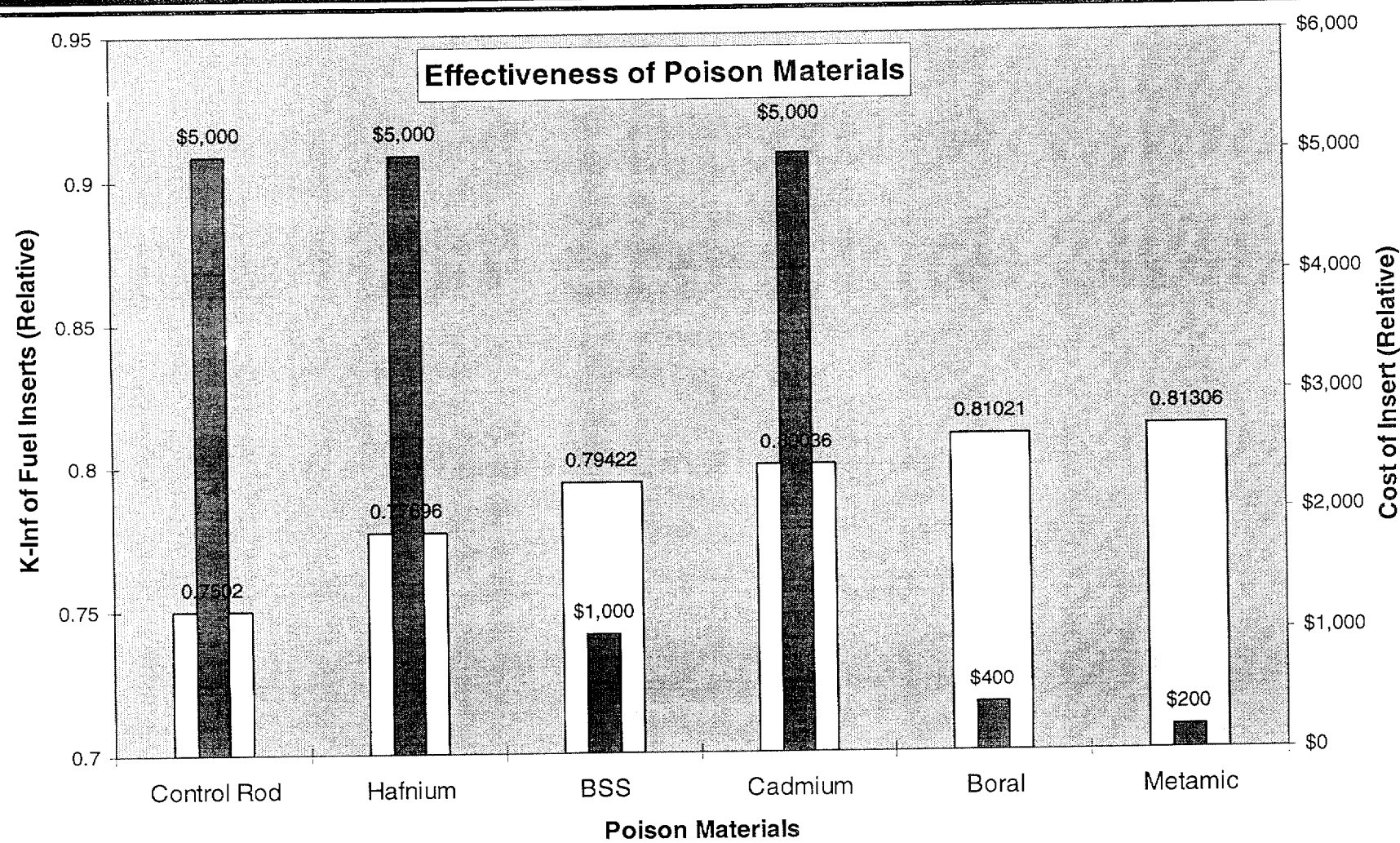
Turkey Point Spent Fuel Storage

- Neutron Poison Inserts
 - Metamic as a neutron poison
 - Rack inserts (RackSaver)
 - Poison fuel inserts (rodlets)
 - Multi-regioning / checkerboarding
 - optimizes the quantity of poison inserts

Turkey Point Spent Fuel Storage

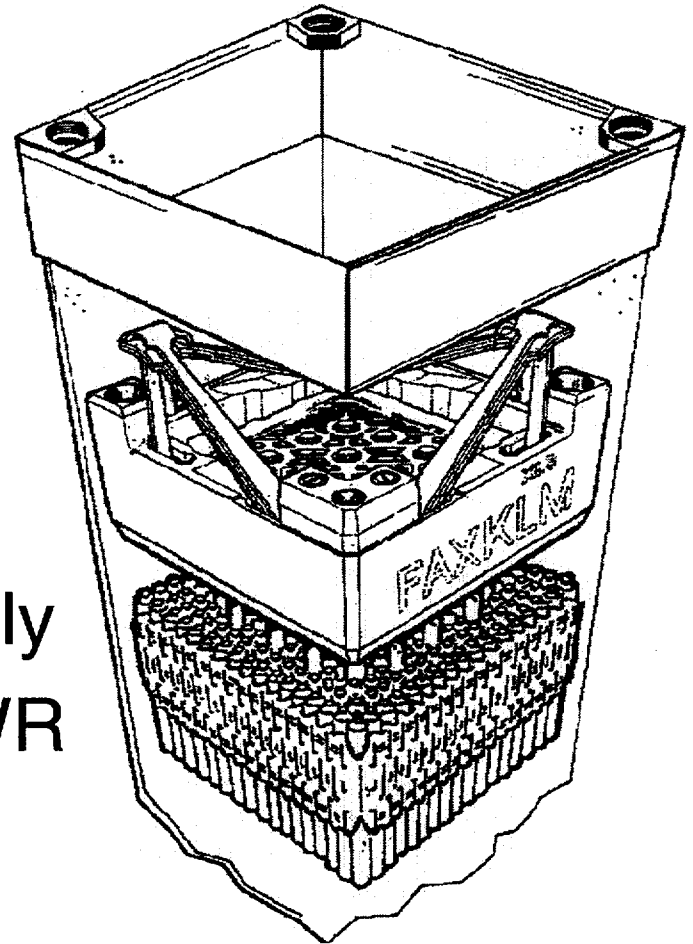
- Metamic Poison Insert Material
 - Al/B₄C metal matrix composite material
 - Effective neutron poison material
 - May be extruded, rolled into various shapes
 - Storage rack inserts (RackSaver_{TM})
 - Fuel assembly inserts (rodlets)
 - Anodized for corrosion protection

Turkey Point Spent Fuel Storage



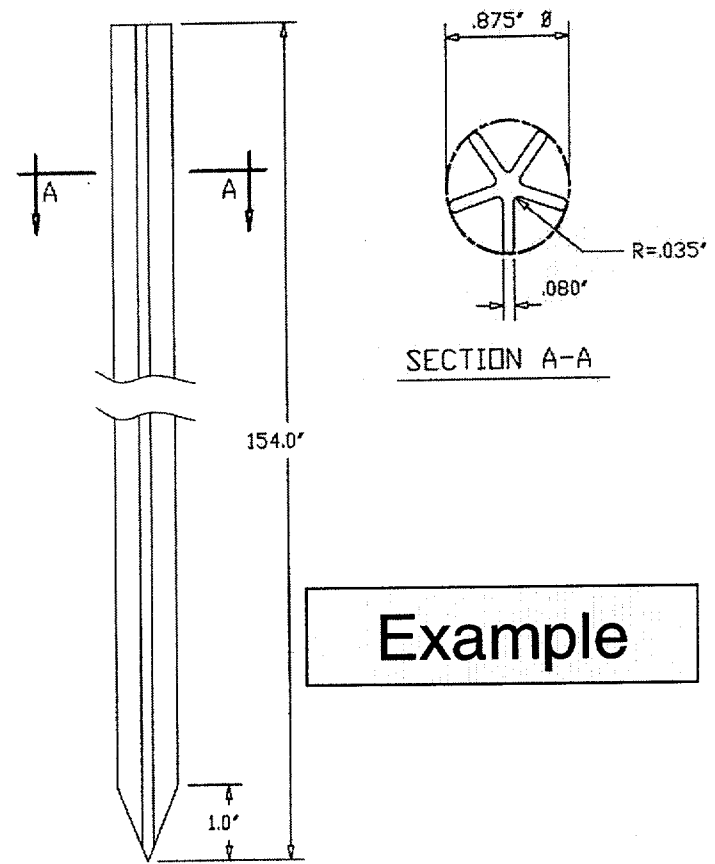
Turkey Point Spent Fuel Storage

- RackSaver Rack Inserts
 - Metamic
 - Simple installation
 - Incremental installation
 - No top-nozzle interference
 - Avoids rodlets for W assembly
 - Prototype tested at PWR/BWR



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- Pentaform Rodlets
 - Metamic
 - Asymmetric pentaform
 - improves surface area
 - Simple installation
 - Incremental installation
 - Up to 20 per assembly
 - Spiders/hubs



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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

Turkey Point Spent Fuel Storage

- Metamic PLA Parameters
 - Boron density
 - Environmental performance
 - corrosion resistance
 - dimensional variations in service
 - structural integrity
 - Installation effects
 - installation / removal with no damage to fuel
 - thermal-hydraulic performance
 - seismic response

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- Metamic PLA 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

Turkey Point Spent Fuel Storage

- Metamic PLA Content - Environmental
 - 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

Turkey Point Spent Fuel Storage

- Metamic PLA Content - Installation Effects
 - Thermal-hydraulic analysis
 - Seismic analysis
 - RackSaver installation with no damage to fuel
 - Prototype trials at PWR and BWR
 - Planning prototype trials at Turkey Point in 2002

Turkey Point Spent Fuel Storage

- Metamic Licensing
 - Site-specific PLA
 - Include use of Metamic poison inserts
 - Include proposed spent fuel pool reconfiguration
 - Comparable to Improved Standard Tech Specs
 - Criticality Analysis Method
 - KENO-Va or KENO-VI for criticality analysis
 - KENO-VI for criticality study of non-symmetrical shape
 - Comply with 10 CFR 50.68 criticality criteria
 - Plan to submit proposed license amendment in 2003

Turkey Point Spent Fuel Storage

- Spent Fuel Storage Plan
 - Monitor Boraflex
 - Install Region I cask pit racks
 - Proposed license amendment planned for Fall 2002
 - Evaluate / Optimize poison inserts
 - Fuel assembly inserts - Metamic, Boral, borated SS
 - Rack inserts (RackSaver_{TM}) - Metamic
 - Multi-regioning, checkerboarding
 - Plan to install poison inserts in 2004
 - Plan to submit PLA in 2003

Turkey Point Spent Fuel Storage

- Discussion
 - Summary of Meeting Objectives
 - Storage plans (cask pit racks, poison inserts)
 - Schedule for license amendment reviews
 - Analysis methods
 - Metamic for neutron poison material
 - Followup action items

Turkey Point Spent Fuel Storage

- Boraflex
 - Boraflex degradation dependent on
 - dose
 - pool temperature
 - flow rate
 - EPRI RACKLIFE software
 - Calculates radiation dose to Boraflex panels
 - Predicts Boraflex dissolution