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

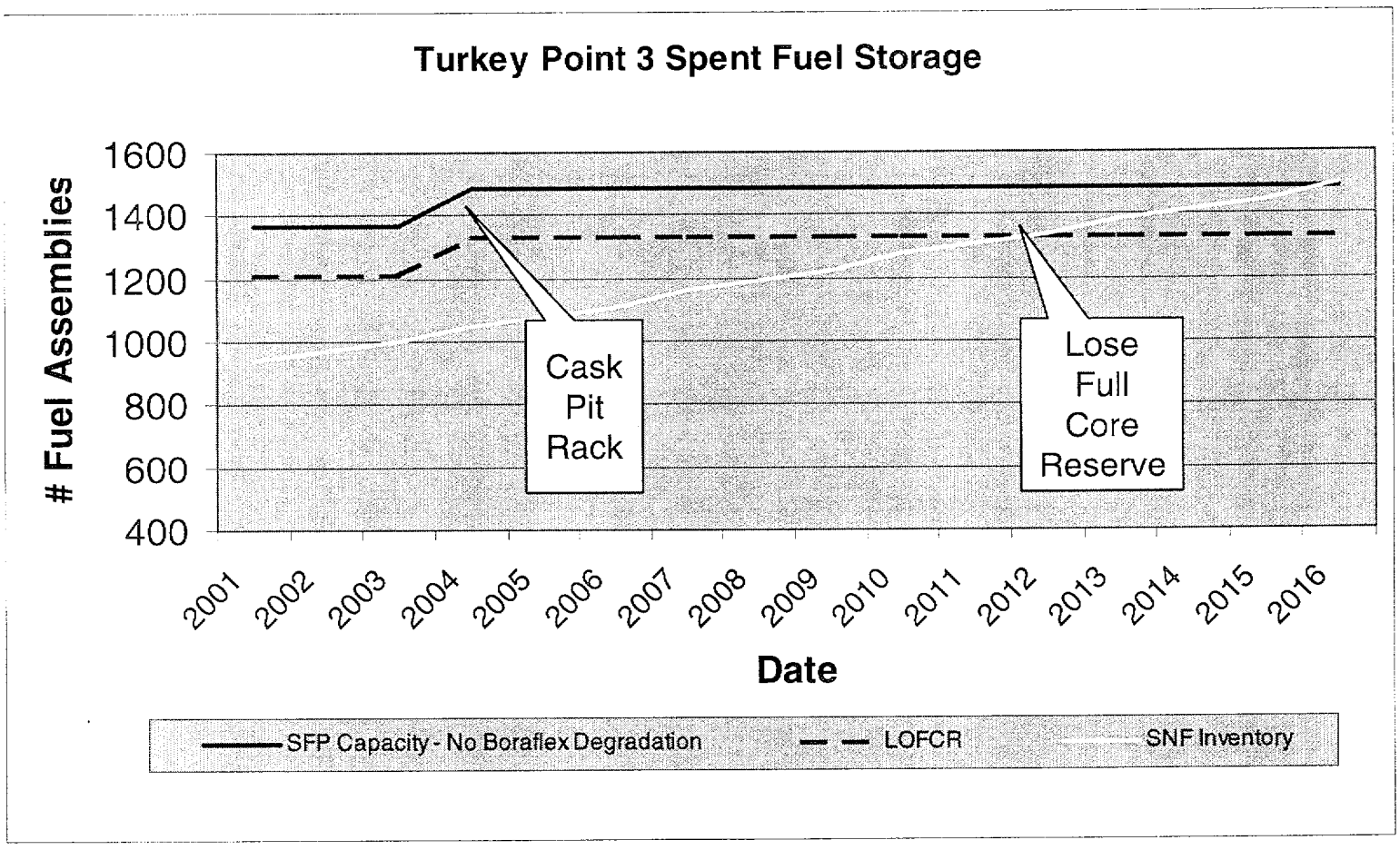
Turkey Point Spent Fuel Storage

- 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

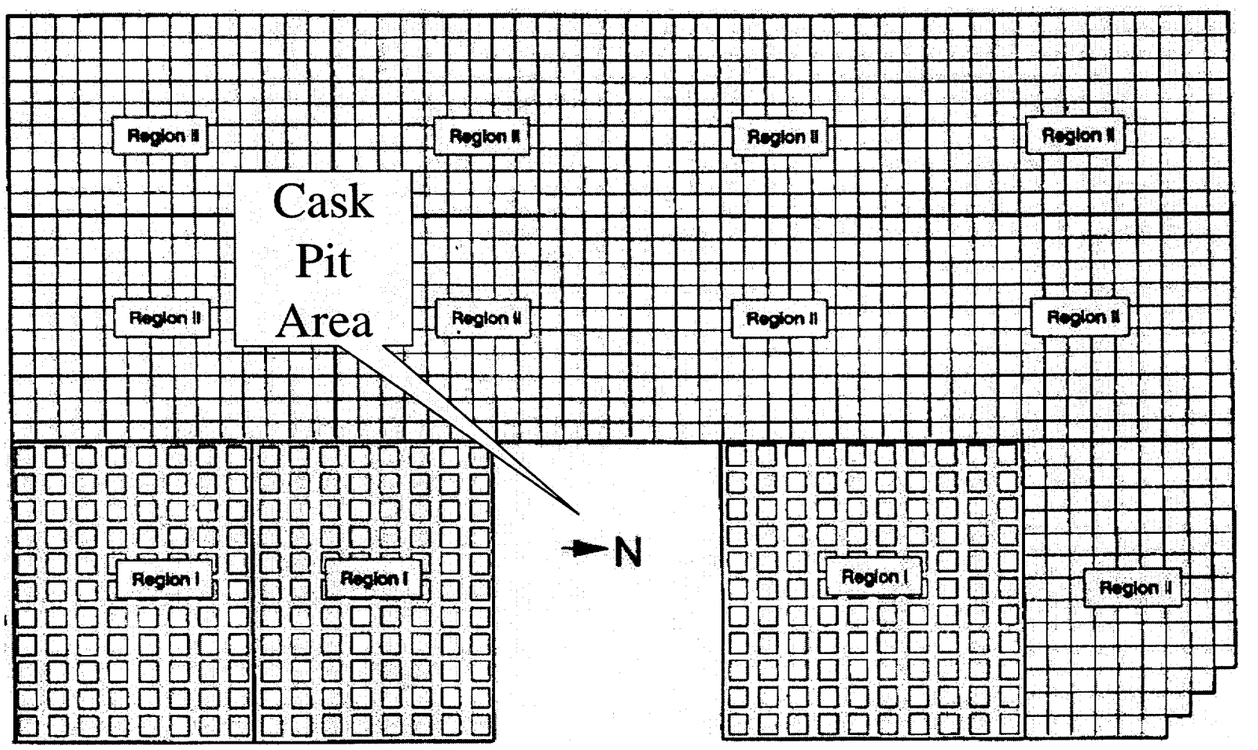
Turkey Point Spent Fuel Storage

- 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

Turkey Point Spent Fuel Storage



Turkey Point Spent Fuel Storage

- 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
    - Keff < 0.95 in unborated water
    - Burnup / enrichment curve for Region II racks
    - Nominal rack cell pitch

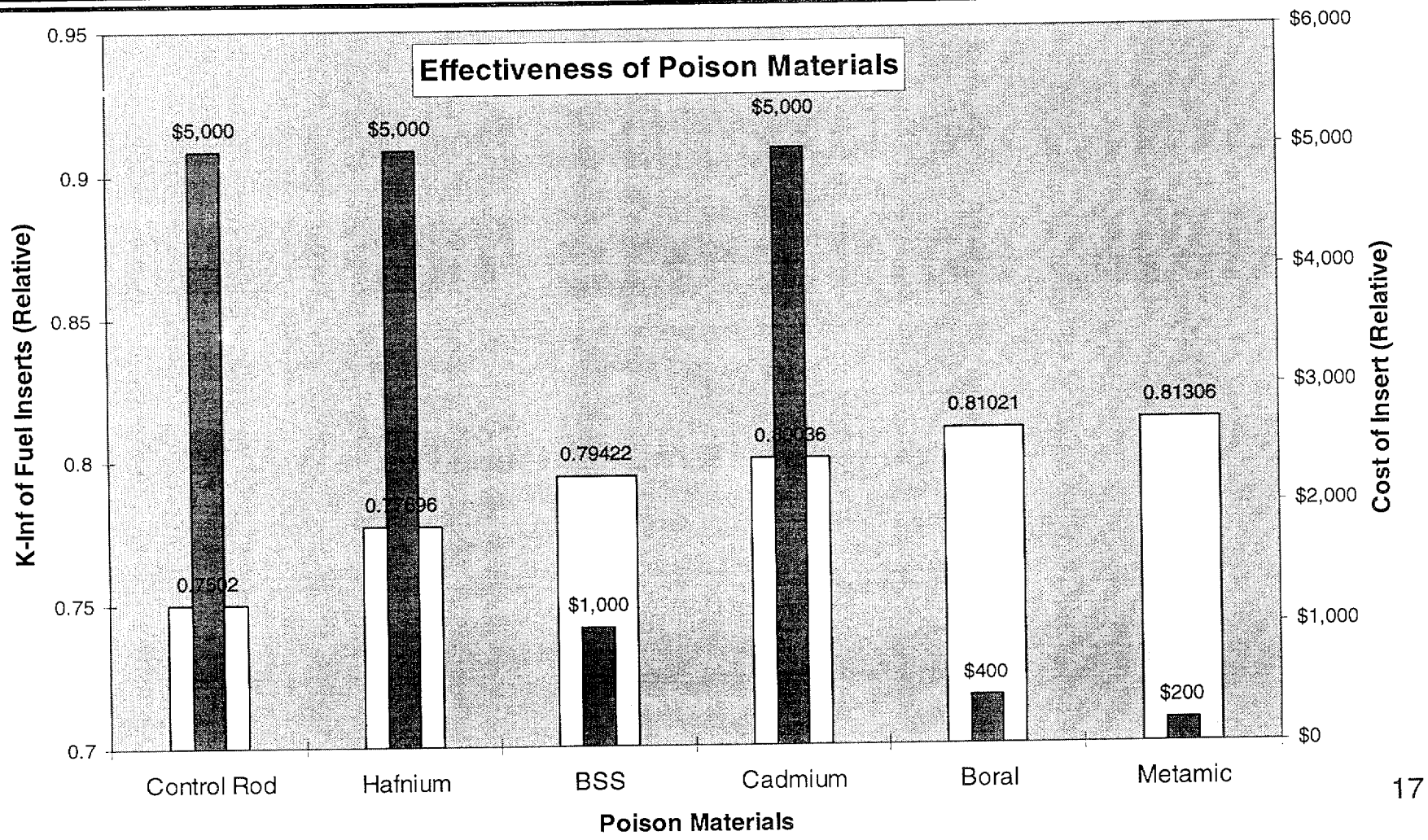
Turkey Point Spent Fuel Storage

- 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

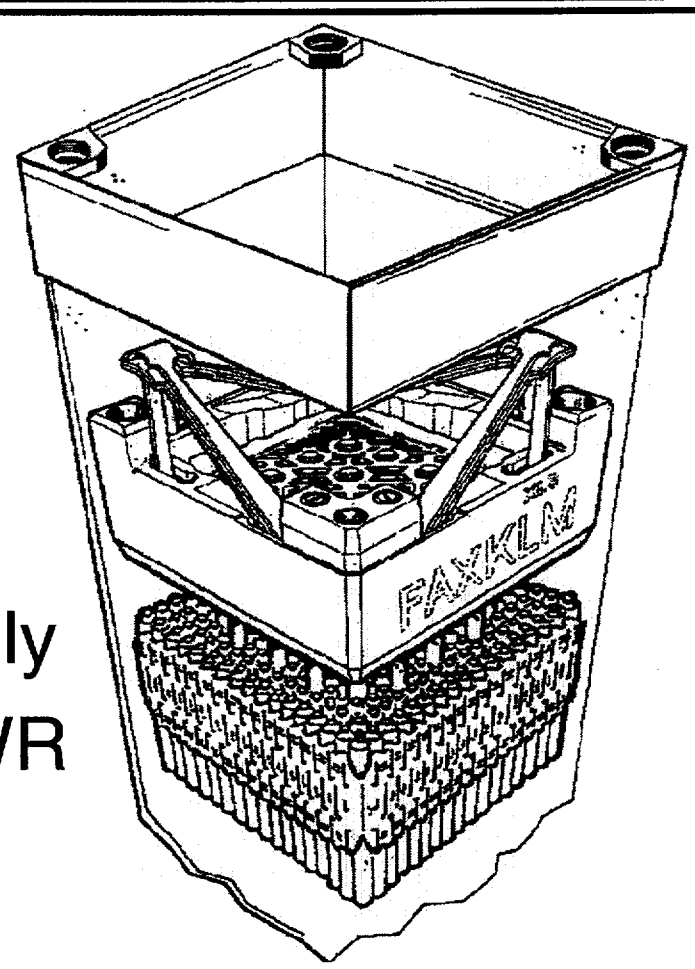
- Metamic Poison Insert Material
  - Al/B_4C metal matrix composite material
  - Effective neutron poison material
  - May be extruded, rolled into various shapes
    - Storage rack inserts ($RackSaver_{TM}$)
    - Fuel assembly inserts (rodlets)
  - Anodized for corrosion protection

Turkey Point Spent Fuel Storage



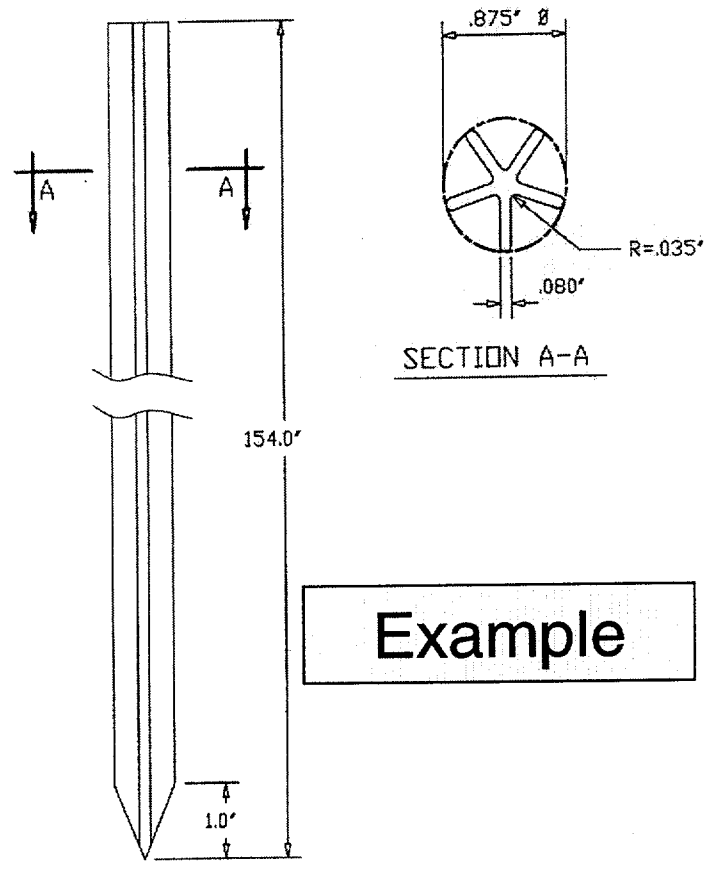
Turkey Point Spent Fuel Storage

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



Turkey Point Spent Fuel Storage

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



Turkey Point Spent Fuel Storage

- 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

Turkey Point Spent Fuel Storage

- 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