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DATE OF MEETING

**01/15/2002**

The attached document(s), which was/were handed out in this meeting, is/are to be placed in the public domain as soon as possible. The minutes of the meeting will be issued in the near future. Following are administrative details regarding this meeting:

Docket Number(s)	<u>50-250 and 50-251</u>
Plant/Facility Name	<u>Turkey Point Plant, Units 3 and 4</u>
TAC Number(s) (if available)	<u>MB3674 and MB3675</u>
Reference Meeting Notice	<u>Mtg Notice dated 12/13/01, ADAMS Acc # ML013480320</u>
Purpose of Meeting (copy from meeting notice)	<u>Turkey Point Spent Fuel Storage and use of Metamic Material</u>
	<u> </u>
	<u> </u>

NAME OF PERSON WHO ISSUED MEETING NOTICE

**Kahtan N. Jabbour**

TITLE

**Senior Project Manager**

OFFICE

**NRR**

DIVISION

**Division of Licensing Project Management**

BRANCH

**Project Directorate II**

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Docket File/Central File  
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DF01



**FPL**

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# Turkey Point Spent Fuel Storage

January 15, 2002

# Turkey Point Spent Fuel Storage

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- Agenda
  - Objectives / Background
  - Spent fuel storage status
  - Cask pit racks
  - Poison insert material - Metamic<sub>TM</sub>
  - Discussion
  - Summary

# Turkey Point Spent Fuel Storage

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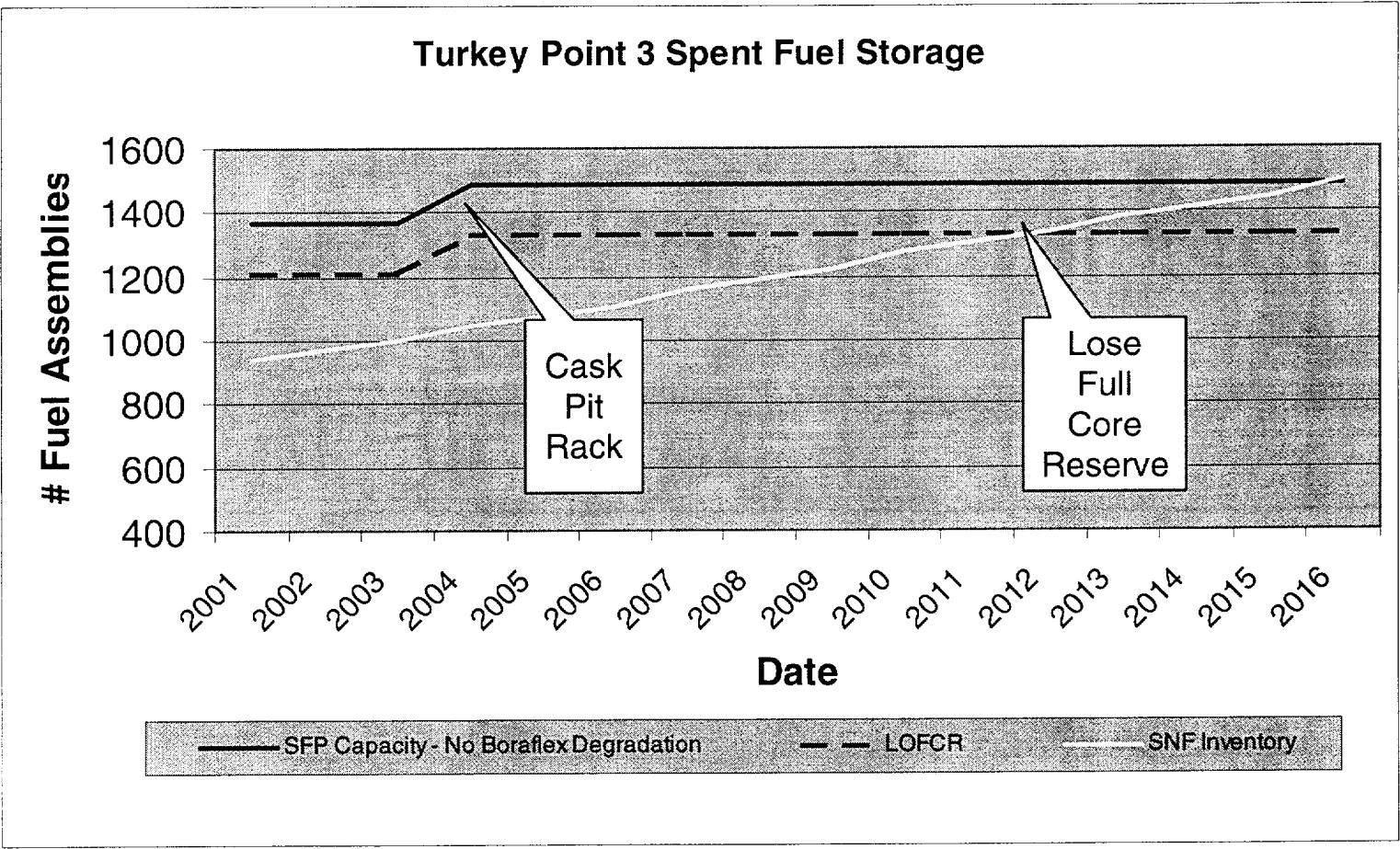
- Objectives
  - FPL share information on:
    - Short-Term storage plans
      - Cask pit racks
      - Poison inserts
    - Schedule for license amendments, NRC reviews
    - Analysis methods
    - Metamic for neutron poison material
  - NRC-FPL discussion of these items

# Turkey Point Spent Fuel Storage

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- Background
  - High density Boraflex<sub>TM</sub> 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

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- 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

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- 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

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- 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

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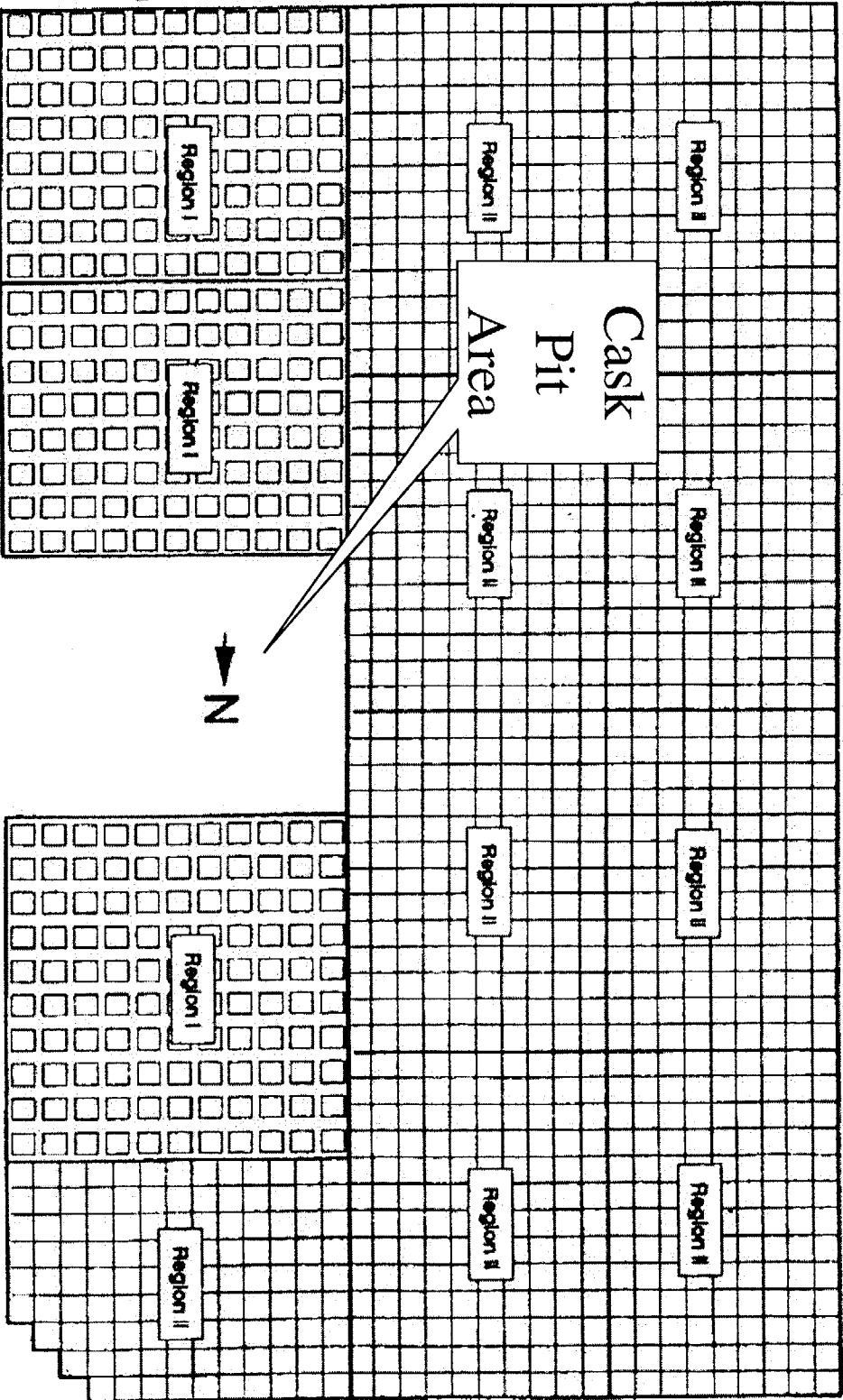
- Spent Fuel Storage Proposed Plan
  - Evaluated options to maintain current spent fuel storage capacity
  - Selected option is:
    - Cask pit racks
    - Poison inserts
      - Preliminary analysis requires 550 rack inserts

# Turkey Point Spent Fuel Storage

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- 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

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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

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- 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

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- 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

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

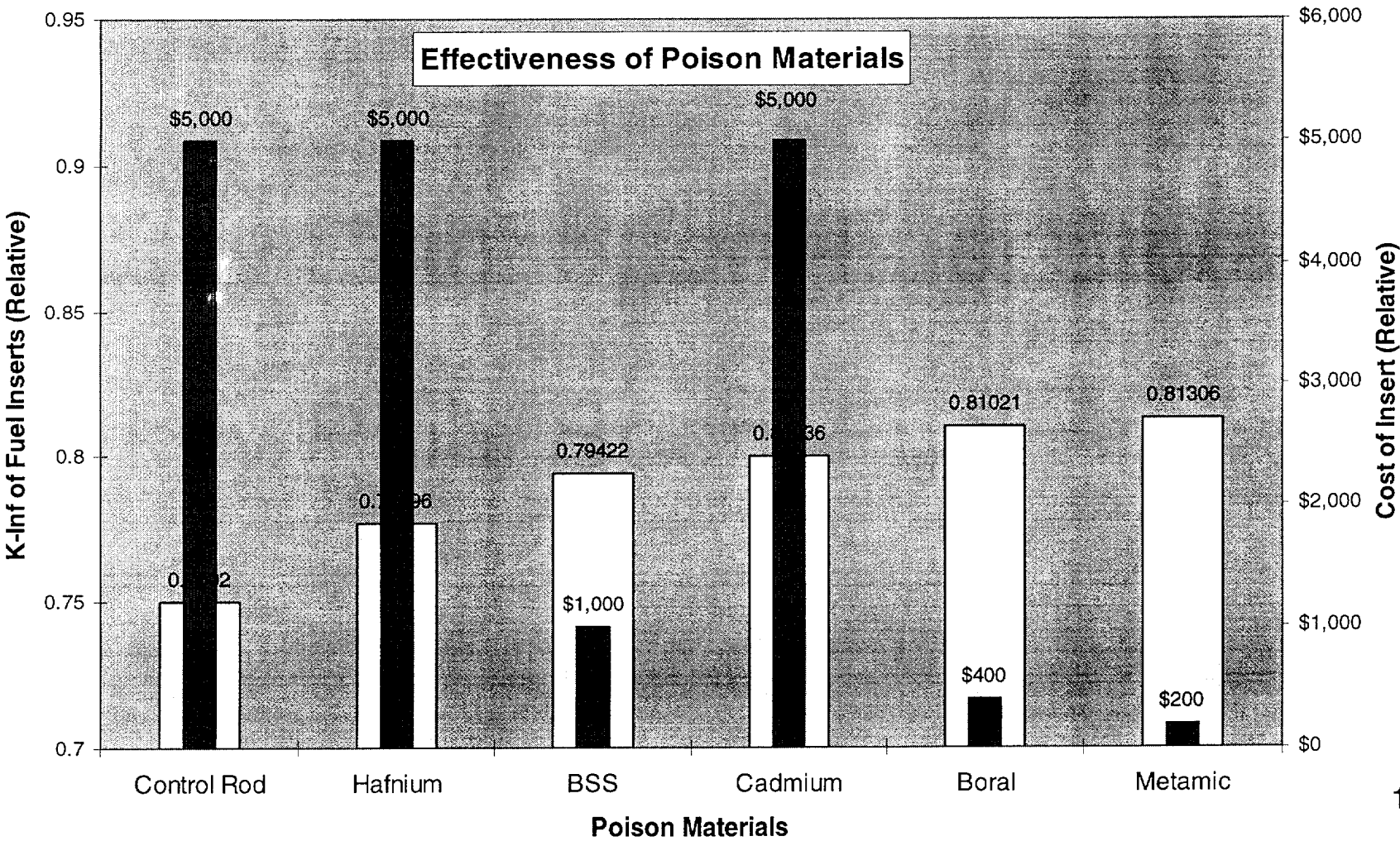


# Turkey Point Spent Fuel Storage

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- Metamic Poison Insert Material
  - Al/B<sub>4</sub>C metal matrix composite material
  - Effective neutron poison material
  - May be extruded, rolled into various shapes
    - Storage rack inserts (RackSaver<sub>TM</sub>)
    - Fuel assembly inserts (rodlets)
  - Anodized for corrosion protection

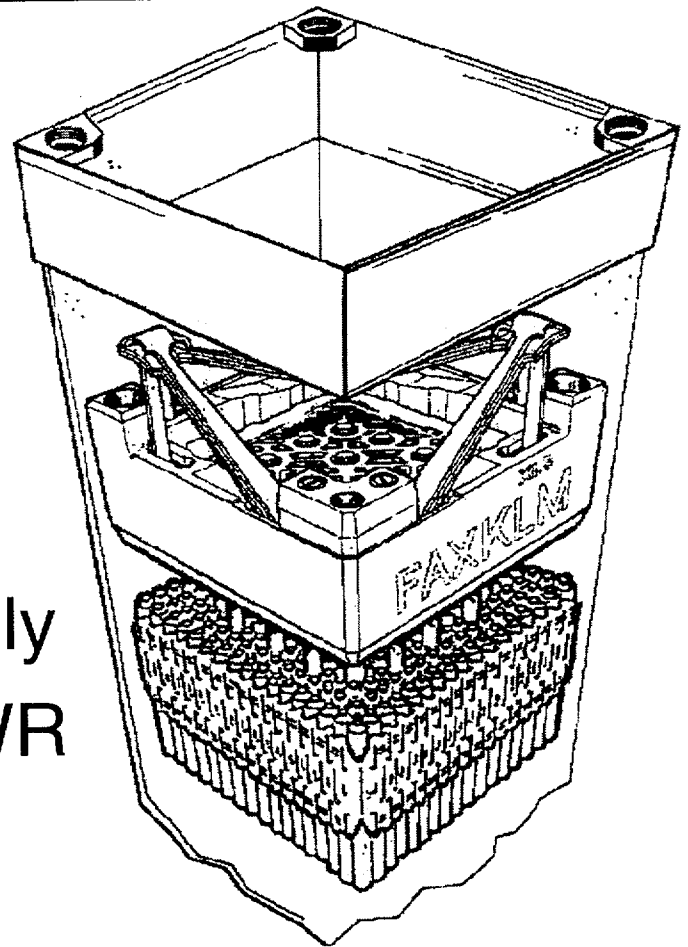
# Turkey Point Spent Fuel Storage



# Turkey Point Spent Fuel Storage

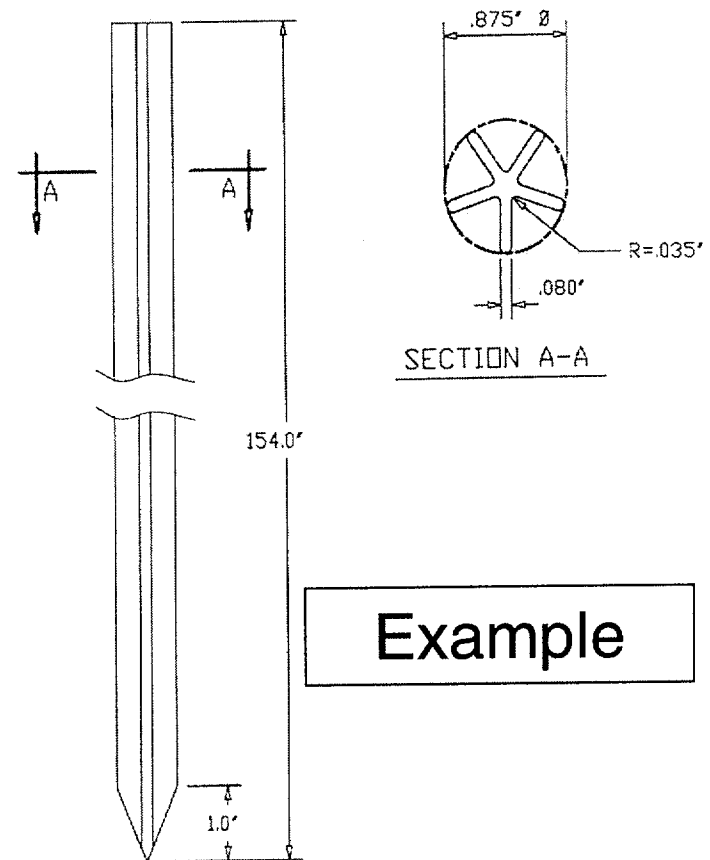
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- RackSaver Rack Inserts
  - Metamic
  - Simple installation
  - Incremental installation
  - No top-nozzle interference
  - Avoids rodlets for W assembly
  - Prototype tested at PWR/BWR



# 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

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- 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

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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

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- 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

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- 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

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- 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

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- 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<sub>TM</sub>) - Metamic
    - Multi-regioning, checkerboarding
  - Plan to install poison inserts in 2004
    - Plan to submit PLA in 2003

# Turkey Point Spent Fuel Storage

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- 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

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