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North Anna Fuel Transition Program Reload Methods Topical Report Review

NRC-One White Flint
July 24, 2001

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Meeting Participants

- *Dominion*
  - G. L. Darden - Program Manager/Nuclear Safety Analysis
  - K. F. Flaig - Nuclear Safety Analysis
  - R. A. Hall - Nuclear Core Design
  - C. B. LaRoe - Nuclear Core Design
  - R. S. Margolis - Asst. Program Mgr/Nuclear Safety Analysis
  - E. T. Shaub - Nuclear Licensing

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➤ *Meeting Objectives*

- Discuss the proposed changes to Dominion reload methodology topical (VEP-FRD-42A, Rev. 1) in support of transition to fuel supplied by Framatome ANP (FRA-ANP)
- Obtain NRC Staff feedback concerning proposed changes
- Define review schedule and relation to transition program

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Overview of Proposed Topical Changes

- Changes to address applicability for analysis of incremental fuel design differences
- Changes to address generic methodology items impacted by transition to FRA-ANP fuel
- Changes to reflect prior Dominion submittals regarding code and model updates
- Miscellaneous editorial changes

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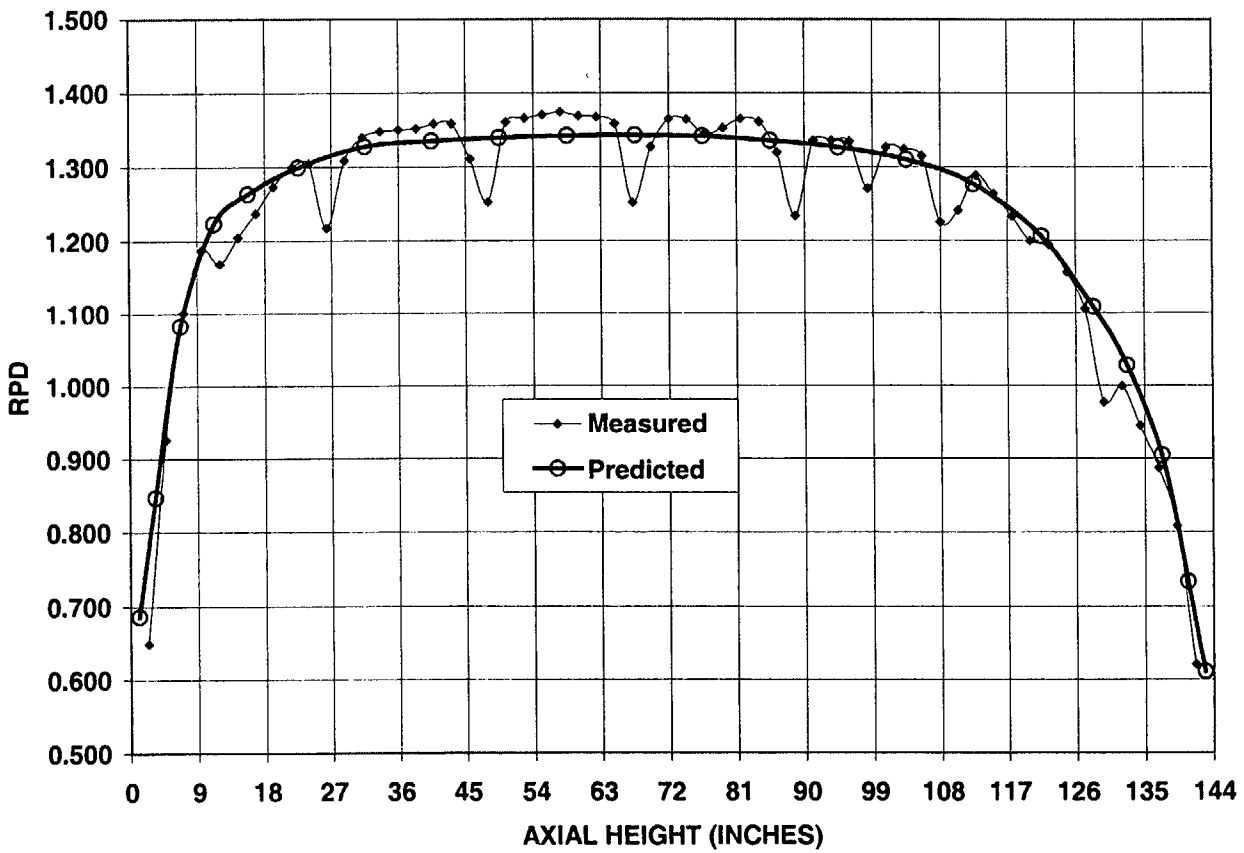
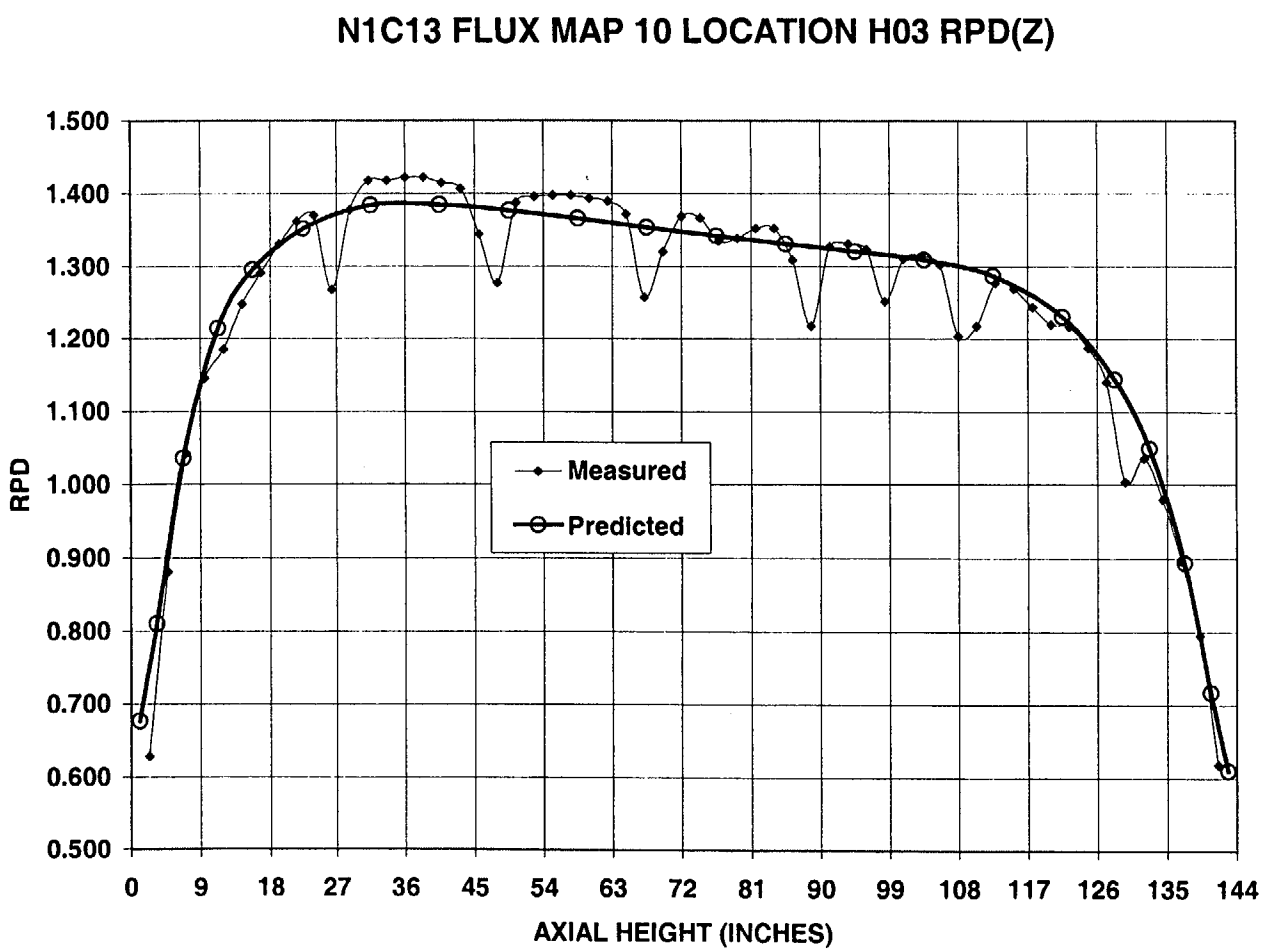
➤ *Accommodating Incremental Fuel Design Differences*

- Nuclear Core Design Items
  - key design features are essentially the same
    - fuel-H_2O ratio
    - fuel rod radial pitch
    - pellet & fuel stack dimensions
  - minor design differences can be modeled
    - increase in nominal fuel density
    - grid changes (dimensions, use of MSMGs, material)
    - change in cladding material
  - Dominion has previously demonstrated this capability
    - modeling & prediction of evolutionary W fuel changes
    - power distribution predictions for Framatome LTAs in North Anna Unit 1 (comparison to flux map data)

LTA First Cycle BOC
Flux Map Axial Power



LTA First Cycle MOC
Flux Map Axial Power



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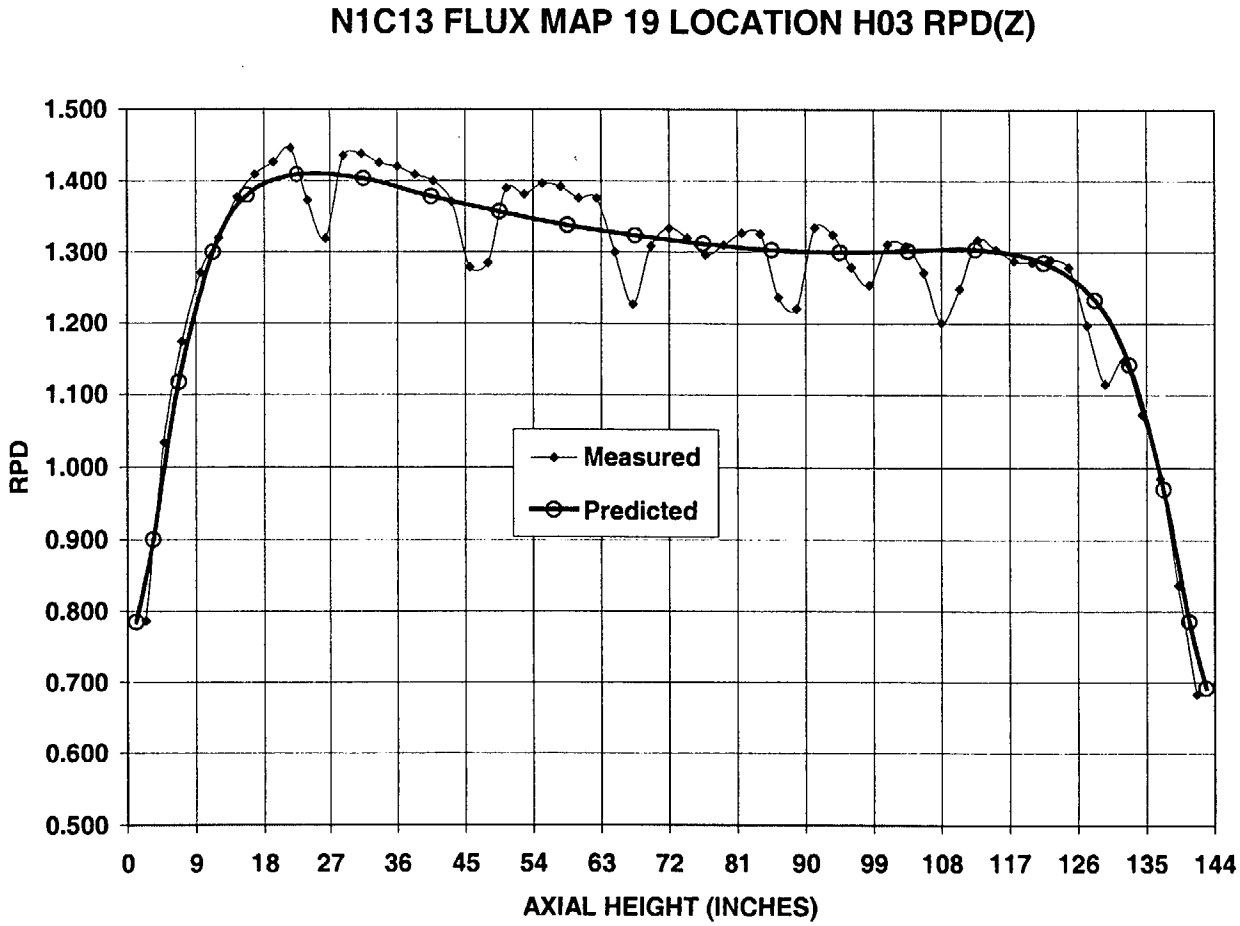
LTA First Cycle EOC
Flux Map Axial Power



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- *Accommodating Incremental Fuel Design Differences (continued)*
  - Safety Analysis Items
    - fuel is a functional equivalent to W fuel
    - Dominion prior demonstration of W fuel changes
      - Surry Improved Fuel (Zircaloy grids, ZIRLO cladding)
      - North Anna V5H (Zircaloy grids, ZIRLO cladding)
    - minor differences will be incorporated into NSSS models
      - fuel pellet thermal properties & temperature
      - M5 cladding material properties
      - effects of MSMGs (e.g., core pressure drop)

- *Changes involve design inputs not methods*

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Accommodating Generic Methodology Items

- *Nuclear Core Design Items*
  - no inherent fuel differences result in the need for a new type of analysis or analysis approach
- *Safety Analysis Items*
  - reference approved DNB correlations
  - reference approved Statistical DNB methodologies
  - confirmed transient analysis key parameters remain valid for FRA-ANP fuel (no additional parameters)
  - confirmed that parameter values are 'well-behaved' to allow use of Dominion bounding parameter value analysis approach
    - LTA analyses of DNB correlation behavior
    - core design analyses for cores with LTAs

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Accommodating Generic Methodology Items

- *Two licensed features of FRA-ANP fuel result in need to provide core design data to verify new limits*
  - LOCA K_{burnup} - augments FQ limit at intermediate burnups
  - Maximum rod power vs. burnup - clad strain limit

- *No other features impact Dominion generic analysis methodologies*

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- *Administrative Changes*
  - incorporate responses to original Staff review questions
  - consolidate modifications from prior supplements
    - COBRA/WRB-1 usage
    - Dominion Statistical DNBR Methodology
    - Dropped Rod methodology
    - Nuclear Core Design codes & models
  - miscellaneous editorial changes
    - Dominion vs. Virginia Power
    - Cite COLR versus Technical Specifications for core limits

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➤ *Status of Effort*

- Dominion changes to VEP-FRD-42 are under final review
- Submittal of VEP-FRD-42 Rev. 2 expected Aug 2001

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Topical Review Schedule & Fuel Transition

- *Proposed Schedule Milestones*
  - Dominion submits VEP-FRD-42, Rev. 2 - Aug 2001
  - Dominion submits fuel transition License Amendment Request - Mar 2002
  - Receipt & response to RAIs – Dec 2001 to Apr 2002
  - Target to issue SER for VEP-FRD-42, Rev. 2 – Aug 2002
  - Dominion N1C17 reload design analysis begins - Fall 2002

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- *NRC Staff Feedback*
- *Action Items*
  - Dominion to submit VEP-FRD-42, Rev. 2