Fiscal Year 2011 Budget Workshop

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Power Range Neutron Monitors and ARTS/MELLLA

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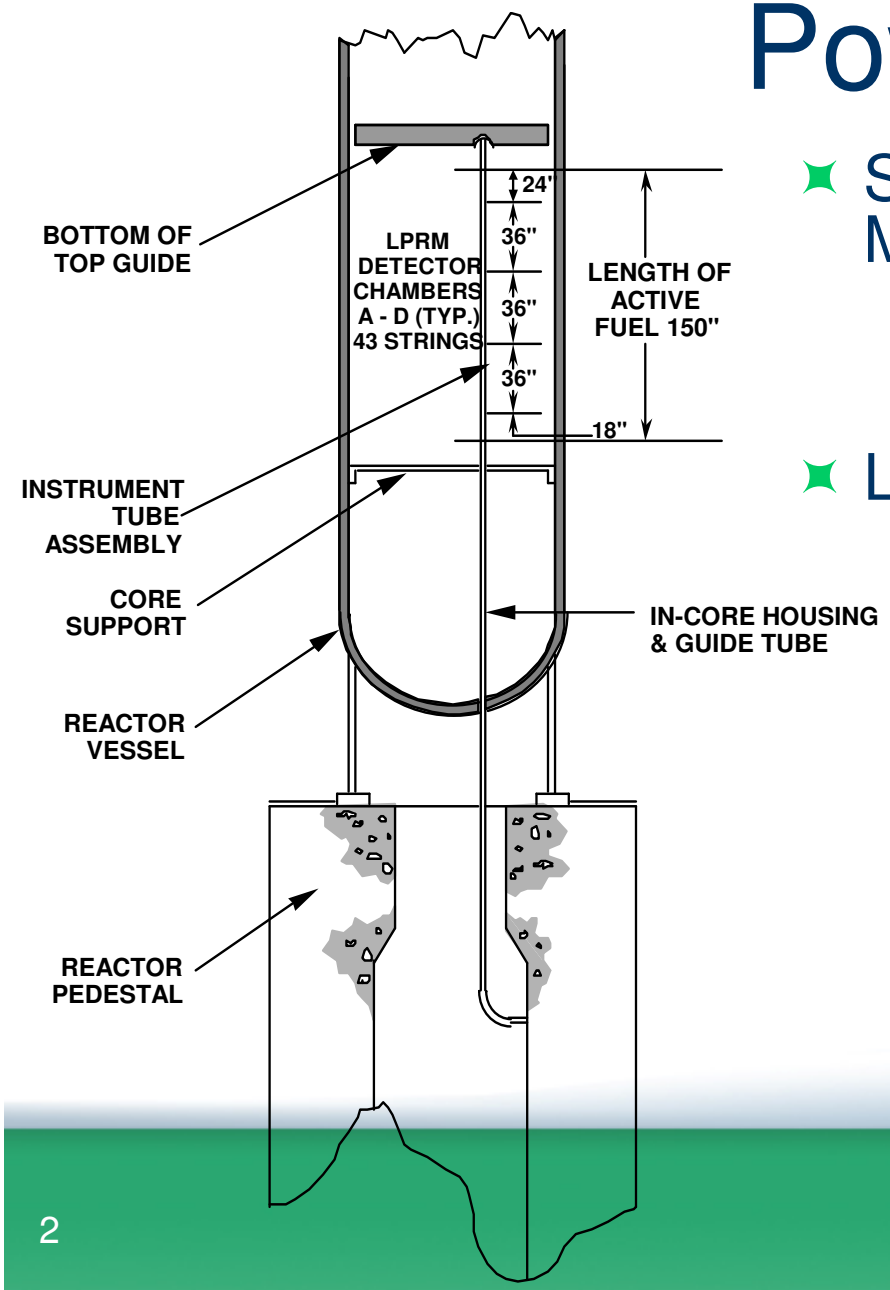
Power Monitoring



- Starts with Local Power Range Monitors (LPRM)
  - **172 neutron detectors reside in the core in between fuel assemblies**
  - **Detector signals go to control room**
- LPRM system provides inputs to …
  - **Average Power Range Monitor**
    - Computes bulk power
    - Initiates scrams as-needed
  - **Rod Block Monitor**
    - Initiates rod withdrawal blocks to prevent local fuel damage
  - **Oscillation Power Range Monitor**
    - Initiates scrams upon detecting power oscillations in the core

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Project Scope

- Hardware
  - Replace obsolete neutron monitoring equipment with state-of-the-art system
    - **Average Power Range Monitors (APRM)**
    - **Rod Block Monitors (RBM)**
    - **Oscillation Power Range Monitors (OPRM)**
    - **Local Power Range Monitors (LPRM) – control room instrumentation**
    - **Two out of Four Voters**
- Analyses
  - Revise instrument setpoints
    - **APRM, RBM Technical Specifications (ARTS) improvements**
  - Revise analyses to allow operation in expanded power-flow configuration
    - **Maximum Extended Load Line Limit Analysis (MELLLA)**
- Licensing
  - Submit license amendment request to Nuclear Regulatory Commission for approval

Existing Instrumentation

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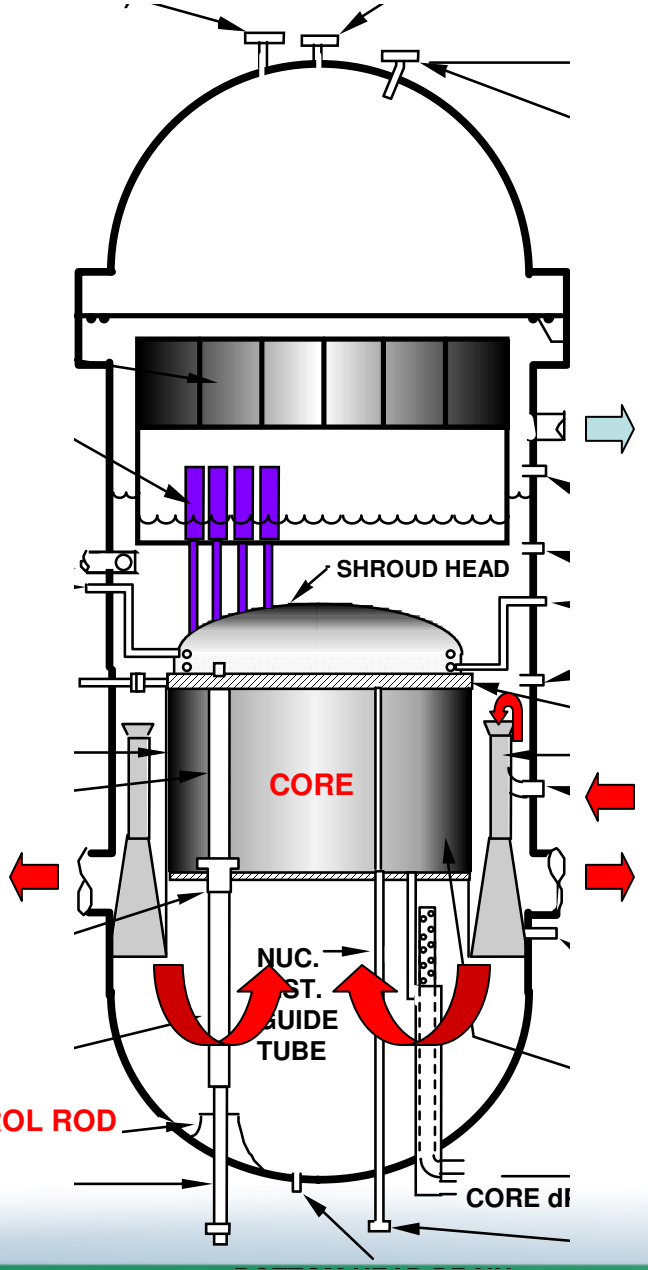
Replacement Instrumentation

- Hardware provided by General Electric
- Installation scheduled for Refuel Outage 20 (2011)
- Benefits
  - Allows implementation of ARTS/MELLLA
  - Increased equipment reliability
  - Reduced maintenance costs
  - Improved logic removes surveillance-induced ½-scrams

ARTS/MELLLA

Analyses

- ARTS/MELLLA will expand the "operating domain"
  - **At 100% power …**
    - **Existing flow range is 98%-100%**
    - **Expanded range will be ~86%-100%**
- Benefits
  - **Improved fuel utilization**
  - **Increased operating flexibility**
  - **Increase in net MWe**
  - **Reduction in number of down-powers to move rods**
  - **Reduce operator burden**



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Industry Perspective

- Twenty-eight BWRs have Implemented the Power Range Neutron Monitor Upgrade
  - **16 US BWRs**
- All but one US Plant has Implemented ARTS/MELLLA
  - **Columbia**
- Extensive Bench-Marking of other Plants Systems, Procedures and Training has been Performed to Date:
  - **Brunswick**
  - **Nine Mile**
  - **Monticello**
  - **Susquehanna**

Cost

- Total Project Cost Estimate
  - $19.4 million
  - Current project is on budget
- FY 2011
  - $5.5 million
    - **Final progress payments to GE**
    - **Licensing fees**
    - **Factory testing**
    - **Work order planning**
    - **Modification installation & testing**
    - **Procedures & training**

Status

- Schedule:
  - Current Project is on Schedule
    - **Submit license amendment request to NRC**
      - **April 2010**
      - **Typical approval time is 1 year**
    - **Factory Acceptance Test**
      - **September 2010**
    - **Equipment arrival onsite**
      - **Simulator components May 2010**
      - **December 2010**
    - **Simulator modification**
      - **December 2010**
    - **Plant installation**
      - **April 2011**