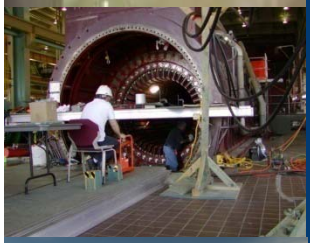
December 14, 2010

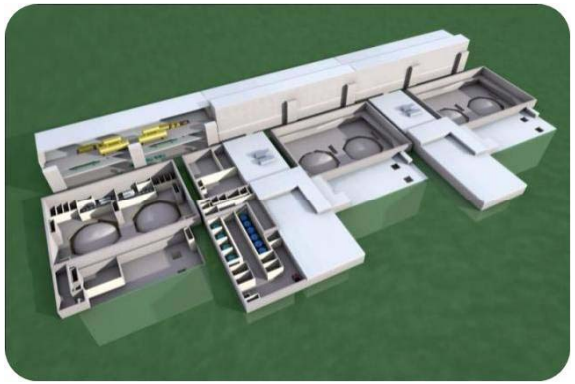
ATTACHED ARE THE SLIDES FROM THE “CLINCH RIVER SMR, KEY ASSUMPTIONS” PRESENTATION, WHICH WAS GIVEN AT THE DECEMBER 14, 2010 PUBLIC MEETING WITH TENNESSEE VALLEY AUTHORITY REGARDING KEY ASSUMPTIONS LETTER FOR THE POSSIBLE LICENSING AND CONSTRUCTION OF A SMALL MODULAR REACTOR AT THE CLINCH RIVER SITE (MEETING NOTICE ML103360316)

THESE SLIDES WERE PROVIDED ON THE DATE OF THIS COVER SHEET.






Clinch River SMR




Key Assumptions
December 14, 2010

Clinch River SMR Key Assumptions

- Identifying and gaining agreement on key regulatory assumptions is one of several early project development activities that are performed prior to a project recommendation being made to the TVA Board. No recommendation has been made or authorized, and is not expected until additional study and preliminary developmental activities have been completed.

Agenda

- Introduction
- Background
- Key Assumptions
  1. Project Status 10 CFR Part 50 Licensing Process
  2. Regulatory Guide 1.70 and SRP
  3. One Design – One Review – FSAR and DCA
  4. Combined Part 30, 40, 50, and 70 licenses
  5. NRC Staff would inspect Generation mPower as a vendor.
  6. The SMR initial test program - Regulatory Guide 1.68, Revision 3
- Project Status
- Next Steps

Nuclear is Key Part of TVA Vision of Cleaner Affordable Energy

New generation

Deliver more new nuclear capacity this decade than any other utility in the country

Technology

Commercialize the first small modular reactor in the U.S.

SMR Advantages

- Advantages
  - Cleaner generation
  - Improved ability to finance new nuclear generation
  - Ability to incrementally add generation where its needed on the transmission system
  - Repowering aging fossil sites (reusing assets such as environmental permits, transmission and water availability)

- Deployment of First of Class SMR Technology Advantages
  - Re-establishing U.S. manufacturing base for nuclear components
  - “Good jobs” creation in manufacturing, construction and operation
  - Distribution of jobs in more locations
  - U.S. SMR global leader with potential for export
  - Allows smaller utilities to consider nuclear option as part of generation mix

TVA Project Evaluation Elements

Need For Power	Updates forecasted need for baseload, peaking and intermediate generation and identifies least cost alternatives for meeting TVA needs.
NEPA Final Environmental Impact Statement	TVA requirement under National Environmental Policy Act (NEPA), whose purpose is to inform about potential environmental consequences prior to any project decision.
DSEP	Detailed scoping, estimating, and planning (DSEP) for the project. Establishes certainty around the cost estimate and overall schedule.
Risk Assessment	Detailed assessment of the project level and enterprise level risks along with mitigation actions for certain key risks.
Financial Analysis	Evaluates impact on rates and revenue requirements, including fuel, and impact on TVA debt.

First of Class Deployment Licensing Options

- 10 CFR 50 or 10 CFR 52?
- Evaluation of Options
  - 10 CFR 50 Experience for Operating Fleet
  - TVA 10 CFR 50 experience for BFN, WBN2 and BLN
  - Near-term ALWR 10 CFR 52 Experience
  - Schedule Needs
  - Business Planning
- Internal TVA Team
- NRC Discussions/Input
- External Advisory Team Input

10 CFR 50 Meets TVA Needs for First of Class Deployment

Licensing Steps

- TVA is following approach successfully used in past
- Key Assumptions Letter
  - NRC Feedback
- Regulatory Framework
  - Regulatory Assessment
  - CP Application content and level of detail
  - OL Application Plan
  - NRC Interaction and Feedback – Iterative process – start in February
- Construction Permit Application Submittal
- NRC Review

Current Intent – Not Commitments

Key Assumptions – First of Class Deployment

- NRC Understanding:
  - *TVA will request a 10 CFR Part 50 construction permit (CP) for two modules*
  - *Generation mPower will submit DCA after NRC issues DSER*
  - *Subsequent modules at Clinch River site would be licensed under Part 52*
- TVA Intent:
  - "TVA is considering submitting an application for Construction Permits for up to six B&W mPower 125 megawatt SMR modules at TVA's Clinch River site"
  - TVA is assessing how many units would be in CP application

Key Assumption 1

- "The application for Construction Permits supporting the deployment of the mPower modules would be prepared in accordance with the content requirements of 10 CFR 50.33, 50.34 and 10 CFR 50.34a. The Part 50 process would allow for the effective and systematic development of project licensing, design finalization and construction. TVA believes that the use of the Part 50 process provides the flexibility necessary to support potential design modifications identified during construction as well as inform future deployments. Therefore, use of the Part 50 licensing process is TVA's **first key assumption**."

Assumption 1 – Part 50 Licensing

- NRC Question 1 (a):
  - *Specific requirements in 10 CFR Part 52 will need to be addressed during licensing of a new plant under the Part 50 CP-OL process. One example of such requirements is the severe accident considerations as required in Part 52.47. How does TVA plan to identify and address these applicable requirements in the CPA?*
- TVA Intent:
  - Systematic review of applicable regulations
  - Communicate through Regulatory Framework
  - Identify anticipated regulatory exemptions, policy issues, guidance exceptions and SRP non-conformances

CP and OL will address all applicable Regulations

Assumption 1 – Part 50 Licensing

- NRC Question 1 (b):
  - *Assuming Part 50 and Part 52 licensed modules at the same plant site, what is TVA's plan for maintaining standardization of all modules?*
- TVA Intent:
  - Current plan is to submit a Part 50 application for the Clinch River Site
  - TVA is assessing how many units would be in CP application
  - Any potential future modules at a different TVA site – licensed under Part 52 and Reference DCD

Standardization is a Fundamental Commitment

Assumption 1 – Part 50 Licensing

- NRC Question 1 (c):
  - *When evaluating the change processes associated with a CP, has TVA considered the Part 52 change control process outlined in the proposed Appendix C of NEI 96-07.*
- TVA Intent:
  - TVA industry participation
  - TVA Licensing assessment concluded 10 CRF Part 50 preferred for Clinch River project

Key Assumption 2

- "The **second key assumption** stems from the first. In accordance with the Part 50 licensing process, TVA would develop a Preliminary Safety Analysis Report (PSAR). The PSAR would be prepared utilizing the guidance of Regulatory Guide 1.70, Revision 3, and the organizational structure of the Standard Review Plan (SRP). The PSAR would include an evaluation of the facility against the SRP revision in effect six months prior to submittal of the application for the Construction Permits. The application would include an environmental report addressing the Environmental Standard Review Plan guidance contained in NUREG 1555."

Assumption 2 - Regulatory Guide 1.70/SRP

- NRC Question 2 (a):
  - *Does TVA intend to prepare a specific environmental report to support its application with the NRC, or does TVA intend to ask the NRC to rely, in whole or in part, on the TVA-prepared EIS?*
- TVA Intent:
  - ER addresses NUREG 1555 requirements
  - TVA's NEPA review would utilize ER content
  - Regulatory Framework

TVA will address NUREG 1555 requirements

Assumption 2 - Regulatory Guide 1.70/SRP

- NRC Question 2 (b):
  - *Regulatory Guide 1.70 (1978) is different from current Part 50 regulations. How will TVA identify and address those changes for this Part 50 application?*
- TVA Intent:
  - Construction Permits would comply with 10 CFR 50.33, 50.34 and 10 CFR 50.34a
  - Regulatory Framework
  - Interaction expected to begin in early 2011
  - Lessons learned from COL process

CP and OL will address applicable Regulations

Assumption 2 - Regulatory Guide 1.70/SRP

- NRC Question 2 (c):
  - *It appears that a significant amount of design information will be available early in the Part 50 licensing process. Does TVA expect to submit design details in the PSAR as required by 10 CFR 50.34 and that could provide a basis for the Part 52 design certification application?*
- TVA Intent:
  - The design details required by 10 CFR 50.34(a)(1)(ii), (f), (g), and (h)(1)(ii) will be provided in the PSAR
  - RG 1.206 content and level of detail addressed in DCD and OL
  - Regulatory Framework

Assumption 2 - Regulatory Guide 1.70/SRP

- NRC Question 2 (d):
  - *How does TVA envision the implementation of the staff requirements enumerated in COMGBJ-10-0004/COMGEA-10-0001, "Use of Risk Insights to Enhance Safety Focus of Small Modular Reactor Reviews" with the submission of the Part 50 construction permit application?*
- TVA Intent:
  - Participation in industry SMR Task Force and NRC interaction
  - Risk insights are an integrated element of the B&W mPower design process
  - PRA would be included in the DCD and OL
  - Risk insights will be considered in Operating Program development

Risk Insights are being applied

Key Risk Attributes of the B&W mPower Reactor Design

- Integral Reactor Vessel
  - Reduced Design Basis LOCA Threat
  - No RCP Seal LOCA Issues
  - No RV Penetrations Below Top of Fuel
  - Steam Generator Secondary Heat Removal Is Not Credited as a Safety-Related Heat Removal Method
- Passive ECCS Design
  - Simple, In-Containment Design Will Have High Reliability
- Reduced Operator Action Following an Event
  - Longer Times Available for Response
  - Simpler Actions to Take
- Reduced Potential for Active Common Cause Failures
- Non-Safety Systems Available for Accident Mitigation
  - RCIPS – Provides Both High and Low Pressure Decay Heat Removal, Plus Inventory Control
  - Feedwater – While Not Credited in Design Basis Analyses, System Is Available to Provide DHR
  - Standby AC power – Can Support Operation of RCIPS and Other Systems

Key Assumption 3

- "Following the receipt of the NRC's draft Safety Evaluation Report for the PSAR, it is anticipated that a Design Certification Application (DCA) would be submitted to the NRC by Generation mPower, a B&W and Bechtel Corporation alliance. TVA proposes that through the NRC license review process, a "One Design - One Review" approach be adopted in anticipation of parallel Operating License submittals – TVA's Final Safety Analysis Report (OL-FSAR) as well as a Generation mPower DCA application. This is consistent with the concept of a design-centered review approach as described in Regulatory Issue Summary 2006-06, "New Reactor Standardization Needed To Support The Design-Centered Licensing Review Approach." To the extent that the scope and content of the FSAR's design overlap with a DCA submittal, TVA anticipates that the NRC Staff would perform a single review of the generic content common to both the FSAR and DCA, consistent with the design-centered review approach. Based on the likelihood of parallel submittals, the **third key assumption** is the utilization of a "One Design - One Review" approach."

Assumption 3 – One Design - One Review

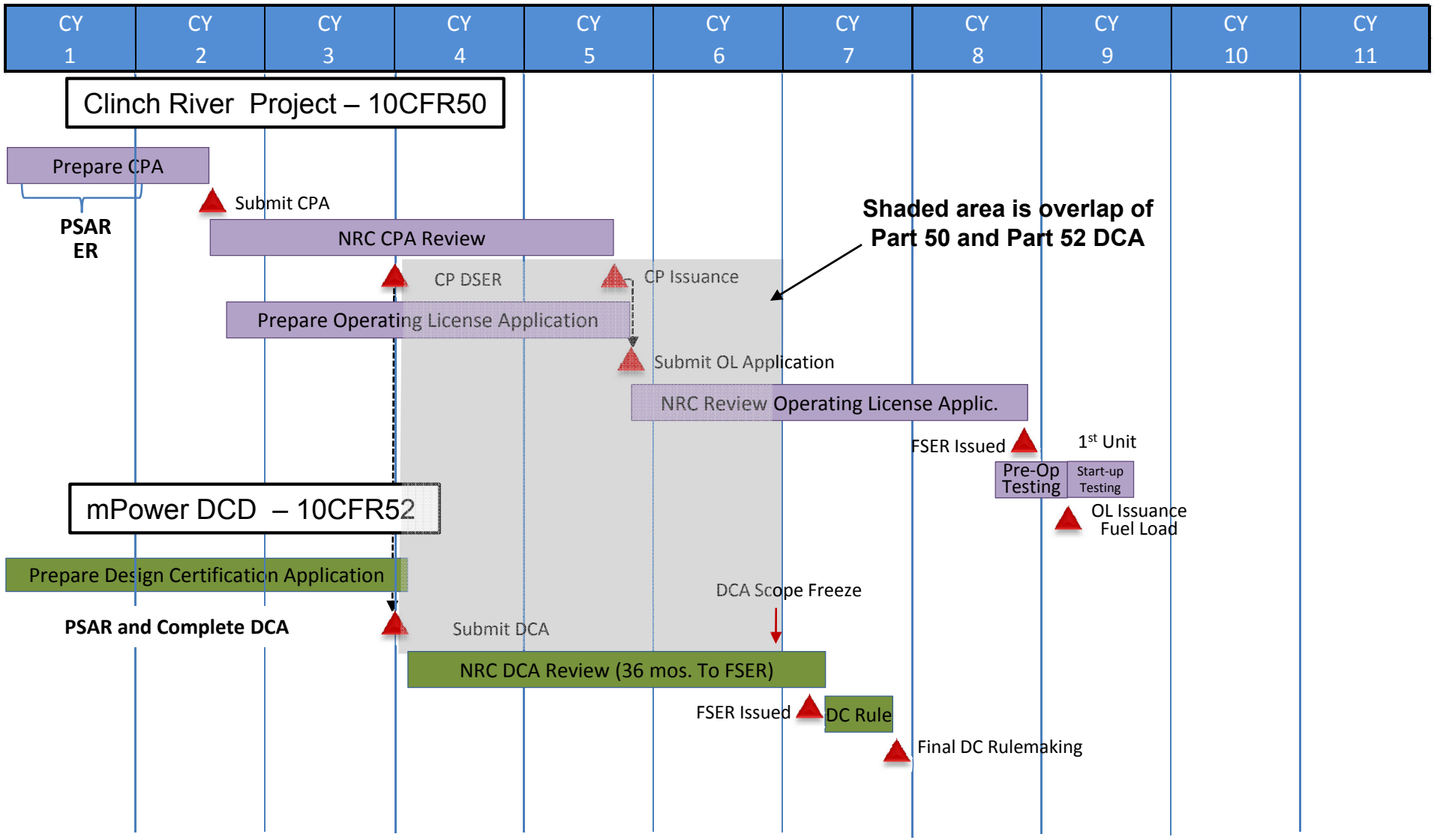
- NRC Question 3 (a):
  - *How will the Part 52 design control document and the Part 50 final safety analysis report (FSAR) be maintained consistent with each other throughout the licensing process?*
- TVA Intent:
  - Throughout licensing process, the objective is for the Clinch River FSAR to be consistent with the design control document (DCD)
  - Design changes would be integrated in the DCP and FSAR
  - DCWG process would to be used
  - Regulatory Framework

Standardization is a Fundamental Commitment

Assumption 3 – One Design - One Review

- NRC Question 3 (b):
  - *Clarify TVA's licensing plan using a timeline or schedule including milestones that reflect the submittal plans, review timing, and expectations for concurrent reviews.*
- TVA Intent:
  - See Next Slide

First of Class Part 50 Deployment and DCD



Assumption 3 – One Design - One Review

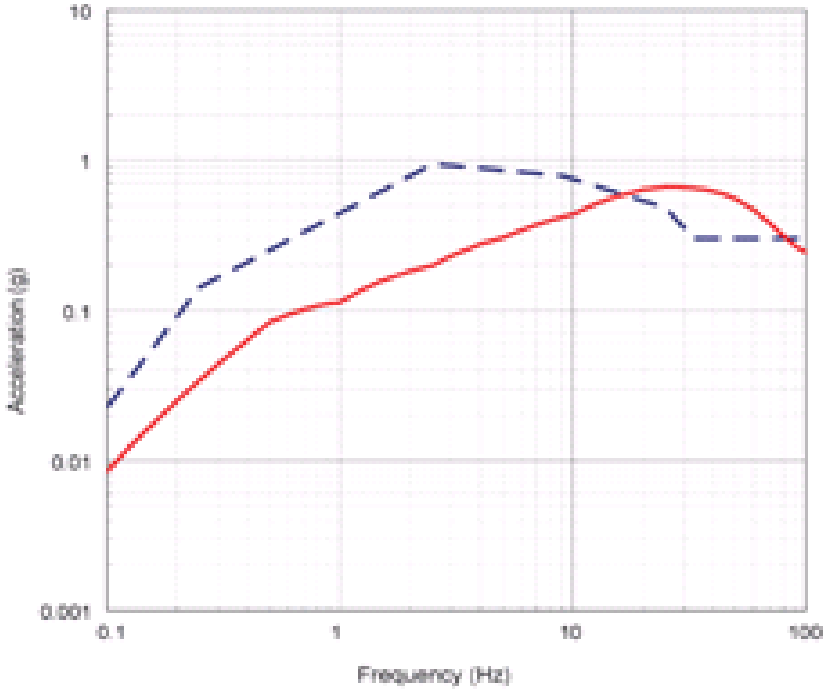
- NRC Question 3 (c):
  - *Does TVA plan to seek a final design approval in the path to issuance of a CP or OL, but prior to any design certification rule (DCR)?.*
- TVA Intent:
  - The current intent – Design Certification Rule is expected to be complete before OL
  - Final Design Approval is not required for a CP or OL
  - DCWG process would be used

Assumption 3 – One Design - One Review

- NRC Question 3 (d):
  - *Assuming two applications, such as an OL- FSAR and a DCR, are being reviewed concurrently, how would TVA and Generation mPower propose to address environmental siting issues, particularly concerning areas where site-specific information is required or bounding parameters and characteristics are required?*
- TVA Intent:
  - CP includes RG 1.70/NUREG 1555 – Clinch River Site Characteristics
  - DCD – Design envelope – RG 1.206 Standard Design
  - OL - RG 1.206 Site Specific
  - OL - Confirmation that site falls within the DCD envelope

Integrated Review Process Expected to be Efficient and Effective

Seismic Example



- Design CSDRS
- Design Certification Review

- Site Ground Motion Response Spectrum
- Construction Permit Review

Operating License Review

- Confirm CSDRS bounds GMRS
- Justify any exceedence if necessary.

Assumption 3 – One Design - One Review

- NRC Question 3 (e):
  - *When discussing the coordination of design and licensing reviews, have the parties formed a design-centered working group and reached alignment on the strategy and timing of submittals for the CP, OL, design certification (DC), reference combined license (R-COL), and subsequent combined licenses (S-COLs)? What review schedules are assumed and is each party accepting of the possible schedule impacts from the other parties (e.g., the possible delay of the DC review until after completion of the preliminary SER for the CP)?*
- TVA Intent:
  - Design Centered Working Group Process would be utilized
  - TVA and Generation mPower agreements in place
  - Other industry and DCWG groups

Assumption 3 – One Design - One Review

- NRC Question 3 (f):
  - *Has TVA considered if and/or how the units licensed under Part 50 would be brought under the standardization processes incorporated into Part 52 (e.g., a license condition to adopt the requirements of 10 CFR 52.63(a)(3), which requires that any changes to a DCR will be applied to all plants referencing the certified design)?*
- TVA Intent:
  - Developed and managed through the Regulatory Framework

Assumption 3 – One Design - One Review

- NRC Question 3 (g):
  - *To facilitate the one review concept, does TVA anticipate developing formatting conventions similar to that used for design certification documents, R-COLs, and S-COLs?*
- TVA Intent:
  - TVA would employ industry formatting conventions used in COLs to clearly identify DCD content

Standardization is a Fundamental Commitment

Key Assumption 4

- "In accordance with 10 CFR 50.31, Combining Applications, TVA would combine license applications for Part 30, 40, 50, and 70 licenses. This is consistent with the process currently being used for licensing new reactors and represents TVA's **fourth key assumption**."

Assumption 4 – Part 30, 40, 50, and 70 licenses

- NRC Question 4 (a):
  - *The staff would need to evaluate this request after understanding TVA's expectation and timeline for issuance of the Part 30, 40, and 70 licenses. The basis for Part 52 combined licenses incorporating Part 30, 40, and 70 licenses does not necessarily apply to the Part 50 CP. If TVA were to request issuance of the Part 30, 40, and 70 licenses concurrent with the issuance of the OL, the timeline for startup may be impacted depending upon activities that are still incomplete and/or awaiting the Part 30, or 40, or 70 license completion. At what point in the Part 50 licensing process does TVA anticipate issuance of the Parts 30, 40, and 70 licenses?*
- TVA Intent:
  - Single submittal coincident with OL
  - Schedules for individual licenses based on Project need dates.

Key Assumption 5

- "As described previously, TVA is evaluating the mPower technology for use at its Clinch River site. The mPower design makes substantial use of modular construction technology which enables major portions of the plant to be fabricated in controlled manufacturing environments and shipped to the site via rail and trucks. TVA plans to use Generation mPower as its vendor responsible for the development of the mPower reactors. As a result of treating Generation mPower as a vendor, the fabrication of major plant components may begin before the issuance of the Construction Permits and may require NRC inspection resources in advance of the Construction Permits' issuance. This will necessitate close coordination and timely communication of manufacturing plans and schedules to facilitate NRC Inspection activities. TVA's **fifth key assumption is** that the NRC Staff would inspect Generation mPower as a vendor."

Assumption 5 – Inspect Generation mPower as Vendor

- NRC Question 5 (a):
  - *The NRC's current fee structure may need to be revisited since fees for NRC audits and inspections of vendors are not currently charged back to applicants, licensees, or vendors.*
- TVA Intent:
  - Maintain existing practice
  - Similar to current vendor inspection and QA oversight process
  - Dry Cask
  - SG replacement
  - Near term ALWRs

TVA Approach Consistent with Current Modular Design and Inspection Approach

Assumption 5 – Inspect Generation mPower as Vendor

- NRC Question 5 (b):
  - *The staff will need to understand TVA's concept for inspection at a manufacturer's facility, as well as, integration of those components into the facility, and TVA's plan for quality assurance oversight, including fitness for duty and physical protection considerations. Please explain what you envision in these areas.*
- TVA Intent:
  - Similar to current vendor inspection and QA oversight process

Assumption 5 – Inspect Generation mPower as Vendor

- NRC Question 5 (c):
  - *Clarify how the organizational relationship between TVA and Generation mPower will be addressed for administrative responsibilities such as fee billing, response to technical questions, and licensing decision-making for common issues*.
- TVA Intent:
  - For the CP and OL Applications, TVA would be responsible for Administrative Responsibilities (such as RAI responses and fees)
  - Generation mPower would be responsible for DCA Administrative Responsibilities

Assumption 5 – Inspect Generation mPower as Vendor

- NRC Question 5 (d):
  - *How will TVA identify and control the items being performed at the site as opposed to those performed at the vendor facility? Given the fairly unique nature of TVA's proposed approach, additional NRC effort will be required to design the appropriate approach to conducting inspections as this effort moves forward.*
- TVA Intent:
  - Similar to current modular design approach
  - TVA approach would establish generic approach
  - TVA would provide NRC with detailed fabrication and construction schedules
  - Clinch River not unique
  - Provides efficient mechanism for following plants

TVA Approach Consistent with Current Modular Design and Inspection Approach

Key Assumption 6

- "The SMR initial test program would be developed using the guidance of Regulatory Guide 1.68, Revision 3, to assure that all Systems, Structures, and Components (SSCs) important to safety are tested to demonstrate that the facility can be operated in accordance with design requirements and in a manner that will not endanger the health and safety of the public. The scope of the inspection and enforcement program along with the initial test program that encompasses site preparation inspections, construction inspections, manufacturing inspections, and system tests through hot functional testing will inform and demonstrate successful execution of future Inspections, Tests, Analysis and Acceptance Criteria (ITAAC) that may be specified in Design Certification or Combined Operating License applications. This represents TVA's **sixth key assumption**."

Key Assumption 6

- Staff Understanding:

  The staff understands TVA's assumption as follows. TVA expects to prepare the ITAAC to support the mPower DCR based upon: (i) internal TVA and B&W lessons learned in the design, construction, and testing of the initial mPower module under the Part 50 CP/OL process, as well as (ii) TVA and B&W consideration of the results of the NRC licensing, inspection and auditing activities found under the CP/OL process. TVA also expects the NRC to use its lessons learned to inform (and focus) the NRC's: (i) consideration of ITAAC adequacy during its review of the proposed DCR and COL, and issuance; and (ii) finding that the acceptance criteria are met under 10 CFR 52.103(g).

Assumption 6 – Initial Test Program

- NRC Question 6 (a):
  - *Is the staff's understanding correct? If not, please provide a statement containing the information necessary to correct the staff's understanding.*
- TVA Intent:
  - TVA will perform all required testing and inspection using 10 CFR 50 processes such as RG 1.68, and not develop or use ITAAC
  - Lessons learned in design, construction, and testing of the initial mPower module from Clinch River would inform ITAAC

Clinch River Project Informs ITAAC

Assumption 6 – Initial Test Program

- NRC Question 6 (b):
  - *The staff would like further dialogue and clarification of the statements made with respect to this assumption, including discussion centered around how NRC inspections of vendors would be incorporated into the initial test program. Please describe how you envision NRC inspections of vendors being incorporated into the initial test program.*

- TVA Intent:
  - TVA would interface with the Staff as issues are developed
  - Component level testing consistent with current practice
  - Initial Test Program conducted at the site

Clinch River Project Informs ITAAC

Key Points Summary

- 10 CFR 50 Meets TVA Needs for First-of-Class Deployment
- Current Intent – Not Commitments
- CP and OL would address applicable Regulations
- Standardization is a Fundamental Commitment
- TVA will address NUREG 1555 requirements
- Risk Insights are being applied
- Integrated Review Process Expected to be Efficient and Effective
- Consistent with Current Modular Design and Inspection Approach
- Clinch River Project Informs ITAAC

Project Status

- Clinch River Site located adjacent to the Oak Ridge Reservation
- TVA project approval for Construction Permit (CP) Project
  - Site characterization activities underway
  - Met Tower data collection – 1st Quarter 2011
  - Site geotechnical data studies expected to begin 2nd Quarter 2011
  - Review of historical site information planned to be completed by December 31, 2010
  - CP application preparation initiated
  - High-level schedule development underway

Next Steps

- Key Assumption Letter Addendum
- Regulatory Framework Interaction
- Generation mPower Topical and Technical Reports
- NEI SMR Task Force White Papers
- Communicate site investigation and data collection schedules
- RIS 2010-10