



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

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10 CFR Part 50

U. S. Nuclear Regulatory Commission  
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Clinch River Site  
Project Number 785

**Subject: TENNESSEE VALLEY AUTHORITY (TVA) - ADDENDUM TO THE KEY ASSUMPTIONS LETTER FOR THE POSSIBLE LICENSING AND CONSTRUCTION OF SMALL MODULAR REACTOR MODULES AT THE CLINCH RIVER SITE**

- References
1. TVA letter to NRC dated November 5, 2010, "Key Assumptions Letter For The Possible Licensing And Construction Of Small Modular Reactor Modules At The Clinch River Site"
  2. NRC letter dated December 1, 2010, "Nuclear Regulatory Commission Staff Questions Related To The Tennessee Valley Authority Key Assumptions Letter, Dated November 5, 2010, For The Possible Licensing And Construction Of Small Modular Reactor Modules At The Clinch River Site"

In Reference 1, TVA outlined the key licensing assumptions underpinning its evaluation of the feasibility of siting up to six Babcock & Wilcox (B&W) mPower design small modular reactor (SMR) modules at TVA's Clinch River site in Roane County, Tennessee.

In response to TVA's Key Licensing Assumptions, the NRC Staff requested additional details regarding the key assumptions in a letter dated December 1, 2010 (Reference 2). On December 14, 2010, the NRC Staff held a public meeting with TVA to further discuss these questions and to help to clarify the assumptions.

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The purpose of this letter is to capture the results of the public meeting and provide the NRC Staff with clarifications regarding TVA's intent for each Key Licensing Assumption. Each of the Key Licensing Assumptions discussed in Reference 1 are repeated in this letter followed by TVA's clarification.

#### Key Licensing Assumptions

*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**.*

TVA is currently assessing the feasibility of licensing up to six modules to be deployed at the Clinch River site. Based on the outcome of this assessment, TVA would submit a construction permit application for an initial group of modules (two to six) using the 10 CFR Part 50 process. For future additional deployments at Clinch River or other sites, TVA would use the 10 CFR Part 52 process.

During the development of the construction permit and operating license applications, TVA will assure applicable regulations are addressed. It is recognized that maintaining standardization of all modules whether licensed under the Part 50 or Part 52 process is a fundamental objective. To ensure regulations are adequately addressed and standardization is maintained, TVA will utilize the Regulatory Framework process it has employed in recent nuclear plant licensing projects such as the restart of Browns Ferry Unit 1 and the resumption of construction at Watts Bar Unit 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.*

As briefly discussed in the first key assumption, TVA will utilize its Regulatory Framework process to assure applicable regulations are addressed. This includes but is not limited to the requirements of 10 CFR Part 50 for a construction permit and operating license (during the applicable phase of the project), the standard review plan, Regulatory Guide 1.70 Revision 3, generic communications and new and emerging regulations, as applicable.

The level of detail provided during the construction permit review phase of the project would be consistent with the standard content guidance defined in Regulatory Guide 1.70. It is recognized that additional mPower design information may be available beyond that required to support the CP application. In order to align the CP application with existing guidance, TVA plans to provide that level of additional information in the OL application phase of the project.

In addition to the safety aspects of the licensing process, TVA intends to employ the Regulatory Framework process during the development of the Environmental Report to address the guidance contained in NUREG 1555. In accordance with its own National Environmental Policy Act (NEPA) responsibilities, TVA would develop its own environmental impact statement utilizing, in large part, the information contained in the Environmental Report.

Finally, TVA and Generation mPower are participating in NEI's SMR Task Force and interacting with the NRC regarding the use of risk insights during the licensing of small modular reactors. For the first-of-class deployment at the Clinch River site, TVA would provide the methodology and criteria for developing the severe accident management design alternatives (SAMDA) during the construction permit phase of the project and provided the detailed description and analysis for the mitigation and prevention approaches during the operating license /design certification application phase of the project. The development of a probabilistic risk assessment (PRA) would also occur during the operating license /design certification application phase of the project. While the PRA would not be submitted until the operating license /design certification application phase of the project, mPower is integrating risk insights into its design process.

*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.*

The timing of the design certification application is the most important aspect of the "One Design - One Review" approach. For evaluation purposes, TVA assumes that a design certification application would be submitted after a Construction Permit draft Safety Evaluation Report (SER) is issued with no generic content open items that could impact

issuance of the final SER and construction permit. At that point, a DCA could, and most likely would, be submitted. As shown in Enclosure 1, the gray box defines the time-frame when the "One Design - One Review" approach would be exercised: the operating license /design certification application phase of the project. It is critical that standardization of content and format be maintained during this process. To facilitate this alignment and standardization, TVA would utilize a design-centered working group approach and use its Regulatory Framework Process. Additionally, TVA would implement many of the standard formatting and content conventions defined in Regulatory Guide 1.206.

Equally important is how changes identified during the construction phase would be factored into the design certification and combined operating license processes for future SMRs. Lessons learned and design changes identified during the construction phase of the Clinch River project would be factored into the site design by amendments to the Final Safety Analysis Report and in subsequent designs through a revision to the design certification document (DCD), through a standard departure from the DCD or by an amendment to a future R-COL.

TVA would not seek 10 CFR Part 52 "Design Approval" during the 10 CFR Part 50 licensing process. The DCA would achieve full design certification under the 10 CFR Part 52 process.

A more detailed description of the principles and rationale behind the "One Design - One Review" approach is included in Enclosure 2.

*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**.*

Upon discussions with the NRC Staff regarding the scheduling difficulties associated with the assumption, TVA withdraws this fourth key assumption.

*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.*

In discussions early in the conceptual phase for small modular reactors, the Manufacturing License application process was considered due to the modular

construction technology that allowed for fabrication in a manufacturing facility and subsequent shipment to a site. TVA's evaluation assumes that B&W would be treated as vendor supplying modules to the site. This is the approach being taken for current Advanced Light Water Reactor (ALWR) programs and the concepts discussed in the Modular Construction Techniques section of SECY-07-0105, "Enhancement to the Vendor Inspection Program within the Office of New Reactors."

The NRC staff provided valuable insights and information during the public meeting on December 14, 2010, related to changes that would likely be required to support the vendor inspection effort. TVA would work with the NRC Staff to implement the thorough vendor inspection program for small modular reactors.

*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**.*

Deployment of the first modules at the Clinch River site under 10 CFR Part 50 would not require the development of ITAAC. TVA would provide a method of informing and confirming the ITAAC that would be developed by Generation mPower as part of the design certification application. As part of the 10 CFR Part 50 process, NRC inspections would occur during the engineering, procurement, and construction phases of the project. Additionally, system testing would be performed in accordance with the guidance of Regulatory Guide 1.68.

TVA appreciates the NRC Staff's engagement and facilitation of the public meeting to provide a forum for discussing our approach to the small modular reactor project at the Clinch River site. As stated in Reference 1, TVA's key assumptions are an important part of its evaluation and we look forward to continued dialogue with the NRC Staff.

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TVA will keep the NRC Staff informed of its ongoing activities related to its evaluation and looks forward to the NRC staff's continued views and feedback. Please contact Gordon Arent at (423) 751-2233 if you have questions.

Sincerely,



Jack Bailey  
Vice President, Nuclear Generation Development  
Nuclear Generation Development and Construction

Enclosures:

1. Timeline for Small Modular Reactors
2. Principles and Rationale One Design - One Review Process

cc: See Page 7

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cc (Enclosures):

R.W. Borchardt  
U.S. Nuclear Regulatory Commission  
One White Flint North, 16E15  
11555 Rockville Pike  
Rockville, Maryland 20852-2738

Michael Johnson  
U. S. Nuclear Regulatory Commission  
Two White Flint North, 6F15  
11545 Rockville Pike  
Rockville, Maryland 20852-2738

Eric Leeds  
U.S. Nuclear Regulatory Commission  
One White Flint North, 7H4  
11555 Rockville Pike  
Rockville, Maryland 20852-2738

Michael Mayfield  
U.S. Nuclear Regulatory Commission  
Two White Flint North, 6E4  
11545 Rockville Pike  
Rockville, Maryland 20852-2738

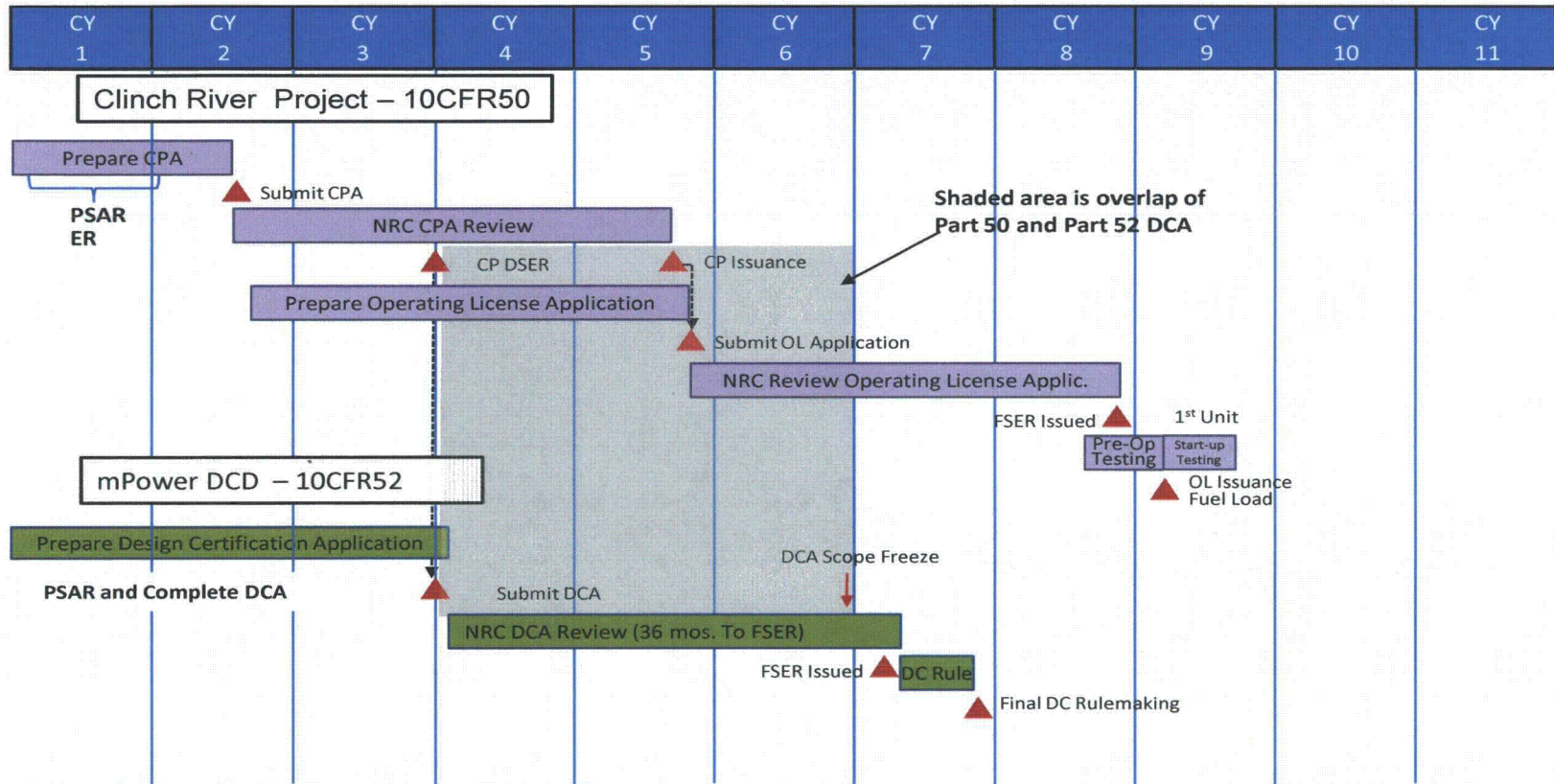
Luis Reyes  
U. S. Nuclear Regulatory Commission  
Region II  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW, Suite 23T85  
Atlanta, Georgia 30303-8931

## ENCLOSURE 1

### Timeline for Small Modular Reactors



# First of Class Part 50 Deployment and DCD



**ENCLOSURE 2**

**Principles and Rationale  
One Design - One Review Process**

## **PRINCIPLES AND RATIONALE FOR THE ONE DESIGN – ONE REVIEW PROCESS**

### **I. INTRODUCTION**

This provides a more detailed discussion of how the “One Design – One Review” approach, first identified in TVA’s November 5, 2010 letter to the NRC Staff, and as further discussed in the cover letter (“Key Assumptions Letters”), could be implemented. The paper also explains that this approach is consistent with the Atomic Energy Act, NRC regulatory requirements, and NRC policy. In particular, this “One Design – One Review” approach would not modify any of the NRC’s procedural review requirements and would not alter the standards for granting licenses or certifications. Instead, the approach would streamline these reviews and result in consistent conclusions and increased standardization.

### **II. DESCRIPTION OF “ONE DESIGN – ONE REVIEW” APPROACH FOR THE mPOWER DESIGN**

The mPower design could factor into multiple overlapping licensing reviews, including (1) TVA’s construction permit (“CP”) application for the Clinch River site; (2) Generation mPower’s design certification (“DC”) application for the mPower design; and (3) TVA’s operating license (“OL”) application for the Clinch River site.<sup>1</sup> Each of these licensing reviews, and the corresponding use of the “One Design – One Review” approach, is discussed below.

#### **Clinch River CP Application**

As discussed in the Key Assumptions Letters, TVA is evaluating the feasibility of submitting a CP application for up to six mPower SMR modules at the Clinch River site. TVA expects that this CP application would be submitted before a DC application for the mPower design, and would be the first application submitted to the NRC that provides mPower design information. TVA believes that use of the Part 50 process for the Clinch River project would allow for the effective and systematic development of project licensing, design finalization, and construction.

The CP application would be prepared in accordance with the requirements of 10 CFR Part 50 (Domestic Licensing of Production and Utilization Facilities), including the content requirements of 10 CFR 50.33, 50.34, and 50.34a. These regulations require a certain level of design information. For example, 10 CFR

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<sup>1</sup> The “One Design – One Review” approach also could factor into the review of any combined license (“COL”) applications that reference the mPower DC to the extent that the COL applications repeat design information that already has been reviewed in earlier applications. As already provided in 10 CFR 52.79(d), if a COL application references the mPower DC, then the application may incorporate that DC information by reference. This has been the practice for recent COL applications that reference DCs. The DC information has finality according to 10 CFR 52.63 and does not need to be re-reviewed and cannot be changed or challenged under most circumstances.

50.34(a)(3) requires that the PSAR submitted with the CP application include the "preliminary design of the facility." The PSAR also would be prepared utilizing the guidance of Regulatory Guide 1.70, Rev. 3, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants" (Nov. 1978) and the organizational structure of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" ("Standard Review Plan"). It is recognized that additional mPower design information may be available beyond that required to support the CP application. In order to align the CP application with existing guidance, TVA plans to provide that level of additional information in the OL application phase of the project.

#### Generation mPower DC Application

Following the NRC's issuance of the draft Safety Evaluation Report ("SER") for the CP PSAR, and provided that the draft SER indicates that no unresolved issues remain regarding the generic B&W mPower Plant Design or it is otherwise mutually determined that no such issues exist that would affect the NRC's issuance of a final SER, it is anticipated that Generation mPower could, and most likely would, submit a DC application for the mPower design.

The DC application would be prepared in accordance with the requirements of 10 CFR Part 52, Subpart B (Standard Design Certifications), including the content requirements of 10 CFR 52.46 and 52.47. The application also would be prepared utilizing the guidance of the Standard Review Plan. It is expected that the DC application would be consistent with and repeat some mPower design information that is provided in the CP application. This would occur because of the overlapping content requirements for CP applications and DC applications and would be accomplished with close coordination between TVA and Generation mPower. The DC application would identify which information is identical to information already provided and reviewed in the CP application.

The overlapping content requirements among new reactor applications are illustrated by the Standard Review Plan itself. The individual sections of the Standard Review Plan provide Review Procedures specifying how a reviewer should complete review of the relevant information and verify the applicable acceptance criteria. As shown in the Standard Review Plan, these content requirements are often the same for CP, OL, DC, and COL applications. Therefore, it is expected that the content of these applications would overlap significantly.

Under the "One Design – One Review" approach, any design information in the DC application that is identical to corresponding design information in the earlier CP application would not need to be re-reviewed during the DC review. Instead, the staff reviewers for the DC application could rely upon the earlier review performed by staff as part of the CP review. This reliance would be particularly justified if the NRC has issued the draft or final SERs on this design information

as part of the CP review. As discussed further below, this approach is consistent with NRC policies and regulatory requirements.

### Clinch River OL Application

Following CP issuance, but during continued review of the DC application, TVA would submit its OL application for the Clinch River site.

The OL application would be prepared in accordance with the requirements of 10 CFR Part 50, including the content requirements of 10 CFR 50.33, 50.34, and 50.34a. The application also would be prepared utilizing the guidance of the Standard Review Plan. TVA anticipates that the design information in the OL application would be consistent with and repeat some mPower design information that is provided in the DC application. This would occur because of the overlapping content requirements for DC applications and OL applications and would be accomplished through close coordination between TVA and Generation mPower. The OL application would identify which information is identical to information already provided and reviewed in the DC application.

As discussed above, the overlapping content requirements among new reactor applications are illustrated by the Standard Review Plan itself. The Introduction to the Standard Review Plan (page 4) states: "The [Standard Review Plan] was originally written for 10 CFR Part 50 license applications. For DC and COL applications submitted under 10 CFR Part 52, the level of design information reviewed should be consistent with that of a final safety analysis report (FSAR) submitted in an OL application." Therefore, the information provided in TVA's Clinch River site OL application generally would be consistent with the level of detail provided in the mPower DC and COL applications.

Under the "One Design – One Review" approach, any design information in the OL application that is identical to corresponding design information in the earlier DC application would not need to be re-reviewed during the OL review. Instead, the staff reviewers for the OL application could rely upon the earlier review performed by staff as part of the DC review. This reliance would be particularly justified if the NRC has issued the draft or final SERs on this design information as part of the DC review.

### **III. THE "ONE DESIGN – ONE REVIEW" APPROACH IS CONSISTENT WITH THE ATOMIC ENERGY ACT, NRC REGULATORY REQUIREMENTS, AND NRC POLICY**

As described above, TVA intends the "One Design – One Review" approach to be a method for ensuring consistency in and improving the efficiency of the review of identical mPower design information across applications. TVA does not intend for this review approach to alter the NRC's legal requirements in any manner.

The Atomic Energy Act of 1954, as amended, provides the statutory authority for all of the new reactor licensing activities discussed above for the mPower design. In particular, Section 103 of the Atomic Energy Act authorizes issuance of commercial licenses for production or utilization facilities. Neither Section 103 nor any other section of the Atomic Energy Act prohibits the “One Design – One Review” approach envisioned by TVA.

Additionally, the “One Design – One Review” approach would not alter the existing procedural regulatory requirements for the various types of applications. The details of how the NRC staff conducts its reviews of these applications are a policy matter and are not governed by regulation. Thus, the NRC staff’s use of a single review of identical design issues across applications does not impact the public participation requirements in NRC regulations. For example, mPower design information reviewed by the NRC staff as part of the CP application would be subject to the CP hearing process with an opportunity for the public to challenge this information. If identical information is provided in the DC application, then the information still would be subject to the public comment process during DC rulemaking, even if it is not re-reviewed by the staff. The staff’s reliance on its earlier review of the identical information would not alter the public participation aspects of these licensing proceedings.

In this regard, TVA would not be seeking any additional legal finality for the mPower design than already is granted by the NRC regulations. The regulations in 10 CFR Part 52 provide finality for DC information that is either copied or incorporated by reference in a COL application referencing the DC. In other words, if design information is reviewed and approved as part of the DC, then that information cannot be changed or challenged in the COL proceeding under most circumstances. The regulations do not provide, and TVA would not seek, this level of finality for scenarios in which the DC information is not incorporated by reference in this manner. Therefore, TVA’s licensing approach is consistent with NRC regulatory requirements.

The “One Design – One Review” approach also is consistent with NRC guidance and policy. In particular, this approach is an extension of the design-centered review approach (“DCRA”) set forth in Regulatory Issue Summary (“RIS”) 2006-06, “New Reactor Standardization Needed to Support the Design-Centered Review Approach” (May 31, 2006). Under the DCRA, a reference COL (“R-COL”) application sets forth standardized application content. A subsequent COL (“S-COL”) application then identifies content that is the same as that in the R-COL application. As stated in RIS 2006-06: “The DCRA permits significant streamlining of S-COL application reviews because standardization results in the review becoming a verification that the previously completed R-COL application review applies to S-COL applications rather than being a unique review.” Similarly, in SECY 2006-0187, “Semiannual Update of the Status of New Reactor

Licensing Activities and Future Planning for New Reactors” (Aug. 25, 2006), the NRC explained (page 17):

The staff’s DCRA strategy is based on a concept of industry standardization of COL applications referencing a particular design (e.g., COL applications referencing either the AP1000, ESBWR, ABWR, or EPR reactor designs). This approach will use, to the maximum extent practical, a “one issue, one review, one position” strategy to optimize the review effort, the resources needed to perform these reviews, and the review schedules. In effect, the staff will conduct one technical review for each reactor design issue and use this one decision to support the decision on a DC and on multiple COL applications.

The R-COL/S-COL process utilized in current COL applications appears to be working as designed and having the desired benefits.

The underlying legal issues for the “One Design – One Review” approach envisioned by TVA are the same as those for the DCRA approach using R-COLs and S-COLs. Consistent with the strategy described above, the NRC staff would conduct one technical review for each reactor design issue for the mPower reactor. Specifically, TVA’s Clinch River OL application and the Generation mPower DC application would identify information that is the same as that provided in the earlier applications containing mPower design information. Under these circumstances, the staff should be able to verify that the content is the same, rather than re-review the content. TVA envisions the “One Design – One Review” approach to be an extension of the DCRA approach to include relevant Part 50 applications in addition to the Part 52 applications typically discussed with respect to the DCRA. This approach should result in the significant benefits described below.

The Commission encouraged standardization of reviews of a reactor design in its 2008 policy statement on the licensing of new reactors. See Policy Statement, Conduct of New Reactor Licensing Proceedings, 73 Fed. Reg. 20,963 (Apr. 17, 2008). In particular, Section II.B of the policy statement addresses treatment of generic issues in multiple applications. See 73 Fed. Reg. at 20,971-973. The Commission stated that it “believes that generic consideration of issues common to several applications may well yield benefits, both in terms of effective consideration of issues and efficiency.” 73 Fed. Reg. at 20,971. The Commission also stated: “If a COL applicant adopts an approach to a technical issue previously found acceptable, no further staff review of the adequacy of the approach is necessary.” 73 Fed. Reg. at 20,973 (emphasis added). While the policy statement focuses on DC and COL applications, the same principles apply

to applications related to the mPower design. TVA's proposed "One Design – One Review" approach is supported by the Commission's policy statement.

#### **IV. BENEFITS OF THE "ONE DESIGN – ONE REVIEW" APPROACH**

Use of the "One Design – One Review" approach offers important benefits to NRC, TVA, Generation mPower, and the public. First, and perhaps most importantly, this approach would result in standard and consistent reviews by the NRC staff based on the same information. For example, under this approach a conclusion made during the NRC staff's review of specific design information during the DC review would be relied upon during the OL review, which would prevent a different conclusion from being reached on the same design information. This consistency would result in less uncertainty and a more stable licensing process from the perspective of applicants and the public.

Additionally, the "One Design – One Review" approach would result in more efficiency and less complexity during the reviews of the CP, OL, and DC applications related to the mPower design. This increased efficiency and reduced complexity could translate into less NRC staff resources needed for reviewing the applications, which could in turn result in shortened licensing reviews and decreased costs to the NRC and applicants.

The "One Design – One Review" approach also would encourage standardization among projects using a similar design. Standardization has many benefits, including those discussed above. Standardization also can result in enhanced safety, reliability, and availability of nuclear power plants.