Enhancing ITAAC for SMRs

NRC Public Meeting

November 19, 2013

Vision for ITAAC for SMRs

Develop an enhanced ITAAC framework for SMRs that improves clarity, predictability, efficiency and effectiveness by incorporating lessons learned and reflecting unique SMR features.

Potential benefits from improved ITAAC for SMRs

- More efficient DCA development and NRC review
- Ensure focus on top level design and performance characteristics
- More consistent and effective implementation
- Reduce bow-wave of ITAAC closure

Proposed approach toward making improvements

- Begin with the end in mind - Implementation and verification
- Apply lessons learned from first generation ITAAC
  - Use best, standard language
  - Ensure clarity, workability
- Enhance consistency
  - Standardization for maximum clarity, efficiency and predictability
- Reflect SMR unique features
  - Modular design/construction
  - Increased factory fabrication
- Improve manageability of ITAAC process
  - Mitigate bow-wave in ITAAC completion
- Consider alternate approaches consistent with Part 52 requirements

Opportunities for ITAAC improvements

1. Phased DCA submittal
2. Standardized ITAAC
   a) ITAAC scope
   b) ITAAC categories
   c) ITAAC standard language

PHASED DCA SUBMITTAL

Concept of DCA Phased Submittal

- DCA submittal in phases envisions submittal of Tier 1 at an appropriate time following submittal of Tier 2 (e.g., 9 -12 months)
  - Tier 1 contains no new design information
  - Review guidance in SRPs and DSRSs instruct the NRC staff to review Tier 1 after completing initial review of Tier 2
  - Part 52 experience indicates potential efficiencies by reviewing Tier 1 after the Tier 2 design review has reached a more mature state
  - SMR design certification applicants could submit Tier 1 following Tier 2 submittal in a timeframe to facilitate this process and secure potential DCA review efficiencies

Benefits of Phased Submittal

- Potential resource savings through review efficiencies and less cycling of DCA revisions and NRC re-reviews
- Follow-on Tier 1 submittal would reflect the more mature state of the Tier 2 information based on design review
- Focus the initial review on the design of SSCs and associated safety analysis

Areas to Develop for Proposed Approach

- Timing of Tier 1/ITAAC submittal following Tier 2
- Protocols for phased DCA submittal process
- DCA acceptance review guidance
- Technical review guidance, if necessary

SCOPE OF ITAAC

Scope of ITAAC

- Begin with first principles to improve criteria for determining if ITAAC is needed
  - Top Level characteristics that verify the plant is constructed and will operate as licensed
  - Rooted in DC Policy papers (e.g. SECY 90-241); reflected in SRP 14.3
- Enhance integration with other required programs/ processes (e.g., QAP, Initial Test Program, Operational Programs) for verification of more detailed characteristics
- Assure that together with other NRC requirements, ITAAC provide reasonable assurance that the plant has been constructed and will be operated in conformity with the license, etc.

Benefits of Clarified ITAAC Scope

- Assure that ITAAC are safety focused on top level design and performance characteristics
- Assure consistency with ITAAC principles
- Improved clarity, predictability, and efficiency during the application and review process
- Assure safety-focus of NRC ITAAC verification process

Areas to Develop for Proposed Approach

- Establish objective and clear criteria for determining whether an ITAAC is necessary
  - Based upon first principles
  - Factoring unique features of SMRs
  - Considering other NRC required programs/processes
- Establish scope of standard ITAAC
  - Based upon established criteria
  - To be augmented as appropriate to address design-specific SSCs

CATEGORIES OF ITAAC

Concept of SMR ITAAC Categories

Design			As-Built Inspections and Tests				
Design Completion	EQ	Analysis	Factory/ Module Facility		On-Site Construction		Pre-op
			Insp.	Test	Insp.	Test	Test

- Aid in development, understanding and management of ITAAC
- Facilitate discussion of appropriate SMR ITAAC scope

Design ITAAC

- As-built inspections and tests are not required
- Examples are:
  - Design completion: ASME Section III Piping Design
  - EQ: Valve functional qualification
  - Analysis: Leak before break analysis report

Factory/Module Facility ITAAC

- ITAAC performed and closed prior to installation in final plant location for SSCs/modules meeting established criteria (TBD)
- Controlled factory environment for fabrication, testing, and inspection
- ITAAC Maintenance requirements apply following ITAAC closure
- Builds upon existing approved guidance (NEI 08-01) allowing ITAAC to be performed at factory/vendor shop
- Helps to flatten ITAAC closeout bow wave
- Examples:
  - ASME design reconciliation
  - ASME Section III piping systems hydrostatic test
  - Class 1E electrical equipment physical separation inspection
  - Equipment qualification inspection

On-Site Construction ITAAC

- ITAAC performed after SSCs installed in the plant
  - Similar to existing as-built ITAAC
- Construction ITAAC performed on-site
  1. ITAAC type was not fully executed at factory/module facility

  or
  2. ITAAC requires SSC configuration not available at factory/module facility
- Examples:
  1. ITAAC partially performed at factory/module facility
     - ASME design reconciliation
     - ASME Section III piping systems hydrostatic test
     - Class 1E electrical equipment physical separation inspection
     - Equipment qualification inspection
  2. ITAAC without SSC configuration available at factory/module facility
     - Flood analysis reconciliation (requires as-built structure)
     - Class 1E divisional power test (requires as-built cables terminated at class 1E component)

Pre-Op Test ITAAC

- Pre-operational test ITAAC performed after
  - SSCs installed in plant, and
  - Associated system turned over to start-up organization
- Executed using pre-operational test procedure
  - Abstract described in FSAR Section 14.2
- Approved pre-operational test procedure contains evidence the ITAAC has been executed
- Examples
  - ASME Section III containment integrated leak rate test
  - Containment isolation valve closure time
  - Electrical equipment design capacity (e.g. battery discharge test)

Areas to Develop for Proposed Approach

- Categorize expected ITAAC for SMRs
- Provide examples on how ITAAC in each category would work
- Establish characteristics for ITAAC to be closed at the factory/module facility
- Identify use of categories for improving ITAAC scope
- Revise NEI 08-01

STANDARDIZED LANGUAGE

Concept of Standard ITAAC Language

- Numerous ITAAC types common to all designs, e.g., ASME, EQ, Separation, etc.
- Sources of guidance on ITAAC best practices:
  - NRC Regulatory Issue Summary 2008-05, Revision 1
  - Recent and pending design certifications
- Use of state-of-the art ITAAC will maximize clarity, workability, and consistency of ITAAC implementation

Benefits of Standard ITAAC Language

- Improved clarity of ITAAC
- Improved consistency across disciplines and DCs
- Improved clarity during ITAAC closure

Areas to Develop for Proposed Approach

- Develop standard language for a range of common ITAAC types
  - Lessons learned from previous DCA and current ITAAC implementation

PATH FORWARD FOR DEVELOPING IMPROVEMENTS

Actions and Schedule on Phased DCA

- Jan 2014 – NEI white paper on Phased DCA submittal
- NRC Public Meetings in early 2014 as needed
- March 2014 – NRC feedback to confirm Phased DCA submittal is viable, and discuss process

Additional Actions

- 1st Quarter 2014
  - Industry white paper on Standard ITAAC (scope and categories)
  - Discussions on related issues
    - Common ITAAC
    - Minimizing DAC
    - Standardized Tier 1 Form and Content
    - More efficient review of Tier 1/ITAAC
- 2nd Quarter 2014
  - Standard ITAAC language