

## Application of Standardized ITAAC to the APR1400 Design Certification

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### 1. Introduction

Design certification applications (DCAs) submitted pursuant to 10 CFR Part 52 contain two tiers of information, Tier 1 and Tier 2. Tier 1 contains information that is to be certified through rulemaking, and includes the inspections, tests, analyses, and acceptance criteria (ITAAC). Tier 2 contains more detailed information and is the source for information included in Tier1 [1].

DC applicants have developed the ITAAC with their own format and contents. This has caused the ineffectiveness of the review process by Nuclear Regulatory Commission (NRC) at the design certification stage. Standardizing the format and content of Tier 1 and ITAAC will achieve greater efficiency and effectiveness for Tier 1 and ITAAC development and NRC review, and for ITAAC implementation and verification. Nuclear Energy Institute (NEI) and US industry have discussed with NRC on the development of standardized ITAAC for light water reactors (LWR) designs from 2013 through public workshops. With this effort, NEI issued the generic guidance for design certification applicants to develop Tier 1 and ITAAC for new nuclear plants on May, 2015. And the letter was issued by NRC of transmitting the standardized DCA ITAAC that may be used in a design certification application of APR1400 on August, 2016.

KHNP is considering to apply the standardized ITAAC proposed by NRC to APR1400 design certification application.

### 2. Standardized ITACC

Standardized ITAAC are established based upon the common technologies and features LWRs employ to comply with NRC requirements. In developing standardized ITAAC, a review of over 5,000 ITAAC included in previous applications was performed. Majority of ITAAC for previously certified LWR designs are common to all LWR designs. Thus, it is possible to generalize these design-neutral ITAAC to improve standardization in future DCAs [1].

Table 1: Table format of standardized ITAAC

No.	ITAAC Category/ Type	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
AXX	xxxx...	xxxx...	xxxx...	xxxx...
	Tier 2 Section 14.3 Discussion of ITAAC Implementation xxxx...			

Standardized ITAAC consists of table providing the scope and language for standardized ITAAC that are expected to be applicable to LWR design certification applications. Table 1 shows the table format of standardized ITAAC. Each standardized ITAAC is shown with five columns. The two left columns are included to reference and identify the standardized ITAAC; and are not included in the DCA. The three right columns are the standardized ITAAC that are to be incorporated and adapted as appropriate into a DCA. The row below the standardized ITAAC contains a discussion to further clarify the scope of the ITAAC that should be considered for inclusion in Tier 2 Section 14.3; this discussion is not to be included in Tier 1. Standardized ITAAC are grouped by technical discipline as shown in the Table 2.

Table 2: Category and number of standardized ITAAC

Category	Total ITAAC	ITAAC needs to be discussed
ASME (A)	9	3
Containment (C)	6	2
Electrical (E)	30	26
Fire Protection (F)	7	3
Human Factors Engineering (H)	2	0
Hazard Barrier (HB)	5	0
Instrumentation and Control (I)	25	0
Mechanical (M)	34	14
Qualification (Q)	10	2
Radiation Protection (R)	11	3
Structural (S)	9	5
Total	148	58

Although NEI, US industry, and NRC have discussed to develop the standardized ITAAC, all of the ITAAC was not discussed for acceptance. 58 NRC proposed standard ITAAC still needs to be discussed and checked by NEI and US industry for NRC endorsement. And approximately 54 COL/ESP ITAAC that have not yet been discussed with the NRC still need to be discussed in the near future.

A meeting with NRC will be needed to review the standardized ITAAC as it applies to APR1400 and ultimately come to some agreement with the NRC staff. Before a meeting, we need to review the proposed standardized ITAAC by NRC to determine if we should accept the NRC proposed ITAAC as-is; or propose a revision to the NRC proposed ITAAC; or develop a rationale for not including the NRC proposed ITAAC. Given the APR1400 DCA review status we need to gain a support from NEI and US industry. And the review

results with NRC would be provided as input to the US industry standard.

### 3. ITAAC for Design Certification

#### 3.1 First Principles for Tier 1 Design Descriptions and ITAAC

General criteria that provide clarity on the scope and level of detail of Tier 1 Design Descriptions and ITAAC have been expressed in several NRC policy papers and guidance documents are consolidated and grouped into a set of First Principles. These First Principles are described in the NEI industry guideline [1] and should be applied in determining whether any design-specific ITAAC are necessary. First Principles are used as guidance for identifying Tier 1 Design Descriptions and ITAAC in DCAs that are “necessary and sufficient to provide reasonable assurance” that an as-built facility will operate in conformance with the NRC regulations and the license.

#### 3.2 Standardized ITAAC

Standardized ITAAC represent the scope of top-level design features and performance characteristics common to all LWR designs. The process to determine the required ITAAC for the given design is as follows:

First, the standardized ITAAC against the Tier 2 design information should be reviewed to determine which standardized ITAAC are applicable to a particular SSC. This review should be performed on a system by system basis.

Second, the bracketed information identified by [] in the standardized ITAAC should be filled with the appropriate design information.

ITAAC are constructed with simple language and avoid unnecessary detail to minimize ambiguity and assure a focus on the top-level design feature or performance characteristic to be verified. To assure a clear understanding of the intent of design certification ITAAC, additional information in each ITAAC should be provided in Tier 2 Section 14.3. After determining of application for each standardized ITAAC, the information in Tier 2 Section 14.3 of APR1400 needs to be check and modified, if necessary.

#### 3.3 Design-Specific ITAAC

Not all standardized ITAAC may be applicable for a particular design. Design-specific ITAAC may be needed for some designs. The largest category of design-specific ITAAC is expected to stem from risk-significant functions that are performed by non-safety-related SSC. Design-specific ITAAC may also be necessary for innovative top-level design features and performance characteristics that are unique to the DCA.

Although the NRC provided the proposed standardized ITAAC, design-specific ITAAC will still be necessary for a complete set of ITAAC required in a design certification application.

### 4. Conclusions

NRC provided the proposed standardized ITAAC for APR1400, and KHNP is considering the application of the proposed ITAAC. The strategy for application of the NRC proposed standardized ITAAC to the APR1400 design certification is now under developing, and a meeting with NRC to review the NRC proposed standardized ITAAC is expected to be held in the near future. In this review process, establishment of industry position on the NRC proposed standardized ITAAC is very important. The support from NEI and US industry is expected to be gained. The lessons learned from the application of NRC proposed standardized ITAAC for APR1400 will also be beneficial for the US industry use.

### REFERENCES

- [1] NEI, NEI 15-02 Draft A of Revision 0, “Industry Guideline for the Development of Tier 1 and ITAAC Under 10 CFR Part 52,” May 2015.
- [2] USNRC, “Transmittal of Standard Inspections, Tests, Analysis and Acceptance Criteria,” August 2016.
- [3] J. K. Kim, et al., “ITAAC Development for APR1400 NRC Design Certification,” Trans. Of the KNS Autumn Meeting, Gyeongju, Korea, October 24-25, 2013
- [4] NEI, NEI 08-01 Revision 5, “Industry Guideline for the ITAAC Closure Process Under 10 CFR Part 52,” July 2013.

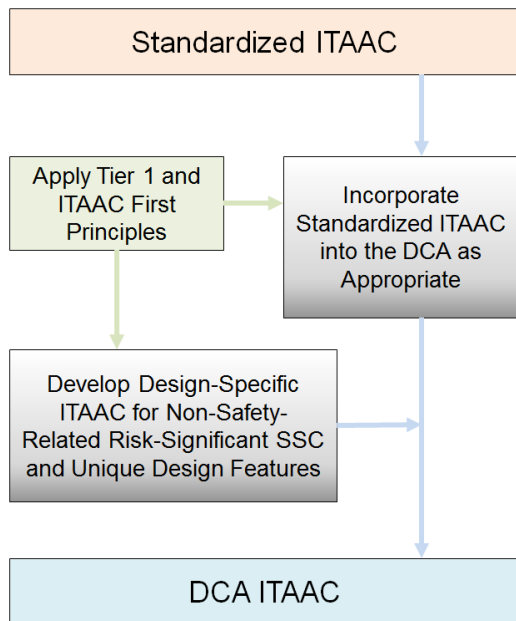


Figure 1. Development of ITAAC using standardized ITAAC