



**U.S. NRC**

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

# **The Role of ITAAC in Construction Inspection Program**

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# Construction Inspection Program

- Supports ITAAC completion/closure activities
- Supports review of licensees' operational programs
- Supports review of vendors
- Provides a basis for construction assessment
- Provides a basis for transition to ROP



# Construction Inspection Program

- Insights from Construction Experience Program
  - Review of domestic and international construction experience to prevent similar occurrences
  - International exchange
  - Generic communications
  - Influencing construction inspection program
- NRC R-II Center for Construction Inspection (CCI) leads inspections
- Technical staff support inspectors



# Construction Inspection Program

- **Guidance documents:**
  - IMC 2501: ESP
  - IMC 2502: Pre-COL
  - IMC 2503: ITAAC-related
  - IMC 2504: non-ITAAC inspections
  - IMC 2505: Periodic assessment of inspection results
  - IMC 2507: Verification of QA program – implementation and compliance
  - IMC 2508: Verification of QA program – preparation for certified design



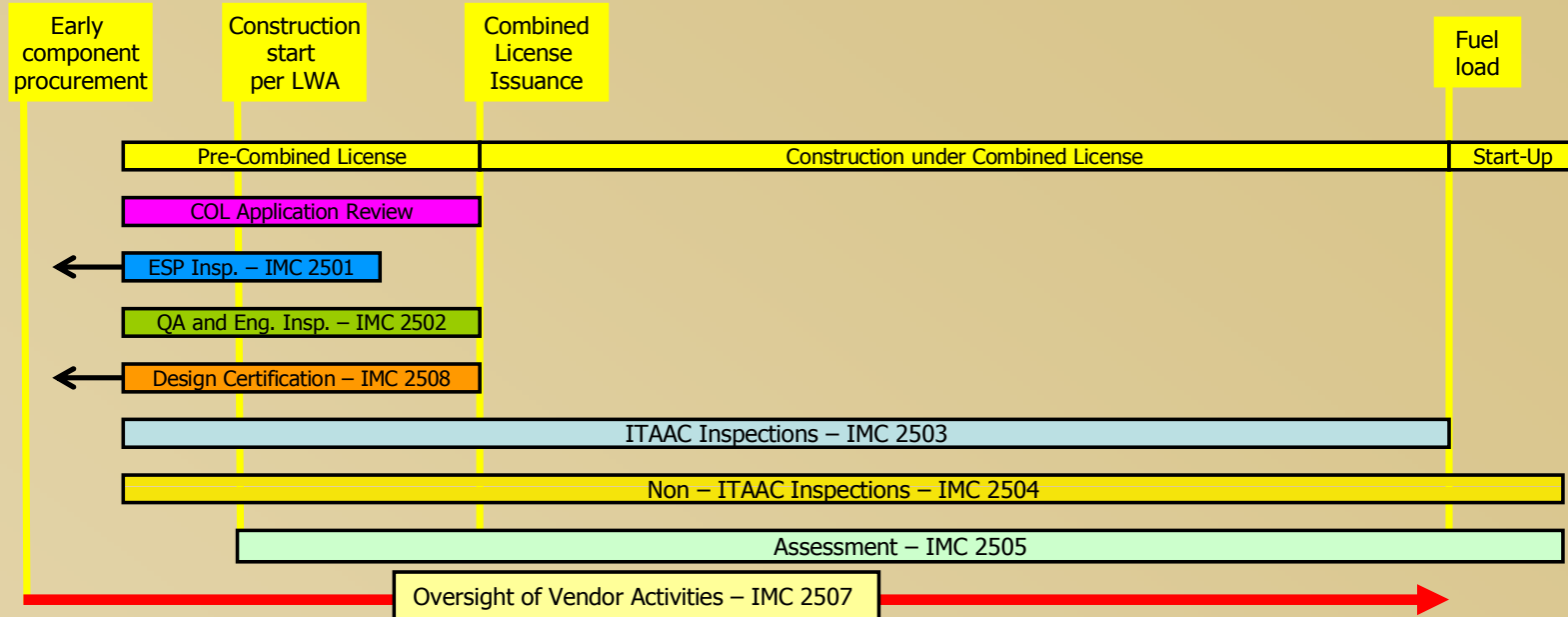
# Construction Inspection Program

- NRC uses a “sampling” approach to inspection
- NRC focuses on the identification of safety significant issues
- NRC fosters open communications with licensees
- NRC maintains its independence throughout the process



# NRC CONSTRUCTION OVERSIGHT HAS MULTIPLE COMPONENTS

*Oversight will assure plants are constructed as designed.*



## Abbreviations

ESP – Early Site Permit  
 IMC – Inspection Manual Chapter  
 ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria  
 LWA – Limited Work Authorization

## IMC 2501

-ESP QA controls on integrity & reliability of data collected for site characterization.  
 -ESP controls for application preparation

## IMC 2502

-QA for design, procurement, & construction  
 -Translation of certified design into design details  
 -COL controls for application preparation

## IMC 2503

Verification of successful performance of ITAAC-related activities

## IMC 2504

-QA for construction & operations  
 -Problem identification, reporting, & corrective action  
 -Work planning/control over work & contractors  
 -Translation of certified design into design details  
 -Design change process  
 -Pre-operational & startup testing  
 -Operational programs & operational readiness

## IMC 2505

-Guides inspection planning

## IMC 2507

- Verification of QA program implementation, compliance, reporting and corrective action

## IMC 2508

- Verification of QA program implementation for the preparation of a Certified Design.



## Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

- **ITAAC = ITA + AC**
  - Those inspections, tests, analyses, and acceptance criteria identified in the combined license that if met are necessary and sufficient to provide reasonable assurance that the facility has been constructed and will operate in conformity with the license, the provisions of the Atomic Energy Act, as amended, and the Commission's rules and regulations.





## **Regulatory Basis and Format of ITAAC**

- ITAAC are required by Part 52 and submitted by reactor vendors during the licensing process
- ITAAC verify that the plant has been constructed as designed and licensed
- ITAAC are reviewed and approved by NRC (AP1000 and ABWR are certified designs, while NRC is reviewing ESBWR, EPR, US APWR, and AP-1000 amendment)



# ITAAC Examples

<b>Design Commitment</b>	<b>Inspection, Test, Analysis</b>	<b>Acceptance Criteria</b>
The RCPs have a rotating inertia to provide RCS flow coastdown on loss of power to the pumps.	Inspection of the as-built RCP vendor data will be performed.	The calculated rotating inertia of 16,500 lb-ft <sup>2</sup> .
Pressure boundary welds in components identified in Table 2.1.3-1 as ASME Code Section III meet ASME Code Section III.	Inspection of the as-built pressure boundary welds will be performed in accordance with ASME Code Section III.	A report exists and concludes that ASME Code Section III requirements are met for NDE of pressure boundary welds.



## **ITAAC Closure Process**

- Licensee submits ITAAC closure notifications per 10 CFR 52.99 for each ITAAC
- NRC verifies closure of all ITAAC
- NRC documents ITAAC closure in a Federal Register Notice for each ITAAC
- After all the inspections, tests, and analyses in a COL were performed and all acceptance criteria in the COL are met, an affirmative Commission finding per 10 CFR 52.103(g) authorizes operation



# ITAAC Closure Notifications

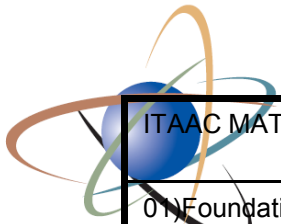
- Licensees submit ITAAC closure letters for each ITAAC per 10 CFR 52.99
- 10 CFR 52.99 requires licensees to submit sufficient information in the ITAAC closure notifications to allow a reasonable person to understand the logic why an ITAAC is considered closed
- Licensees are also required to submit sufficient information for how the uncomplete ITAAC will be completed 225 days before scheduled fuel load



## ITAAC Matrix/Families/Prioritization

- For each design, an ITAAC matrix is developed to group similar ITAAC into *families* for inspection planning purposes
- A formal prioritization process is used to select a sample of ITAAC for NRC inspection
- This prioritization process calculated an importance-of-inspection value for each ITAAC which was approved by the ACRS and Commission

# AP 1000 ITAAC Matrix Distribution



ITAAC MATRIX	A)As-Built Insp	B) Welding	C)ConstTesting	D)Opn Testing	E)Qual Criteria	F)Design/Fab Req
01)Foundations & Buildings	14				1	4
02)Struc Conc			1			
03)Piping	10	10	10	4		17
04)Pipe Spt & Restraints						8
05)RPV & Int'l's	7	2	1	2	1	4
06)Mech Comp	28	5	6	22	4	22
07)Valves	8	4	6	27	12	20
08)Elec Comp & Systems	15		5	24	8	8
09)Elec Cable	10		1			11
10)I&C Comp & Systems	61		35	63	16	9
11)Containment Integrity & Pen's	6			1	1	1
12)HVAC	11	3	3	14	2	10
13)Eqp Handle & Fuel Racks	6			5	3	3
14)Complex Sys w/ Multi-Comp	25			4	4	6
15)Fire Prot	7		1	2		
16)Engineering	5				2	10
17)Security	3				1	
18)EP						
19)Rad Prot	5				1	14

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## **Five Attributes of ITAAC Prioritization**

- Safety Significance
- Propensity for Errors
- Construction and Testing Experience
- Opportunity to Verify by Other Means
- Effectiveness of Licensee Oversight



## Results of ITAAC Prioritization

- AP-1000: A minimum of 233 (of 672) ITAAC will be directly inspected
- ABWR: A minimum of 383 (of 881) ITAAC will be directly inspected
- The NRC monitors licensee performance and can expand the selection of ITAAC samples based on poor performance
- All security-related ITAAC will be inspected





# Scheduling ITAAC Inspections

- R-II is leading a scheduling working group
- HQs is leading an Information Technology working group
- Licensee construction schedule



# Commission Authorization to Load Fuel per 52.103(g)

- Acceptance criteria for each ITAAC must be met at the time of the Commission finding
- NRC and stakeholders are developing a process to allow maintenance of closed ITAAC until the Commission finding
- After an affirmative Commission finding authorizes fuel load, the plant technical specifications and license conditions govern system operability requirements
- After the Commission 52.103(g) finding, ITAAC will no longer exist.



# Current Challenges

- Resolution of design acceptance criteria
- Impact of using construction modules (prefabrication) on the inspection process
- Obtaining a real and detailed construction schedule
- Continued development and refinement of construction assessment program



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