Construction Inspection Program Overview

Slide 1

I|20

Historical Two-Step Licensing Process (10 CFR Part 50)

Construction Permit

Application includes:
- Antitrust
- Environmental
- Preliminary safety analyses

ACRS Conducts Review
Hearing

Operating License

Application includes:
- Final safety analyses report
- Updated environmental report

ACRS Conducts Review
Hearing

slide 1A

PART 50 INSPECTION PROGRAM

IMC - 2511: Light Water Reactor Inspection Program - Pre-CP Phase

- Approximately 25 Inspection Procedures

IMC - 2512: Light Water Reactor Inspection Program - Construction Phase

- Approximately 90 Inspection Procedures

IMC - 2513: Light Water Reactor Inspection Program - Preoperational Testing and 0perational Preparedness Phase

- Approximately 175 Inspection Procedures

IMC - 2514: Light Water Reactor Inspection Program - Startup Testing Phase

- Approximately 55 Inspection Procedures

Alternative Licensing Process

Licensing Goals:

- provide opportunity for public participation at the design stage and prior to siting and construction of nuclear power plants
- assure design certification complete prior to starting construction
- resolve safety and environmental issues before authorizing construction
- resolve inspection requirements and acceptance criteria before authorizing construction
- encourage standardization of nuclear plants
- reduce financial risk for holders of a combined license

10CFR Part 52 Licensing Process

Standard Design Certification

Early Site Permit

Combined License

PART 52 INSPECTION PROGRAM

IMC - 2501: Inspections to Support Issuing Early Site Permit
- 5 Inspection Procedures

IMC - 2502: Inspections to Support Issuing a COL
- 9 Inspection Procedures

IMC - 2503: Inspections of ITAAC - Related Construction Activities
- 25 Inspection Procedures being developed

IMC - 2504: Inspections of Non ITAAC - Related Construction Activities
- Approximately 150 Inspection Procedures being developed

Early Site Permit (ESP)

Early Site Permit (ESP)

NRC decision that a proposed site is suitable for construction and operation of a nuclear power plant or plants

- demonstrates the suitability of a site for construction and operation of a nuclear power plant without having to define and evaluate the acceptability of a particular plant design
- reduces licensing uncertainty by resolving site-related issues early in the licensing process
- allows an applicant to "bank" a site
- 10 - 20 year duration

Early Site Permit - NRC Review

Site Safety Review

Seismology
Geology
Hydrology
Meteorology
Geography
demography (population distribution)
site hazards evaluation

Emergency Preparedness Review

Environmental Protection Review

Inspection Manual Chapter - 2501, "Early Site Permit"

Establishes guidance for NRC inspection activities associated with review of an ESP application

Five inspection procedures verify that an adequate quality assurance framework governs the data and analyses supporting ESP application

Inspections begin when NRC is formally notified that an Applicant is preparing an ESP application

Inspections related to MC-2501 complete when ESP issued

NRC ESP Inspection Activities

Pre-Application Site Visit

- observe pre-application subsurface investigation activities conducted by the Applicant to obtain geotechnical/seismic soil data
- provides useful background information for future NRC review of ESP application

Post-Docketing ESP QA Inspection

- ascertain whether applicant's ESP QA controls provide reasonable assurance of the integrity and reliability of ESP data/analyses
- provides assurance that technical data/analyses associated with ESP application were properly developed and maintained

Design Certification (DC)

Standard Design Certification

NRC certification that a plant design is acceptable

certified design is appendix to 10 CFR Part 52

reduces licensing uncertainty by resolving generic design issues

facilitates standardization

15 year duration

ITAAC

- Inspections, tests, analyses and their respective acceptance criteria
- "Necessary and sufficient to provide reasonable assurance .... that the facility has been constructed and will operate in conformity with the combined license, the Atomic Energy Act and NRC regulations." 10 CFR 52.79(c)
- ITAAC are specifically stated in the certified design
- "Prior to operation of the facility, the Commission shall find that the acceptance criteria in the combined license are met." 10 CFR 52.103(g)

Table 2.2.3-4
ITAAC For Passive Core Cooling System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the PXS is as described in the Design Description of this Section 2.2.3.	Inspection of the as-built system will be performed.	The as-built PXS conforms with the functional arrangement as described in the Design Description of this Section 2.2.3.
2.a) The components identified in Table 2.2.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built components as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built components identified in Table 2.2.3-1 as ASME Code Section III.
4.a) The components identified in Table 2.2.3-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.	A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested.	A report exists and concluded that the results of the hydrostatic test of the components identified in Table 2.2.3-1 as ASME Code Section III conform with the requirements of the ASME Code Section III.
11.a) Controls exist in the MCR to cause the remotely operated valves identified in Table 2.2.3-1 to perform their active function (s).	i) Testing will be performed on the squib valves identified in Table 2.2.3-1 using controls in the MCR, without stroking the valves.	i) Controls in the MCR operate to cause a signal at the squib valve electrical leads that is capable of actuating the squib valve.

ITAAC COMPLIANCE

In the event that an applicant or licensee has not demonstrated compliance to a required ITAAC, the applicant or licensee may either:

- take corrective actions to successfully complete that ITAAC
- request an exemption from the ITAAC in accordance with the Design Certification rule and 10 CFR 52.97(b), or
- petition for rulemaking to amend the Design Certification rule by changing the requirements of the ITAAC

Combined Construction Permit and Conditional Operating License (COL)

Combined License (COL)

COL - combined construction permit and conditional operating license for a nuclear power plant

may reference an ESP, a standard design certification, both, or neither

objective is to resolve all safety and environmental issues before authorizing construction

prior to fuel load, NRC must verify that the facility has been constructed in accordance with COL

fundamental licensing process in Part 52 for reducing regulatory risk associated with building nuclear power plants

Inspection Manual Chapter - 2502, "Pre-Combined License (Pre-COL) Phase"

Establishes inspection policy and guidance for NRC inspection during review of Combined License (COL) applications submitted under 10 CFR Part 52

Inspection procedures focus on:

- Quality assurance program
- Control of contractors
- Site work permitted by limited work authorization
- Design engineering

Inspection of Quality Assurance Program (Prior to Issuing COL)

Review of the QA manual shall be performed by NRO, in accordance with the Standard Review Plan

Review of QA program implementation shall be performed by a team led by the lead region

Significant inspection findings related to QA implementation should be resolved with NRO

Design Engineering Inspection

Design engineering inspections for the lead plant of a certified design will be conducted to:

- verify that the high-level certified design information is properly translated into lower-tier construction/design documents

- verify that regulatory requirements are correctly implemented in the design control processes, including the design change process

Design engineering team inspections will be composed of experienced design engineers led by either NRR or the lead region

Inspection Manual Chapter - 2503, "Inspections, Tests, Analyses, and Acceptance Criteria"

Describes the NRC policy and the 25 core inspection procedures that assure that the acceptance criteria specified in the combined license have been met

Inspection results are the foundation of the staff's recommendation to the Commission regarding ITAAC completion

Inspections directed by MC 2503 begin when ITAAC-related work is initiated

Inspection Manual Chapter - 2504, "Non-ITAAC Inspections"

Establishes NRC policy and identifies NRC Inspection Procedures for inspecting licensee QA program, construction programs, engineering design change process, pre-operational and start-up testing, and overall operational readiness

Inspections begin when COL application is submitted and continues until transition to MC-2515, "Light-Water Reactor Inspection Program - Operations Phase," and the reactor oversight process (ROP) is complete

Construction Inspection Program

inspections to support a licensing decision for an early site permit

inspections to support a licensing decision regarding a combined license application

inspections to determine whether construction activities supporting ITAAC have been successfully completed

inspections to determine whether the pre-operational test program has been successfully developed and implemented

inspections to determine whether operational programs have been successfully developed and implemented

inspections to determine whether preparations for plant operation have been successful

Design Control Document (DCD)

Tier 1 Information

Definition: That portion of the design-related information contained in the DCD that is approved and certified by the NRC

Tier 1 information includes:

- Definitions and general provisions
- Design descriptions
- Inspections, tests, analyses, and acceptance criteria
- Significant site parameters
- Significant interface requirements

Tier 2 Information

Definition: That portion of the design-related information contained in the DCD that is approved but not certified by the NRC

Tier 2 information includes:

- Information required by 10 CFR 52.47, with the exception of generic technical specifications and conceptual design information
- Information required for a final safety analysis report (FSAR)
- Supporting information on the inspections, tests, analyses that will be performed to demonstrate that the acceptance criteria in the ITAAC have been met
- Combined license (COL) information which identify certain matters that shall be addressed in the site-specific portion of the FSAR

DCD Change Process

	TIER 1	TIER 2*	TIER 2
Generic Changes	Rulemaking	Rulemaking	Rulemaking
Plant-Specific Changes	NRC Approval Exemptions	NRC Approval License Amendment	50.59-like Process

Training Exercise

As an inspector assigned to an AP1000 construction site, you are responsible for inspecting the Containment Critical Sections portion of ITAAC 3.3.2(a)(I). For that ITAAC identify the following:

1. Design basis loads
2. Pertinent drawings/diagrams associated with assigned structures
3. Design specifications
4. General description of assigned structures
5. Welding requirements
6. NDE requirements, if applicable
7. Shipping/receiving requirements
8. Applicable NRC inspection procedures

Inspections, Tests, Analyses, and Acceptance Criteria
ITAAC

ITAAC

- Inspections, tests, analyses and their respective acceptance criteria

- "**Necessary and sufficient**, within the scope of the standard design, to provide reasonable assurance that (if ITAAC are performed and met), the facility has been constructed and will be operated in accordance with the design certification, the provisions of the Act, and the Commission's regulations."

  10 CFR 52.54(a)(5).

ITAAC

- "The NRC shall ensure that (all) the prescribed inspections, tests, and analyses in the ITAAC are performed (correctly)."

  10 CFR 52.99(e)

- ."The licensee shall not operate the facility until the Commission makes a finding that the acceptance criteria in the combined license are met....."

  10 CFR 52.103(g)

ITAAC Format

Each ITAAC begins with Design Commitment (not part of ITAAC) + ITA + AC

Unique numbering (e.g., 1.a.i) = Unique ITAAC

Single Design Commitment may have multiple ITA

Individual ITA may have multiple AC

Certified ITAAC (by design) are standard

ITAAC (site-specific) vary between sites

NRC Numbering of ITAAC Example

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1 Following receipt of an initiation signal, the HPCF system automatically initiates and operates in the high pressure flooder mode to provide water to the core region of the reactor.	1 Tests will be conducted on each HPCF division using a simulated initiation signal. (OR) a. A test on Division 1. b. A test on Division 2	1 Upon receipt of a simulated ECCS initiation signal the following occurs: -The HPCF pump starts. -The RPV injection valve opens. (OR) a. (b.)The following HPCF Division 1 test results are achieved: i) Upon receipt of a simulated ECCS initiation signal, the Div 1 (2) HPCF pump starts ii) Upon receipt of a simulated LOP initiation signal, the Div 1 (2) RPV injection valve opens.

Differences in ITAAC terminology

Example: for "as-built" system configuration inspections

- AP 1000 "FUNCTIONAL ARRANGEMENT"

vs

- ABWR "BASIC CONFIGURATION"

AP 1000

First typical ITAAC for a system = "Functional Arrangement"

DEFINITION of a system's "Functional Arrangement":

"the physical arrangement of systems and components to provide the service for which the system is intended, and which is described in the system design description"

ITA + AC refer to the "as-built" system

AP 1000 Passive Core Cooling System (PXS)

Table 2.2.3-4
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The FUNCTIONAL ARRANGEMENT of the PXS is as described in the Design Description of Section 2.2.3.	Inspection of the as-built system will be performed.	The as-built PXS conforms with the functional arrangement as described in Section 2.2.3.
3.b) PRESSURE BOUNDARY WELDS in piping identified in Table 2.2.3-2 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds.
5.a) The SEISMIC CATEGORY I equipment identified in Table 2.2.3-1 can withstand seismic design loads without loss of safety function.	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that seismic Cat I equipment can withstand seismic loads without loss of safety function.
7.a) The CLASS 1E equipment identified in Table 2.2.3-1 as being qualified for a HARSH ENVIRONMENT can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	I) Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E equipment located in a harsh environment.	7.a) The CLASS 1E equipment identified in Table 2.2.3-1 as being qualified for a HARSH ENVIRONMENT can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
12.a) The MOTOR-OPERATED and check VALVES in Table 2.2.3-1 perform an active safety-related function to change position as indicated.	I) Tests or type tests of motor-operated valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	I) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.2.3-1 under design conditions.

ABWR

First typical ITAAC for a system = "Basic Configuration"

Verification for "Basic Configuration" of a system = "Functional Arrangement" + four additional ITA:

- - ASME pressure boundary weld inspections
- - seismic component qualification
- - environmental qualification (EQ)
- - motor operated valve (MOV) qualification

ABWR Example

ABWR High Pressure Core Flooder System (HPCF)

Table 2.2.3-4
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
The BASIC CONFIGURATION of the HPCF System is as shown in Figures 2.4.2a and 2.4.2b.	Inspection of the as-built system will be conducted	The as-built HPCF System conforms with the BASIC CONFIGURATION shown on Figures 2.4.2a and 2.4.2b.

AP 1000 vs. ABWR ITAAC Referencing

Some AP 1000 ITAAC reference other ITAAC for final acceptance

The ABWR does not use such full referencing ITAAC

AP 1000 Passive Core Cooling System (PXS)

Table 2.2.3-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.c) Separation is provided between PXS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.	See Tier 1 Material, Section 3.3, Nuclear Island Buildings.	See Tier 1 Material, Section 3.3, Nuclear Island Buildings.
8.a) The PXS provides containment isolation of the PXS lines penetrating the containment.	See Tier 1 Material, subsection 2.2.1, Containment System.	See Tier 1 Material, subsection 2.2.1, Containment System.

ITAAC Inspection Differences/Challenges

Each ITAAC inspection involves judgment:

- amongst the Part 52 designs
- within any individual design
- appropriate to each ITAAC wording

Some ITAAC delineate self-contained inspection requirements

Other ITAAC require review of references (Tier1/Tier2 material)

AP 1000 Passive Core Cooling System (PXS)

Table 2.2.3-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.b) The accumulator discharge check valves (PXS-PL-V028A/B and V029A/B) are of a different check valve type than the CMT discharge check valves (PXS-PL-V016A/B and V017A/B).	An inspection of the accumulator and CMT discharge check valves is performed.	The accumulator discharge check valves are of a different check valve type than the CMT discharge check valves.
10. Safety-related displays of the parameters identified in Table 2.2.3-1 can be retrieved in the MCR.	Inspection will be performed for the retrievability of the safety-related displays in the MCR.	Safety-related displays identified in Table 2.2.3-1 can be retrieved in the MCR.
12.a) The motor-operated and check valves identified in Table 2.2.3-1 perform an active safety-related function to change position as indicated in the table.	I) Tests or type tests of motor-operated valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	I) A test report exists and concludes that each motor-operated valve changes position as indicated in Table 2.2.3-1 under design conditions.
	iii) Tests of the as-installed motor-operated valves will be performed under preoperational flow, differential pressure, and temperature conditions.	iii) Each motor-operated valve changes position as indicated in Table 2.2.3-1 under preoperational test conditions.

The ITAAC MATRIX

ITAAC Matrix

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

What a Matrix Provides

An inspection planning tool for identifying ITAAC "families"

A methodology that establishes a consistent inspection process

[All ITAAC will be inspected, but not all ITAAC will be inspected equally.]

A format for organizing NRC inspection procedures (IP)

A link to the NRC Part 50 construction IP

Distribution of ITAAC into the Matrix

"Matrix "bins" = ITAAC "families"

Expert Panel convened for each certified design

Matrix row/column definitions used to bin ITAAC

"Binning" distribution assessed for coverage

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'ls	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	1

ABWR 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	12					
02)Struc Conc	5					
03)Piping	2	22	23		1	1
04)Pipe Spt & Restraints						1
05)RPV & Int'ls	3	2	2	1	2	5
06)Mech Comp	25		8	15	2	13
07)Valves			9	26	15	2
08)Elec Comp & Systems	74		64	4	12	30
09)Elec Cable	8					6
10)I&C Comp & Systems	88		3	161		2
11)Containment Integrity & Pen's	3	1	3	12	1	6
12)HVAC	22		1	7	16	1
13)Eqp Handle & Fuel Racks	4		1	3	1	3
14)Complex Sys w/ Multi-Comp	33			2	16	23
15)Fire Prot	5		2	2	4	2
16)Engineering	1				22	12
17)Security						
18)EP	3		2			
19)Rad Prot	3			10		5

The ITAAC Prioritization Process

ITAAC Prioritization Activities

Prioritization of ITAAC for 5 Inspection Attributes

Inspection attributes evaluated by "expert" panels

"Experts" selected from among:
- - NRC managers with construction inspection experience
- - NRR reviewers familiar with ITAAC and having Part 52 experience
- - Regional inspectors with construction interest/experience
- - PRA experts within NRR

ITAAC Inspection Attributes

Safety Significance

Propensity for Errors

Construction and Testing Experience

Opportunity to Verify by Other Means

Licensee Oversight

How the Expert Panels worked

NRC management panel convened one time only

Panel assigned weights to each of the five ITAAC inspection attributes

Weights independent of plant design

Expert Panels for other Attributes

Expert panels convened for the AP 1000 & ABWR ITAAC (to date)

Panels rated following four attributes by establishing the "**value of NRC inspection**" for each ITAAC

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

Licensee Oversight not rated at this time

SUMMARY

A mathematical program developed under NRC contract established an ITAAC prioritization methodology

The following expert panel results were input to the mathematical model:

- - the attribute weight assignments
- - the ITAAC inspection values for "safety significance"
- - the "value of inspection" for each of the three other ITAAC attributes

This ITAAC prioritization process established ranked "**values of inspection**" for both the AP 1000 and ABWR ITAAC

Use of the ITAAC Prioritization Results

"All ITAAC will receive sufficient NRC inspection to support a finding that the acceptance criteria have been met." (reference: 10 CFR 52.99)

ITAAC ranked by "value of inspection"

Ranked ITAAC selected as representative inspection sample

Sampling methodology permits acceptance of other ITAAC in a Matrix "family"

An additional "independent inspection" sample of ITAAC is required

Each licensee ITAAC completion package receives review by the NRC

Result: **All ITAAC will be inspected, but not all ITAAC will be inspected equally.**

Inspection Planning

IMC-2503 Construction Inspection Program: ITAAC

Core Inspection Program

"Process" & "Program" oriented

"Focus" on ITAAC

"Universe" of construction disciplines outlined

ITAAC Inspection Procedures

25 Core Inspection Procedures (IP)
-- developed from related Part 50 IP
-- established for adequate ITAAC coverage
-- related to pre-operational test criteria

Independent, yet complementary, inspections
-- each IP can be independently implemented
-- each "process" IP complements a "program" IP
-- inspections support ITAAC "family" sampling

IMC-2504 Construction Inspection Program: Non-ITAAC

Quality Assurance (QA) Program inspections

Construction Program inspections

Pre-Operational Test Program inspections

Operational Readiness Program inspections

IMC-2504 Construction Programs

Quality Assurance (QA)
-- Appendix B, NQA-1
-- corrective action, PI&R

Construction Controls
-- 10 CFR Parts 21 & 50.55(e)
-- licensee control of contractors
-- allegations

IMC-2504 Pre-Ops Programs

Pre-Operational Testing
- - program controls
- - test performance (non-ITAAC)
- - test criteria and results (non-ITAAC)

Operational Readiness
- - organizational: fire protection, security, RP, operator licensing
- - programmatic: EP, maintenance rule, ISI, EQ, Technical Specifications
- - Operational Readiness Assessment Team (ORAT) - IP 93806

ITAAC Inspections - IP 65001

Plan and perform inspections
- - IP 65001 attachments correlate to Matrix
- - 25 attachment IP = 25 core Matrix IP
- - IP conducted independent of each other

Review licensee procedures
- - NRC in-office inspection activity
- - procedure reviews throughout construction

Select ITAAC attributes for "direct inspection"
- - from "Targeted" ITAAC family samples
- - from "Independent Inspection" ITAAC

IP 65001 Terminology

"Direct Inspection"

"Direct inspection" of ITAAC entails any work observations, SSC field examinations, records review, or related inspection activities that provide an independent NRC verification of a particular ITAAC attribute selected for inspection.

"Direct inspection" may also include follow-up inspection checks; e.g., confirming that adequate corrective measures were taken for a problem identified during a work observation or checking that a material certification is correct if a conflict is identified in the work control documents.

ITAAC Planning Principles - IP 65001

Review IP and related ITAAC for the site design

Review design control document (DCD) and FSAR for applicable SSC

Select ITAAC "targets" in coordination with NRC Inspection Scheduler

Review CIPIMS data for related information

Scope out non-targeted ITAAC for independent inspection

Check that scope of the inspection is representative of ITAAC coverage (e.g., are all applicable programs and contractors covered?)

Review licensee procedures and follow up past procedural deficiencies

Inspection Flexibility - Example

ASME Class 1 piping erection

controls are uniformly governed by the Code

flexibility may be applied to piping inspection

examples of flexibility in piping selected for ITAAC review
- - work performed on "targeted" ITAAC?
- - work performed by an applicable contractor?
- - "independent inspection" sample prudent?

Result: Other ASME Class 1 piping can substitute for selected ITAAC sample within the Matrix "family" constraints

Inspection Coordination - Examples

IP 65001.03 (piping) - IP 65001.B (welding)
- - pipe installation “process” includes welding
- - welding “program” covers piping controls

IP 65001.01 (foundations and buildings) - IP 65001.02 (structural concrete)
- - seismic building design relies on concrete placement controls

IP 65001.D (pre-ops tests) – IMC-2504 Pre-Ops program controls
- - ITAAC test witness can be coordinated

Inspection Guideline Summary

"Targeted" ITAAC are subject to direct inspection

Conduct of the Matrix IP continues as long as:
- - the "process" or "program" is being implemented
- - until all "targeted" ITAAC have been inspected

The NRC Assessment program can impact the ITAAC selected for inspection

QA/PI&R - IP 65001

Programmatic inspections of QA effectiveness = IMC-2504

Implementation of QA/QC controls = IMC-2503
- - ASME NQA-1 work controls
- - Code test requirements
- - QA "hold points"

Problem Identification and Resolution (PI&R) program effectiveness = IMC-2504

Corrective actions to resolve an ITAAC observation or finding = IMC-2503

Off-Site ITAAC Inspections

[coordinated with the vendor inspection program - TBD]

Status of 10 CFR 52 Plant Readiness for Fuel Load

IP 94300 - role in 10 CFR 50 plant licensing

- - IMC-2512: construction inspection
- - IMC-2513: pre-operational testing & operational program readiness

IP 94300 - role in 10 CFR 52 plant licensing

- - IMC 2503: ITAAC status = required to support Commission's 10 CFR 52.103(g) determination
- - IMC-2504: non-ITAAC inspections = relevant to licensee's readiness to load fuel implement programs for the safe conduct of operation

Responsible Region reports Director of NRO

ITAAC Inspection Schedule

ITAAC INSPECTION

ITAAC ..... are necessary and sufficient to provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations (10 CFR 52.97 (b) (1))

Licensees complete 100% ITAAC verification during construction and submit closure letters to the NRC

NRC verifies closure of all ITAAC through an integrated review/inspection program, involving:

- sample inspection of the ITAAC (IMC-2503), focusing on related SSC during construction process & program verification activities
- audit of a licensee's ITAAC completion, closure, & letter preparation/approval process
- 100% review of the ITAAC closure letters

ITAAC SAMPLING

The ITAAC Matrix was developed to group the ITAAC into sampling "families", organized by:

- commonality of construction activities
- coverage of plant construction
- "process" & "program" inspections

For the AP-1000 & ABWR designs, the ITAAC were distributed into the Matrix families by NRC expert panels

For each design, the ITAAC were rank-ordered by NRC expert panels using attributes that focused on the value of inspection of each ITAAC

ITAAC ranked highly were selected for direct inspection as the "targeted" sample of ITAAC:

- 233/672 targeted ITAAC for the AP-1000
- 383/881 targeted ITAAC for the ABWR

INSPECTION SCHEDULING

- A generic AP-1000 NRC inspection schedule was developed, using a recent Westinghouse construction schedule to include:
  - major construction & licensing milestones
  - inspection of the 233 targeted ITAAC
  - other NRC planned inspection activities

- The generic AP-1000 schedule also includes:
  - Inspection-hour estimates for the ITAAC
  - Indication of NRC vendor inspection needs
  - Opportunity for NRC Division of Engineering review

- Sample sizes for the SSC associated with any of the targeted ITAAC were recommended for Region II consideration
- Region II is developing a more detailed protocol for the inspection of ITAAC families

ITAAC INSPECTION
(Level-of-Effort Estimates)

Earlier reviews (based upon Part 50 inspection procedures) for the inspection of the ITAAC for the AP-1000 & ABWR designs resulted in an estimate of 15,000 (± 1,500) inspection hours

Consistent with the development of the AP-1000 inspection schedule, the ITAAC inspection level of effort was re-assessed, using the following general categories of ITAAC inspection scope:

- 1 single point of inspection verification
- 2 walk-down, field verification, or report review
- 3 complex inspection requiring multiple trips
- 4 complex inspection involving diverse SSC

Using representative hours for each of the above categories, a new estimate for the NRC level of effort associated with the inspection of the AP-1000 was calculated = 14,812 hours

LEVEL-OF-EFFORT CONCLUSION

- An estimate of approximately 15,000 inspector-hours for ITAAC inspections for the AP-1000 design (IMC-2503) is a reasonable projection for NRC planning purposes
- This estimate does not include:
  - pre-COL activities (IMC-2501, IMC-2502)
  - post-COL pre-ops test & program reviews (IMC-2504)
  - NRO engineering resources
  - PI&R, allegations, or other follow-up inspections
- These additional inspection activities might add another 12,000 to 20,000 inspection hours to the CIP estimate for planning purposes
- A similar estimate for the ABWR level of effort required for NRC ITAAC inspections is currently under development

NRC INSPECTION DETAILS

ITAAC Number	Level of Effort	NRC Inspection Content (IP 65001)	DE Chk	Start/ Compl
2.1.2.8d.iii	1	Walk down ADS stage 4 valves and measure valve flow area. Inspection: A/C - Each 4th stage ADS valve flow area is satisfactory. IP:03 IP:A 100% review	X	1/1/15 - 5/1/15

NRC INSPECTION DETAILS

ITAAC Number	Level of Effort	NRC Inspection Content (IP 65001)	DE Chk	Start/ Compl
2.1.2.1	2	Inspection effort involves walk-down of completed RCS system. Functional arrangement is defined as the physical arrangement of systems and components to provide the service for which the system is intended, and which is described in the system design description. Inspection: A/C - As-built RCS system functional arrangement meets design description. IP:14 IP:A 100% review	-	1/1/15 - 4/30/15

Additional (Future) Training Topics

Inspection Documentation
- - IMC-0613

NRC Assessment Activities
- - IMC-2505

Enforcement Requirements