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UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Inspection of ITAAC Development Workshop 5

Richard Laura
Team Leader
Construction Inspection Program, DCIP/NRO

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Overview

- NRC Numbering of ITAAC
- Grouping ITAAC into matrix families
- Prioritization and selection for inspection
- Family closure strategy
- Inspection sample size for AP1000 and ABWR
- Site Specific ITAAC and recent ESBWR feedback
- Future ITAAC work

NRC Numbering of ITAAC

- NRC used the ITAAC numbering system provided in each design with some modifications to enhance inspection planning and implementation.
- NRC considered each separate ITAAC alphanumeric (down to the lowest level) as a separate ITAAC.
- Each ITAAC = Inspection, Test and Analysis (ITA) + Acceptance Criteria (AC) with the Design Commitment (DC) specified for clear reference
- A single DC may have multiple ITA; and also, an individual ITA may have multiple AC

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.

NRC Numbering of ITAAC (Cont'd)

- Examples of ITAAC split into several different ITAAC:

  -Each of the approx. 63 ABWR, basic configuration, system-related ITAAC were split into up to 5 separate ITAAC to capture: functional arrangement, ASME welds, Seismic, EQ and MOVs

  -AP1000 electrical separation, ITAAC 3.3.7d.

- Examples of ITAAC not counted since there was no inspection criteria:

  -There are approx. 77 reference-only ITAAC used in AP1000 which were not considered as separate ITAAC.

  -No-entry ITAAC were not counted.

- In the DCDs, for inspection purposes, NRC counted 672 ITAAC for AP1000 and 881 ITAAC for ABWR.

Basic Configuration – System Example

Design Commitment	**Inspection, Test, and Analyses**	**Acceptance Criteria**
The Basic Configuration of the HPCF system is as shown in Figures……	Inspection of the as-built system will be conducted.	The as-built HPCF system conforms with the Basic Configuration shown in Figures……..

Reference-Only Example

Design Commitment	Inspection, Test, and 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.

Discussion

- Industry use of a standard numbering system, for counting ITAAC for plants of same the design, could facilitate more efficient closure verification.

NRC Grouping of ITAAC

- 19 matrix rows – processes
- 6 matrix columns - programs
- The intersection of each row and column are called ITAAC *families* which have common characteristics and use the same inspection procedure.
- Observing performance of ITAAC activity within a family will provide insights that are applicable to the remainder of the family.

ABWR ITAAC Matrix Distribution

ITAAC MATRIX *[Dec. 2005"]*	A)As-Built Insp	B) Welding	C)Const Testing	D) Opn Testing	E)Qual Criteria	F)Design/ Fab Req	**ROW SUM**
01)Foundations & Buildings	12						**12**
02)Struc Conc	5						**5**
03)Piping	2	22	23		1	1	**49**
04)Pipe Spt & Restraints						1	**1**
05)RPV & Int ls	3	2	2	1	2	5	**15**
06)Mech Comp	25		8	15	2	13	**63**
07)Valves			9	26	15	2	**52**
08)Elec Comp & Systems	74		64	4	12	30	**184**
09)Elec Cable	8					6	**14**
10)I&C Comp & Systems	88		3	161		2	**254**
11)Containment Integrity & Pen s	3	1	3	12	1	6	**26**
12)HVAC	22		1	7	16	1	**47**
13)Eqp Handle & Fuel Racks	4		1	3	1	3	**12**
14)Complex Sys w/ Multi-Comp	33			2	16	23	**74**
15)Fire Prot	5		2	2	4	2	**15**
16)Engineering	1				22	12	**35**
17)Security							
18)EP	3		2				**5**
19)Rad Prot	3			10		5	**18**
COL SUM	**291**	**25**	**118**	**243**	**92**	**112**	**TOTAL 881**

AP1000 ITAAC Matrix Distribution

ITAAC MATRIX ***[Dec. 2005"]***	A)As-Built Insp	B) Welding	C)Const Testing	D) Opn Testing	E)Qual Crit	F)Design/ Fab Require	**ROW SUM**
01)Foundations & Buildings	14				1	4	**19**
02)Struc Conc			1				**1**
03)Piping	10	10	10	4		17	**51**
04)Pipe Spt & Restr						8	**8**
05)RPV & Int ls	7	2	1	2	1	4	**17**
06)Mech Comp	28	5	6	22	4	22	**87**
07)Valves	8	4	6	27	12	20	**77**
08)Elec Comp & Sys	15		5	24	8	8	**60**
09)Elec Cable	10		1			11	**22**
10)I&C Comp & Sys	61		35	63	16	9	**184**
11)Containment Integr & Pen s	6			1	1	1	**9**
12)HVAC	11	3	3	14	2	10	**43**
13)Eqp Handle & Fuel Racks	6			5	3	3	**17**
14)Complex Sys	25			4	4	6	**39**
15)Fire Prot	7		1	2			**10**
16)Engineering	5				2	10	**17**
17)Security	3				1		**4**
18)EP							
19)Rad Prot	5				1	1	**7**
COL SUM	**221**	**24**	**69**	**168**	**56**	**134**	**TOTAL 672**

AP1000 ITAAC Assigned to IP65001.06

Family 06A

As-Built Mechanical Components

ITAAC	Rank
2.2.02.07a.iii	0.160
2.2.02.07c	0.307
2.2.02.07f.ii	0.160
2.2.02.08a	0.160
2.2.03.08b.02	0.419
2.2.03.08c.ix	0.419
2.2.03.08c.v	0.419
2.2.03.08c.vi	0.419
2.2.03.08c.vii	0.419
2.2.03.08c.viii	0.419
2.2.03.08c.xi	0.419
2.2.03.08c.xiii	0.289
2.2.03.08d	0.289
2.3.02.08a.ii	0.124
2.3.03.03a	0.124
2.3.03.03b	0.124
2.3.03.03d	0.124
2.3.06.05a.i	0.124
2.3.07.07b.i	0.124
2.3.07.07b.ii	0.124
2.3.09.01	0.124
2.3.09.03.i	0.124
2.3.09.03.iv	0.124
2.3.10.05a.i	0.089
2.3.11.02.i	0.089
2.3.12.01	0.089
2.3.14.03	0.089
2.5.05.02.i	0.124

Family 06B

Welding Mechanical Components

ITAAC	Rank
2.1.02.03a	0.520
2.2.01.03a	0.520
2.2.03.03a	0.520
2.3.02.03a	0.225
2.3.06.03a	0.261

Family 06C

Construction Testing Mechanical Components

ITAAC	Rank
2.1.02.04a	0.289
2.1.02.08c	0.367
2.2.01.04a.i	0.419
2.2.03.04a	0.289
2.3.02.04a	0.089
2.3.06.04a	0.124

Family 06D

Operational Testing Mechanical Components

ITAAC	Rank
2.1.02.08b	0.497
2.2.02.07a.i	0.381
2.2.02.07b.i	0.400
2.2.02.07d	0.381
2.2.02.07e.ii	0.178
2.2.02.07f.i	0.178
2.2.03.08b.01	0.596
2.2.03.08c.i	0.569

Family 06D

Operational Testing Mechanical Components

ITAAC	Rank
2.2.03.08c.ii	0.562
2.3.02.08a.i	0.142
2.3.02.08a.iii	0.142
2.3.02.08b	0.089
2.3.02.12b	0.124
2.3.03.03c	0.142
2.3.06.09b.ii	0.178
2.3.06.09c	0.178
2.3.06.09d	0.178
2.3.07.08.ii	0.142
2.3.08.02.i	0.178
2.3.08.02.i	0.178
2.3.09.03.ii	0.219
3.3.10.i	0.497
3.3.10.ii	0.529

Family 06E

Qualification Criteria Mechanical Components

ITAAC	Rank
2.3.06.05a.ii	0.295
2.3.10.05a.ii	0.260
2.3.11.02.ii	0.260
2.5.05.02.ii	0.295

Family 06F

Design/Fab Requirements Mechanical Components

ITAAC	Rank
2.1.02.02a	0.532

Family 06F

Design/Fab Requirements Mechanical Components

ITAAC	Rank
2.2.01.02a	0.532
2.2.01.04a.ii	0.622
2.2.02.05c	0.300
2.2.02.07a.ii	0.381
2.2.02.07b.ii	0.402
2.2.02.07b.iii	0.402
2.2.03.02a	0.532
2.2.04.08b.ii	0.160
2.3.01.03.i	0.269
2.3.02.02a	0.237
2.3.03.02	0.277
2.3.03.02	0.277
2.3.06.02a	0.273
2.3.06.05a.iii	0.301
2.3.06.09b.i	0.287
2.3.07.08.i	0.252
2.3.08.02.ii	0.287
2.3.10.05a.iii	0.265
2.3.10.05a.iii	0.265
2.3.11.02.iii	0.235
2.3.11.02.iii	0.235
2.3.11.03a	0.124
2.3.12.02	0.089
2.5.05.02.iii	0.301

NRC Inspection Sample Results

- Sample size is based on having adequate inspection coverage of SSCs.
- The same threshold for selection was used for AP1000 and ABWR.
- AP1000 ITAAC inspection sample size is 233/672, approx. 35%; and ABWR sample size is 383/881, approx. 44%
- Reviewed and approved by ACRS and Commission
- NRC Region II is developing detailed inspection plans for each ITAAC family.

Family Closure Strategy

- Non-targeted ITAAC will be verified closed by reviewing each closure letter.
- Based upon inspection of targeted ITAAC in the associated matrix family and the resolution of any related ITAAC findings, the completed non-targeted ITAAC will be closed by a Federal Register notice (FRN).

Site Specific ITAAC

- Located in COL application
- Inspection sample rate will be ≥ to the sample rate for the ITAAC in the DCD
- Sample selection for system-related ITAAC will be based on two attributes: safety significance and verification by other means.
- EP and Security ITAAC will be inspected 100%

ESBWR DC ITAAC

- On 12/20/07, NRC issued a letter with requests for additional information for ITAAC in the ESBWR design certification application. (ADAMS ML073532238)
- The review was led by DNRL with input from all NRO divisions and OGC.
- Items 14.3-341 thru 388 focus specifically on ITAAC format, consistency and quality.

Future ITAAC Work

- Lessons learned on ITAAC quality and format in a generic communication to be issued by 3/31/08
- Review site specific ITAAC in COLAs
- Prepare for expert panels to develop matrix families and inspection samples for new designs
- ITAAC Closure Working Group