

NRC INSPECTION MANUAL

VPO

INSPECTION MANUAL CHAPTER 2503

**CONSTRUCTION INSPECTION PROGRAM:
INSPECTIONS OF INSPECTIONS, TESTS,
ANALYSES AND ACCEPTANCE CRITERIA (ITAAC)
RELATED WORK**

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CONSTRUCTION INSPECTION PROGRAM:
INSPECTIONS, TESTS, ANALYSES, AND
ACCEPTANCE CRITERIA (ITAAC)

2503-01 PURPOSES

01.01 To specify the policy used for the NRC's inspection of the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) of a combined license (COL) or Limited Work Authorization (LWA).

01.02 To provide guidance for inspections intended to support the determination, in accordance with Title 10 of the *Code of Federal Regulations* Part 52, Section 103(g) (10 CFR 52.103(g)), that the acceptance criteria in the combined license have been met.

2503-02 OBJECTIVES

02.01 To provide guidance to inspectors on inspection of ITAAC-related work activities.

02.02 To provide a sufficient basis to support the determination in accordance with 10 CFR 52.103(g) that the acceptance criteria in a combined license have been met.

2503-03 DEFINITIONS

03.01 Definitions can be found in Manual Chapter 2506.

2503-04 RESPONSIBILITIES AND AUTHORITIES

04.01 Office of Nuclear Reactor Regulation (NRR). The Director, NRR, has responsibility for:

- a. Providing the overall direction of the construction inspection program and directing the development and implementation of policies, programs and procedures for the construction inspection program.
- b. Providing inspector resources to support and augment regional inspector resources assigned to construction projects.
- c. Making the recommendation to the Commission regarding a determination pursuant to 10 CFR 52.103(g) that the acceptance criteria have been successfully completed.

04.02 Region II Office. The Regional Administrator has responsibility for:

- a. Supporting the finding required by 10 CFR 52.103(g) by informing the Director, NRR, on the licensee's completion of the ITAAC, the plant's readiness to load fuel, and the overall readiness for operation.
- b. **Overseeing development and implementation of construction oversight guidance, policies and procedures in executing the ITAAC inspection program.**

04.03 Region II **Division of Construction Oversight (DCO)** Staff. The Region II **DCO** staff has responsibility for:

- a. Implementing the construction inspection program and documenting inspection findings.
- b. Providing NRR with the status of inspections related to specific ITAAC.
- c. Coordinating the development of the site inspection plans.
- d. Ensuring that the necessary inspection record is maintained in the Construction Inspection Program Information Management System (CIPIMS) for determination of satisfactory ITAAC completion.
- e. Integrating all the inspection findings to develop an overall assessment of licensee performance as described in **Inspection Manual Chapter (IMC) 2505, "Periodic Assessment of Construction Inspection Program Results."**

04.04 Vogtle Project Office (VPO) Staff. The VPO Staff has responsibility for:

- a. Administering and monitoring the execution of the construction inspection program.
- b. Ensuring the requisite inspection procedures are maintained current and accurate.
- c. Maintaining and ensuring the accuracy of CIPIMS.
- d. Publishing notices in the *Federal Register* of the successful completion of ITAAC in accordance with 10 CFR 52.99.

2503-05 REQUIREMENTS

05.01 ITAAC-related Construction Inspection. The NRC staff will perform the inspections listed in Appendix A to evaluate the licensee's ITAAC-related construction activities.

05.02 Inspection Planning. The staff shall develop and maintain an inspection plan to verify that it is successfully performing ITAAC-related construction activities. This plan shall include, as a minimum, the baseline targeted ITAAC inspection requirements for the selected certified reactor design, as modified per Section 06.04, Process for the Modification of the ITAAC Target Set. The plan shall provide the level of detail necessary to determine the general time-frame in which each occurrence of an inspection procedure is to take place.

- a. Use the licensee's construction schedule to identify when key activities will be available

for inspection.

- b. The overall schedule will incorporate all of the planned inspection activities for the planned period of construction. Use the overall construction inspection schedule for planning of inspection resources (i.e., ensuring the required inspection skills or engineering disciplines are available when required).
- c. Consider bundling ITAAC with the same or similar design commitments and inspections, tests, and analyses (ITA) during the inspection planning process to maximize efficiency and use of NRC inspection resources.

05.03 Inspection Results. NRC inspections of ITAAC-related work result in the early identification and resolution of problems, their root causes, and generic implications. Document inspection observations and inspection results in accordance with IMC 0613, "Power Reactor Construction Inspection Reports."

The staff will use CIPIMS to link inspection results to the docket, the inspection report, and the specific ITAAC.

- a. Categories of ITAAC Inspection Results. Because of their potential for affecting the NRC's verification of successful ITAAC completion, inspection findings will be categorized to reflect their impact on ITAAC. The documentation requirements for the different types of inspection results are described in IMC 0613.
- b. Assessment of Inspection Results. NRC will periodically review inspection results to determine if it should change the level of inspection effort. The review of inspection results will focus on two factors: (1) the implementation of specific construction activities as documented in the inspection history; and (2) the implementation of the licensee's corrective action program. This approach will ensure that any deficiencies that have been identified by the licensee or NRC have been adequately addressed by the licensee's QA program and have resulted in effective corrective actions. The NRC's confidence in the licensee's construction activities is directly related to its confidence in the quality assurance program. IMC 2505 further defines this process.

05.04 Enforcement. During the construction period, the agency will process identified violations of NRC regulations and conditions of the COL in accordance with the cROP process and the Commission's Enforcement Policy, NUREG-1600, "General Statement of Policy and Procedures for NRC Enforcement Actions."

2503-06 GUIDANCE

06.01 General. When licensing a plant under 10 CFR Part 52, the Commission is required by 10 CFR 52.97(b)(1) to identify within the combined license, the inspections, tests, and analyses; including those applicable to emergency planning that the licensee shall perform, and the acceptance criteria that, if met, 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.

In addition, pursuant to 10 CFR 52.103(g), the Commission shall find that the acceptance criteria (AC) in the combined license are met, prior to allowing the facility to operate. The Commission, in the Staff Requirements Memorandum (SRM) for SECY-13-0033, delegated the responsibility for the 10 CFR 52.103(g) finding to the staff.

Successful completion of the ITAAC is the responsibility of the licensee. The NRC will use inspections of construction activities to independently verify that the licensee successfully carries out construction activities and identifies and corrects deficiencies which may have an impact on the ITAAC or other construction activities. The results of the construction inspection program implemented through this manual chapter will form the basis of the staff's recommendation to the Commission's determination, in accordance with 10 CFR 52.103(g), of whether the acceptance criteria have been met.

It may be necessary for ITAAC inspections to be conducted after the 10 CFR 52.103(g) finding for ITAAC that are subject to a hearing during interim operations. These inspections will be conducted using the applicable inspection procedures (IPs) in this IMC. Any findings identified during these inspections will be dispositioned using the Reactor Oversight Process (ROP) and IMC 0609, "Significance Determination Process," and will be assigned to the ROP cornerstone that is most closely related to the finding for consideration in the ROP Action Matrix.

06.02 ITAAC Inspection Overview. The NRC may begin ITAAC inspection according to this Manual Chapter when a licensee is issued a COL or an LWA that contains ITAAC. Since many of the ITAAC are oriented towards system completion, they may not be completed until construction is nearly complete. Therefore, the staff intends to implement an ITAAC inspection approach which will require NRC inspectors to observe ITAAC-related construction activities as they are performed.

The NRC has developed a framework to prioritize the ITAAC and facilitate efficient inspections. This framework is structured to integrate complementary inspection activities that evaluate the licensee's control of the construction processes. Central to the NRC's inspection program for construction under 10 CFR Part 52 is the ITAAC Matrix which provides a means for ensuring adequate inspection coverage of ITAAC inspections. The matrix will be populated with the ITAAC applicable to each certified design as described in Appendix B to this manual chapter. Site specific ITAAC will be added to the matrix population once they have been identified.

The approach to ITAAC inspection will require inspectors to evaluate the acceptability of ITAAC-related processes. The NRC will perform sampling-type inspections of ITAAC-related activities to verify that the licensee is performing the activities successfully. The selection of the ITAAC for each design to receive direct inspection will be based on a prioritization process used to determine overall inspection value.

When the licensee notifies the NRC that an ITAAC is complete, they will also identify the bases for the ITAAC completion. NRC reviews of the licensee's ITAAC closure notification, as well as any NRC inspection history for that ITAAC, will determine if the licensee's ITAAC closure notification and its associated bases are satisfactory.

06.03 Implementation. The inspection program is intended to provide the framework for managing the inspection effort. How often each inspection procedure should be performed during the construction period, and when each inspection procedure occurrence should be performed will be determined during development and periodic update of the site-specific inspection plan.

Inspectors are encouraged to pursue any safety or risk significant concern. However, inspectors must identify the inspection procedure used to perform inspection activities and to accurately record this information and the inspection results, so they can be incorporated into CIPIMS.

Regional managers responsible for the construction inspection program shall periodically review inspection results to monitor progress on the inspection plan. Changes to the inspection plan, discussed in Section 05.03b, should be considered during periodic assessment of licensee performance per IMC 2505.

The primary objective of the construction inspection program is to provide reasonable assurance, and sufficient basis, to support the staff's determination that the licensee performed the inspections, tests, and analyses and met the acceptance criteria for the facility, ensuring construction complies with design requirements.

The staff shall implement an ITAAC inspection approach primarily based on observing ITAAC-related construction activities as they are performed in-situ. However, due to the nature and the fluidity of construction schedules, the staff must remain flexible in how and when it conducts ITAAC inspections. To maximize effective use of inspection resources, staff should discuss the use of the following inspection alternatives with their inspection team leader, branch chief, or senior resident inspector.

- a. ITAAC bundling: One tool useful in providing greater inspection flexibility is ITAAC bundling. ITAAC bundling is the process by which ITAAC with similar design commitments or inspections, tests, and analyses, are grouped together under one or more inspection plans to reduce the overall inspection effort including the number of inspections and inspection samples necessary to verify with reasonable assurance that the licensee has performed the inspections, tests, and analyses and met the acceptance criteria for all ITAAC within that bundle.

Ideally at least one inspection sample from each ITAAC within the bundle should be completed; however, this is not a requirement. The staff's ability to sign off a targeted ITAAC for which no direct inspection sample was completed is based on the completed inspections of the licensee's program, processes and procedures related to that ITAAC and coupled with the results of the completed inspection samples from the other ITAAC within the bundle.

As with any targeted ITAAC, inspections should attempt to cover the various shifts and work crews performing the related work. Examples where ITAAC bundling would be beneficial include: structural and shielding ITAAC related to wall and floor thickness, the structural reconciliation ITAAC, seismic and environmental qualification ITAAC, American Society of Mechanical Engineers (ASME) ITAAC, and the ITAAC related to the separation requirements for electrical cables and cable trays. Other ITAAC highly suitable for bundling are those ITAAC from the design control document with the same design commitment that have been broken out into discrete ITAAC within the COL.

- b. Crediting Inspection of Non-Targeted ITAAC: Inspection of a non-targeted ITAAC may be performed in lieu of a targeted ITAAC inspection sample when a change in the licensee's schedule might challenge the inspection schedule. When implementing this alternative, the inspector must ensure the licensee's performance on the non-targeted ITAAC activity provides meaningful insight with respect to the licensee's ability to meet the design commitment and perform the inspections, tests, and or analyses for the targeted ITAAC in question.

For example, a welding inspection on an ASME Section III piping system is planned for a targeted ITAAC, but due to a change in schedule the targeted sample is no longer available; however, a similar weld on ASME Section III piping for a non-targeted ITAAC is available during that on-site inspection and is on schedule. The inspection of this non-targeted ITAAC which has the same design commitment, ITA and AC would clearly provide the same insights with respect to licensee welding and **nondestructively examination (NDE)** performance that the targeted ITAAC would have provided.

- c. To maximize inspection efficiency and provide a more complete review of the ITAAC's acceptance criteria, staff may perform a sample of direct inspections of the licensee's performance of the ITA coupled with the subsequent review of the completed quality assurance records. This may be particularly useful for ITAAC that require repeated performance of the ITA and or have large amounts of data associated with the acceptance criteria.

For example, inspection of a selected sample of surveys may be coupled with the review of the results from the entire survey; inspection of the licensee's performance of a test on several components (e.g., valve stroke tests, containment penetration leak tests) may be performed followed by a review of the completed procedure test results for the associated ITAAC.

- d. Should changes in the licensee's schedule result in the performance of a targeted ITAAC not receiving direct inspection of the ITA, staff may review the completed quality assurance records to complete the targeted ITAAC inspection.
- e. ITAAC Closure verification: Inspectors may also consider reviewing the licensee's principle closure packages for completed ITAAC in accordance with IP 40600, "Licensee Program for Managing Inspections, Tests, Analyses, And Acceptance Criteria (ITAAC) Closure."

06.04 Process for the Modification of the ITAAC Target Set. The ITAAC prioritization process should be adaptive. When modifying the set of targeted ITAAC, staff should consider lessons learned, inspection history, and NRC inspection resource requirements. The staff should ensure **that execution of** the baseline inspection program (BIP), after the proposed changes, continues to provide reasonable assurance to support the staff's determination that the licensee performed the inspections, tests, and analyses (ITA) and met the acceptance criteria (AC).

This section does not apply to inspections of additional ITAAC based on plant assessments, extent of condition reviews, or for other cause. It also does not apply to the addition and deletion of targeted ITAAC through the license amendment process, which is handled in Office Instruction **NRR-LIC-210**, "Prioritization of Inspections, Tests, Analysis, and Acceptance Criteria (ITAAC) for Inspection."

To optimize inspection resource use, the staff un-targeted ITAAC that had low risk and low inspection value. This included un-targeted **emergency preparedness (EP)** ITAAC that were redundant to activities that the staff already inspect (i.e., EP exercise). The Commission directed that Design Acceptance Criteria (DAC) ITAAC be inspected and were therefore not un-targeted.

For any modification to the targeted ITAAC set, VPO staff will perform a review of the proposed change. The review shall consider the impact on inspection coverage on the ITAAC Matrix, the value of inspection (i.e., prioritization rank), and the following screening questions. Though any ITAAC may be untargeted with Director approval, the staff should not un-target ITAAC with a high value of inspection or that fail to answer “yes” to the screening questions. The staff shall document a basis for **untargeting** each ITAAC using Table D-1 in Appendix D of **NRR-LIC-210**.

- a. If a targeted ITAAC is not performed, do other targeted ITAAC provide adequate, representative inspection coverage?
- b. If a targeted ITAAC inspection is not performed, is the scope of the quality process or program represented by that ITAAC adequately covered by other targeted ITAAC inspections?
- c. If a targeted ITAAC inspection is not performed, do other targeted ITAAC invoke the associated inspection procedures.
- d. If a targeted ITAAC inspection is not performed, is there a high likelihood that a significant flaw or failure to meet an acceptance criterion would go undetected?
- e. If a targeted ITAAC inspection is not performed, is the ITAAC’s inspection value below or at the lower end of the target cutoff (if not ranked does it have low safety significance)?
- f. If a targeted ITAAC inspection related to security or emergency preparedness is not performed, did NSIR agree to un-target it?

The staff should conduct this review using **a panel composed of representative staff from VPO and DCO**. Upon completion of its review, the panel shall provide the changes to the targeted ITAAC set via memo to the VPO and DCO Office Directors.

END

Appendix A: IMC 2503 Inspection Procedures
Appendix B: ITAAC Matrix
Attachment 1: Revision History for IMC 2503

Appendix A: IMC 2503

INSPECTION PROCEDURES

- IP 65001 - ITAAC Inspections
 - 65001.01 - Foundations and Buildings
 - 65001.02 - Installation of Structural Concrete
 - 65001.03 - Installation of Piping
 - 65001.04 - Installation of Pipe Supports & Restraints
 - 65001.05 - Installation of Reactor Pressure Vessel and Internals
 - 65001.06 - Installation of Mechanical Components
 - 65001.07 - Installation of Valves
 - 65001.08 - Installation of Electrical Components and Systems
 - 65001.09 - Installation of Electrical and Fiber Optic Cable
 - 65001.10 - Installation of Instrument Components and Systems
 - 65001.11 - Containment Integrity and Containment Penetrations
 - 65001.11A - Containment Structural Integrity Test
 - 65001.12 - Installation of Heating, Ventilating, and Air Conditioning Systems
 - 65001.13 - Installation of Load Handling Equipment and Fuel Racks
 - 65001.14 - Installation of Complex Systems with Multiple Components
 - 65001.15 - Installation of Fire Protection Equipment
 - 65001.16 - Engineering
 - 65001.17 - Security (For Official Use Only – Security-related Information)
 - 65001.18 - Emergency Planning ITAAC
 - 65001.19 - Radiation Monitoring Components and Systems
 - 65001.20 - Safety-related Piping DAC
 - 65001.21 - Pipe Rupture Hazards Analysis Design Acceptance Criteria (DAC)
 - 65001.22 - Digital Instrumentation and Control (DI&C) System/Software (DAC)
 - 65001.23 - Human Factors Engineering Integrated System Validation
 - 65001. A - As-Built Attributes for Structures, Systems, and Components
 - 65001. B - Welding Program
 - 65001. C - Construction Test Program
 - 65001. D - Operational Testing Program
 - 65001. E - Qualification Program
 - 65001. F - Design and Fabrication Requirements

Appendix B: The ITAAC Matrix

BACKGROUND: The goal of inspections conducted under *Inspection Manual Chapter (IMC) 2503* is to verify licensee compliance with all *Title 10 of the Code of Federal Regulations (10 CFR) Part 52 inspection, test, analysis, and acceptance criteria (ITAAC)* requirements, as well as other relevant *U.S. Nuclear Regulatory Commission (NRC)* regulations, using an integrated inspection and review strategy.

The ITAAC inspection philosophy contained in IMC 2503 recognizes that several ITAAC are expected to be closely related, thereby providing the NRC with the opportunity to evaluate a family of ITAAC based upon an examination of some representative ITAAC within the family. Such an inspection approach would allow for the efficient use of NRC inspection resources for evaluation of the construction processes that result in the ITAAC completion.

OBJECTIVE: A framework was developed by the NRC to manage ITAAC inspections, while recognizing the need for a sampling-inspection approach. This framework was structured to integrate inspection activities that evaluate the licensee's control of the construction processes into the NRC inspection program. Central to the NRC's *construction inspection program (CIP)* for construction under 10 CFR Part 52 is a tool that provides a coherent approach to the coverage and completion of the ITAAC related inspections. This tool is called the ITAAC Matrix and is shown in Figure 1.

OVERVIEW: The ITAAC Matrix provides a means for assigning each ITAAC into a matrix block referred to as an ITAAC family. Each family represents a combination of ITAAC characteristics related to the successful ITAAC completion.

The *inspection procedures (IPs)* for the 19 Matrix rows provide guidance on the inspection of specific technical disciplines, while the IPs for the six Matrix columns discuss those inspection criteria that crosscut disciplinary boundaries. The 25 IPs developed to address all Matrix categories provide a template for ITAAC inspections, as well as inspection of the licensee's control of the construction processes. This facilitates the process of inspecting the selected sample of ITAAC, but also ensures adequate coverage of all construction disciplines. For example, all ITAAC within a specific plant design that discuss instrumentation and control (I&C) components and systems and specific as-built inspection criteria would be binned in the matrix block formed at the intersection of row (10) and column (A).

POPULATING THE ITAAC MATRIX: Each ITAAC for a specific design is evaluated and assigned to the appropriate family by selecting the appropriate combination of row and column. Site specific ITAAC will also be added to the population once they have been identified.

- a. An NRC expert panel reviews all the ITAAC for each design. An expert panel will generally consist of a minimum of three NRC personnel with some combination of expertise in plant construction, reactor risk, and project licensing, including some relevant plant design and ITAAC experience.
- b. The expert panel will review each of the ITAAC and will place it in one of the families of the ITAAC Matrix.

- c. Once the expert panel determines where in the Matrix each of the ITAAC for a particular design should be placed, all facilities constructed with that particular design will use that ITAAC Matrix.

This use of a single ITAAC Matrix format provides a consistent framework for developing the inspection programs for each of the different reactors that are licensed and built under 10 CFR Part 52. This also ensures consistency in the inspection program within any specific design.

DESIGN ACCEPTANCE CRITERIA (DAC): Inspection Procedures 65001.20 through 65001.23 are special purpose procedures for inspection of DAC-related ITAAC. There is no correlation between these procedures and the ITAAC Matrix.

Figure 1: ITAAC Matrix

	A) As-Built Insp	B) Welding	C)Construction Testing	D) Operational Testing	E) Qual Criteria	F) Design & Fabrication
01)Foundations & Buildings	A01	B01	C01	D01	E01	F01
02)Structural Concrete	A02	B02	C02	D02	E03	F02
03)Piping	A03	B03	C03	D03	E03	F03
04)Pipe Supports & Restraints	A04	B04	C04	D04	E04	F04
05)RPV & Internals	A05	B05	C05	D05	E05	F05
06)Mechanical Components	A06	B06	C06	D06	E06	F06
07)Valves	A07	B07	C07	D07	E07	F07
08)Elec Comp & Systems	A08	B08	C08	D08	E08	F08
09)Electrical Cables	A09	B09	C09	D09	E09	F09
10)I&C Comp & Systems	A10	B10	C10	D10	E10	F10
11)Containment Integrity & Penetrations	A11	B11	C11	D11	E11	F11
12)HVAC	A12	B12	C12	D12	E12	F12
13)Eqp Handle & Fuel Racks	A13	B13	C13	D13	E13	F13
14)Complex Sys w/ Multi-Comp	A14	B14	C14	D14	E14	F14
15)Fire Protection	A15	B15	C15	D15	E15	F15
16)Engineering	A16	B16	C16	D16	E16	F16
17)Security	A17	B17	C17	D17	E17	F17
18)EP	A18	B18	C18	D18	E18	F18
19) Rad Protection	A19	B19	C19	D19	E19	F19

- Column Categories [A thru F]: Interdisciplinary NRC inspection activities that represent common ITAAC attributes. An NRC inspection procedure (IP) will correspond to each column category.

- Row Categories [1 thru 19]: Construction processes & resulting products (e.g., **structure, system, and component**) that relate to a unique discipline, with an IP corresponding to each row category.

ITAAC MATRIX NOTES:

Column Classification

[A] “As-Built Inspection” comprises the functional/physical arrangement series of ITAAC, to include checks for location, alignment, dimensions, sizing, and measurements, and may include functional checks, unless related to testing (which would be covered by [C] or [D]) or a design report/analysis (which would be covered by [F]). Simple calculations (e.g., a screen area or tank volume) that can be made from field measurements or sizing estimates would be covered here based upon the dimensional checks; however, more complex calculations, even if field measurements are involved, would better be categorized in [F]. If a single ITAAC involves both as-built information, like a physical or dimensional check, and other criteria, like those for an operational test [D] or design analyses/calculations [F], the [D] or [F] categories, as applicable, would take preference over this as-built [A] category. Also, checking that a meter or display is located properly (e.g., is on the Main Control Board) would be categorized here [A], while reading the meter or retrieving data from the display as part of an operational test would better be categorized in [D].

[B] “Welding” comprises those ITAAC which address any welding process, whether code referenced (e.g., **American Society of Mechanical Engineers (ASME)** piping) or oriented to other processes (e.g., structural steel or electrical supports). This category also includes those ITAAC which address or provide criteria for weld quality (e.g. the requirements for the nondestructive examination (NDE) of welds). Additionally, activities and programs related to the welding process (e.g., welder training, testing, and certification; welding procedure qualification; NDE personnel and procedure qualification; other weld testing activities) are all included in this welding [B] category.

[C] “Construction Testing” includes specific ITAAC tests that are associated with the quality of component fabrication and construction activities, to include quality acceptance tests (e.g., concrete testing or simulated signal testing to confirm Class 1E division boundaries), baseline data checks (e.g., PSI), and field-work completion testing (e.g., “hydros”) or any other similar construction testing activities. In-process field testing of individual pieces of equipment would be covered here, while the construction-complete, pre-operational test phases leading to integrated system testing would better be categorized in [D]. However, the testing (e.g., “type tests”) of equipment for “qualification” in a harsh environment (EQ) or in analyzing seismic response, as well as for other like programmatic “qualification criteria”, should be covered by [E], as described in note (E) below.

[D] “Operational Testing” involves testing activities that check component and system function by measuring operational parameters (e.g., flow requirements) and/or validating operational performance acceptance criteria (e.g., component actuation with signal inputs or similar “pre-op” testing). Such tests might be performed on a single component, an individual system, or a complex, integrated system. Similarly, as with “Construction Testing” above, “type tests” and equipment “qualification” should be covered by [E].

[E] “Qualification Criteria” includes seismic qualification, environmental qualification (EQ) and other ITAAC qualification programs and any related program attributes that are oriented toward broad design criteria versus the specific test parameters of [C] or [D]. The characteristics of such programs as the Design Reliability Assurance Program (DRAP) might be considered here.

[F] "Design/Fabrication Requirements" cover those ITAAC that refer to Code (e.g., ASME) requirements for the fabrication of material and components or discuss the adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, engineering evaluations and other design reports. However, if "Welding" is the primary fabrication process, this is better categorized in [B]. If construction or operational "Testing" result in design parameters/measurements, this is better categorized in [C] or [D]. Also, if the design analyses involve programmatic "Qualification Criteria" (e.g., seismic), this would be better categorized in [E]. Where a report exists, or the functional capabilities of the system/components are analyzed, to confirm compliance with general Code requirements versus specific test results or programmatic qualification criteria, it should be covered here under [F].

Row Classification

(01) "Foundations & Buildings" include geo-technical (e.g., rock) investigation, civil surveying, elevation grading, pre-construction preparations (e.g., "mudmats") and site layout, including the arrangement of buildings and structures; except that the Containment, as a separate "Building", is covered by line (11) while its "Foundation" is covered here with all site foundations. This category also includes the building framework, like the structural steel and bolting materials. However, any ITAAC discussing the details of construction of the buildings that are more specifically defined by other Matrix rows will be classified by that process (i.e., "Structural Concrete" (02) for concrete buildings, "Mechanical Components" (06) for large metal tanks, or "Engineering" (16) for generic design criteria (e.g., seismic) of buildings, like the nuclear island).

(02) "Structural Concrete" includes all the materials (e.g., cement and rebar) and processes (e.g., concrete batch mixing and delivery) that result in a steel reinforced concrete placement, as well as embedded devices, anchors, anchorages, water barriers that are installed before or after the concrete placement, and structural grout. Any items that are installed in the formwork (for example, anchor bolts that are embedded in the concrete when placed) are covered by this line item, while items that are subsequently attached to finished concrete are covered by other functional categories; for example, concrete expansion anchors, which are known to provide piping support or electrical raceway support, are covered under lines (04) and (09) respectively. For work on placed and finished concrete, where the ultimate function is unknown (e.g., expansion anchors for general supports), such activities are covered here under (02).

(03) "Piping" includes all piping, whether safety-related or not, and covers all ASME classes including the reactor coolant pressure boundary, as well as piping referenced in other codes (e.g., B31.1). ITAAC that describe systems that deliver fluid flow through piping as the major function, as well as the pressure boundary function (e.g., the pressure rating verified by hydrostatic testing) of such systems, are best categorized here. However, if the system functions and test acceptance criteria are more complex, involving diverse component interactions, the ITAAC might be a better fit for "Complex Systems w/ Multiple Components" (14).

(04) "Pipe Supports & Restraints" apply to all classes of piping and all types of supports (e.g., snubbers, struts, anchors, and guides) and pipe whip restraints. The seismic adequacy of piping systems would likely be applied here in (04). However, if the ITAAC focuses on the seismic qualification of a unique component (e.g., a pump) instead of the piping system, "Mechanical Components" (06) would be most appropriate line for categorization.

(05) "Reactor Pressure Vessel (RPV) and Internals" While the RPV may be considered a mechanical component or part of a fluid-flow system; it is uniquely covered here, along with the reactor internals. However, any instrumentation internal to the RPV is best characterized under I&C Components & Systems (10).

(06) "Mechanical Components" include all classes (ASME or non-safety) of equipment (e.g., pumps, heat exchangers, strainers, etc.), but not "Valves" (07) and not "HVAC" (12). It also includes any mechanical equipment support that is unique (e.g., a steel pedestal) to the component, rather than part of the building structure [e.g., concrete pads with anchor bolts that are part of "Structural Concrete" (02)]. Storage tanks that are fabricated metal components would fit here (06), but concrete tanks with only a liner, may best fit under "Structural Concrete" (02).

(07) "Valves" regardless of the type of operator (e.g., motor, hydraulic, air, squib, etc.), are considered here as a separate category of mechanical components because of the unique nature in the way they are described in the ITAAC. This category covers all valves, including check valves and any other valves of a similar self-actuating nature. Also, any valve functions related to containment isolation are covered in "Containment Integrity & Penetrations" (11).

(08) "Electrical Components and Systems" include all electrical equipment (e.g., diesel generators) and supporting distribution components (e.g., switchgear), except for the cables. Because of their unique nature, containment electrical penetration assemblies are included here instead of row (11).

(09) "Electrical and Fiber Optic Cable" involves all cable and includes the raceways (e.g., conduit, cable tray) in which the cable is run and the raceway supports (e.g., unistrut), unless they are part of the building structural steel (01) or pipe supports (04).

(10) "Instrument Components & Systems" include sensing instrumentation and actuation control equipment, including the system hardware (e.g., signal process cabinets) and logic process devices, as well as the related signal initiation, control and annunciation checks, e.g., including those for the Main Control Board (MCB). Displays on the MCB and the retrieval of the information from the MCB windows or other panels and cabinets in the main control room (MCR) would be covered here. However, low-voltage instrument cable is covered under "Electrical and Fiber Optic Cable," with all other cable.

(11) "Containment Integrity & Penetrations" involve the Containment structure and boundary, including all aspects of the containment isolation function. Therefore, any containment isolation check (e.g., a valve closure) or integrity criteria (e.g., hatch leakage) are covered here, instead of line (07) for valves or line (06) for mechanical components. However, the containment concrete material and placement is covered by "Structural Concrete" (02) and the electrical penetration assemblies are considered "Electrical Components" (08).

(12) “Heating, Ventilating & Air Conditioning Systems (HVAC)” involves air distribution and environmental control systems from a functional standpoint, thereby including all mechanical, electrical, and I&C equipment that is directly related to the HVAC function or system performance.

(13) “Load Handling Equipment and Fuel Racks” includes the components involved with equipment handling and movement (e.g., polar crane), fuel movement (eg., fuel bridges) both inside and outside of containment, and the spent fuel storage racks and related equipment. The fuel itself is not covered here, but rather in line (05) as an internal component.

(14) “Complex Systems with Multiple-Components” is intended to cover categories that discuss attributes that cross disciplinary boundaries, for example electrical, I&C, and valve response are all connected to the same ITAAC. This would also cover any ITAAC that refer to Tables of equipment, that would fit multiple lines of the Matrix if the components were evaluated separately; for example, a Table that lists valves, mechanical components, and I&C components. This category should be used when the nature of the ITAAC does not lend itself to clear placement in one of the other categories. However, even for complex systems, where the ITAAC focus is specific (e.g., the pressure boundary function of an integrated piping system), the matrix category (in this example line (03) for piping) that best fits the focal point of the ITAAC should be selected.

(15) “Fire Protection” includes all related material, equipment, systems, processes, and programs.

(16) “Engineering” is a separate line to distinguish it as a process separate from the construction activities that result in the SSC and products on the other lines. If design criteria (e.g., flooding analyses) are the dominant focus of an ITAAC (e.g., building room boundaries) an engineering would apply. Similarly, for design issues (e.g., seismic) and more subjective areas (e.g., human reliability analysis) that cross disciplinary boundaries, are engineering oriented, and difficult to categorize on any other line, the most applicable categorization may fit here under row (16).

(17) “Security” and (18) “Emergency Planning” are separate lines to cover the systems, processes, and programs related to these activities.

(19) “Radiation Monitoring Components and Systems” includes not only all radiation protection (RP) components and RP system functions, but also those processes and programs related to RP, similar to the way fire protection and security systems and programs fit under lines (15) and (17) respectively. An ITAAC that refers generally to the EP function, which might include radiological protection, is better categorized under line (18); while a more direct reference to RP equipment functionality and the programs that support the use of RP data would fit here under row (19).

Attachment 1

Revision History for IMC 2503

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
N/A	ML043100008 04/25/06 CN 06-010	Initial Issuance	None	N/A
N/A	ML072681114 10/03/07 CN 07-030	Researched for 4 years and found none. Revised to reflect program development and incorporate stakeholder feedback.	None	N/A
N/A	ML12110A239 07/05/2012 CN 12-012	Complete rewrite. Incorporating language to address Design Acceptance Criteria (DAC).	None	ML12110A239
N/A	ML20030B356 03/04/20 CN 20-013	Revised to reflect the reunification of the Office of New Reactors (NRO) and Office of Nuclear Reactor Regulation (NRR) into NRR, provide additional guidance for ITAAC inspection planning and un-targeting ITAAC, and makes reformatting and editorial corrections.		ML20030B556
	ML20261H390 10/06/20 CN 20-048	Revised to make IMC 2503 consistent with the Vogtle Readiness Group memorandum dated August 14, 2020 and to make minor editorial changes.		N/A