

# **NRC INSPECTION MANUAL**

CIPB

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MANUAL CHAPTER 2506

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CONSTRUCTION REACTOR OVERSIGHT PROCESS  
GENERAL GUIDANCE AND BASIS DOCUMENT

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## 2506-01 PURPOSE

01.01 This Inspection Manual Chapter (IMC) describes the Construction Reactor Oversight Process (cROP) for commercial nuclear power plants applied for and/or licensed under 10 CFR Part 52 (Part 52), "Licenses, Certifications, and Approvals for Nuclear Power Plants."

01.02 IMC 2506 provides the basis for the significant decisions made in developing the cROP.

01.03 IMC 2506 serves as the source information for all applicable program documents such as manual chapters and assessment guidance.

## 2506-02 OBJECTIVES

02.01 To generally describe the cROP processes, their interactions, and provides guidance for their implementation.

## 2506-03 APPLICABILITY

03.01 The cROP is implemented when an applicant announces its intent to submit an application pursuant to Part 52 for an early site permit (ESP), a limited work authorization (LWA), and/or a combined construction permit and operating license (COL). The cROP will remain in effect until regulatory oversight for the plant is transitioned to the Reactor Oversight Process (ROP).

03.02 The degree to which the cROP is implemented depends on the application/license status and the amount of ongoing activities that are associated with applications/licenses. For instance, only inspections pursuant to IMC 2501, "Construction Inspection Program: Early Site Permit (ESP)," may be necessary in the case where an applicant only requests an ESP. On the other hand, if the Nuclear Regulatory Commission (NRC) issues a COL, and there is sufficient activity occurring, all aspects of the cROP will be implemented.

03.03 In developing the cROP, many aspects of the ROP, such as the inspection program, assessment process, and enforcement policy were considered. Elements of the cROP include developing and maintaining programs in the areas of: construction inspection, construction assessment, enforcement, allegations, construction experience, inspections, tests, analyses, and acceptance criteria (ITAAC) closure verification, vendor inspection, and the transition to operations. Coordination of these activities requires that the cROP also consider the ability of the NRC to effectively plan and schedule the conduct of these activities by having sufficient resources available when needed (planning and budgeting). An overview of the cROP and how each of the individual processes interacts can be seen in Exhibit 1, "Construction Reactor Oversight Process Flowchart."

## 2506-04 DEFINITIONS

### 04.01 General.

- a. Act. The Atomic Energy Act of 1954 (68 Stat. 919) including any amendments thereto.
- b. Applicant. A person or an entity applying for a license, permit, or other form of Commission permission or approval under 10 CFR Part 50 or Part 52.
- c. Combined license (COL). A combined construction permit and operating license with conditions for a nuclear power facility issued under subpart C of Part 52.
- d. Construction. The analysis, design, manufacture, fabrication, quality assurance, placement, erection, installation, modification, inspection, or testing of a facility or activity which is subject to the regulations in 10 CFR Part 50 and consulting services related to the facility or activity that are safety-related.
- e. Construction Activities. Activities constituting construction are the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of foundations, or in-place assembly, erection, fabrication, or testing, which are for:
  1. Safety-related structures, systems, or components (SSCs) of a facility, as defined in 10 CFR 50.2;
  2. SSCs relied upon to mitigate accidents or transients or used in plant emergency operating procedures;
  3. SSCs whose failure could prevent safety-related SSCs from fulfilling their safety-related function;
  4. SSCs whose failure could cause a reactor scram or actuation of a safety-related system;
  5. SSCs necessary to comply with 10 CFR part 73;
  6. SSCs necessary to comply with 10 CFR 50.48 and criterion 3 of 10 CFR part 50, appendix A; and
  7. Onsite emergency facilities, that is, technical support and operations support centers, necessary to comply with 10 CFR 50.47 and 10 CFR part 50, appendix E.
- f. Construction Deficiency Report. As described in 10 CFR 50.55(e), an official notification to the NRC of a construction defect or failure to comply that could create a substantial safety hazard, were it to remain uncorrected. A “substantial safety hazard” means a loss of safety function to the extent that there is a major

reduction in the degree of protection provided to public health and safety from the facility.

- g. Construction Inspection Program (CIP): The inspections that will be conducted in accordance with IMCs 2501, 2502, 2503, and 2504.
- h. Construction Inspection Program Information Management System (CIPIMS). The database that provides the means to document, report, and track NRC construction inspection activities and their results.
- i. Contractor. Any organization or individual under contract to furnish items or services to a licensee engaging in an NRC-regulated activity. It includes the terms consultant, vendor, supplier, fabricator, constructor, and sub-tier levels of these organizations.
- j. Design Acceptance Criteria (DAC). A set of prescribed limits, parameters, procedures, and attributes upon which the NRC relies, in a limited number of technical areas, in making a final safety determination to support a design certification. DAC are part of the ITAAC inventory for a given design.
- k. Early site permit (ESP). Commission approval, issued under subpart A of Part 52, for a site or sites for one or more nuclear power facilities. An early site permit is a partial construction permit.
- l. Family of ITAAC. A grouping of ITAAC that are related through similar construction processes, resulting products, and general inspection attributes.
- m. Inspection. (1) An NRC activity consisting of examination, observation, or measurement to determine applicant/licensee/contractor/vendor conformance with requirements and/or standards. (2) Applicant/licensee/contractor/vendor activity consisting of examination, observation, or measurements to determine the conformance of materials, supplies, components, parts, systems, processes or structures to pre-determined quality requirements.
- n. Inspection Document. Any material obtained or developed during an inspection that is considered to be an NRC record. (Inspectors should review IMC 0620, "Inspection Documents and Records," for clarification on how materials become agency records.)
- o. Integrated Inspection Report. A construction inspection report that combines inspection items from multiple inspections (resident, regional, etc.) conducted during a specific time period.
- p. Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC). Those inspections, tests, analyses, and acceptance criteria identified in the combined license that if met by the licensee 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.

- q. Licensee. A person or entity authorized to conduct activities under a license (e.g., early site permit, construction permit, combined license, or limited work authorization) issued by the Commission.
- r. Limited Work Authorization. The authorization provided by the Director of New Reactors or the Director of Nuclear Reactor Regulation under 10 CFR 50.10 allowing that person to perform the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of the foundation, including placement of concrete, any of which are for an SSC of the facility for which either a construction permit or combined license is otherwise required.
- s. NRC Record. Any written, electronic, or photographic record under legal NRC control that documents the policy or activities of the NRC or an NRC licensee (see also the definition in 10 CFR Part 9).
- t. Observation. For the cROP, a factual detail noted during a power reactor construction inspection. Observations not directly related to a finding may only be documented if prescribed by an appendix to IMC 0613, "Documenting 10 CFR Part 52 Construction Inspections," or by a specific inspection procedure.
- u. Pre-operational Testing. Pre-operational Testing includes the testing categories normally identified as construction tests (e.g. activities such as chemical cleaning, flushing, continuity testing, piping and valve testing, calibration of instrumentation) and pre-operational tests to demonstrate SSC function and conformance to design requirements.
- v. Program element. Program element refers to the means that exist to implement elements (e.g., procedures, facilities, equipment, or training) of the licensee's emergency preparedness program.
- w. Quality Assurance. Quality Assurance (QA) comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system or component will perform satisfactorily in service. QA includes quality control.
- x. Safety-related structures, systems and components (SSC). Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
  - 1. The integrity of the reactor coolant pressure boundary
  - 2. The capability to shut down the reactor and maintain it in a safe shutdown condition; or
  - 3. The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable

guideline exposures set forth in § 50.34(a)(1) or § 100.11 of this chapter, as applicable.

- y. Startup Testing. The testing program conducted after the authorization to load fuel. It includes initial fuel loading and pre-criticality tests, and continues until the plant reaches commercial operating status at or near its licensed power rating. The Startup Test Program includes low power, physics, and power ascension testing.
- z. Vendor. Any company or organization that provides products such as material, equipment, components ML102170345, or services to be used in an NRC-licensed facility or activity. In certain cases the vendor may be an NRC licensee (e.g., a nuclear fuel fabricator) or the product may have NRC certificates (e.g., a transportation cask).

#### 04.02 Terms Associated With Safety Culture.

- a. Construction Cross-Cutting Area. Areas that will be evaluated to determine if a Construction Substantive Cross-Cutting Issue exists. These areas are the baseline inspection program and safety conscious work environment (SCWE).
- b. Construction Cross-Cutting Component. Fundamental performance attributes that extend across the Construction Cross-Cutting Areas. The baseline inspection construction cross-cutting components are: Accountability; Construction Experience; Corrective Action Program; Decision-Making; Resources; Self and Independent Assessments; Work Control; and Work Practices. The SCWE construction cross-cutting components are: Environment for Raising Concerns; and Preventing, Detecting, and Mitigating Perceptions of Retaliation.
- c. Construction Cross-Cutting Component Aspect. A safety culture performance characteristic that is the most significant contributor to a finding.
- d. Construction Substantive Cross-Cutting Issue (cSCCI). A baseline inspection cSCCI exists if there are four or more inspection findings (more than minor) that are assigned the same baseline inspection construction cross-cutting component aspect about which the NRC staff has a concern with the licensee's scope of efforts or progress in addressing the issues (theme). The cSCCI theme will be identified as the cross-cutting component aspect. A SCWE cSCCI exists if there is a single finding with a documented SCWE construction cross-cutting component aspect, or the licensee has received a chilling effect letter, or the licensee has received correspondence from the NRC which transmitted an enforcement action with a Severity Level of I, II, or III, and which involved discrimination, or a confirmatory order which involved discrimination and the Agency has a concern with the licensee's scope of efforts or progress in addressing the SCWE concern.
- e. Safety-Conscious Work Environment (SCWE). An environment in which employees feel free to raise safety-significant construction quality concerns,



both to their management and to the NRC, without fear of retaliation and where such concerns are promptly reviewed, given the proper priority based on their potential safety significance, and appropriately resolved with timely feedback to employees.

- f. Safety Culture (as it applies in the new reactor construction environment). That assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, a nuclear plant is constructed as designed with a focus on quality.
- g. Safety Culture Assessment: A comprehensive evaluation of the assembly of characteristics and attitudes related to all of the construction safety culture components. Individuals performing the evaluation can be qualified through experience or formal training. A licensee independent safety culture assessment is performed by qualified individuals that have no direct authority and have not been responsible for any of the areas being evaluated (for example, staff from another of the licensee's facilities, or corporate staff who have no direct authority or direct responsibility for the areas being evaluated). A licensee third-party safety culture assessment is performed by qualified individuals who are not members of the licensee's organization or utility operators of the plant (licensee team liaison and support activities are not team membership).

#### 04.03 Enforcement Terms.

- a. Apparent Violation (AV). A violation of regulatory requirements that is being considered for potential escalated enforcement action.
- b. Closed Item. A matter previously reported as an inspection finding, a deviation, a non-conformance, an item reported by the licensee (e.g., 10 CFR Part 21 report, an ITAAC maintenance item, 10 CFR Part 50.55(e) construction deficiency report or licensee event report), or an unresolved item that the inspector concludes has been satisfactorily resolved based on information obtained during the current inspection.
- c. Construction Finding. A violation of regulatory requirements that is of greater-than-minor significance and is not material to ITAAC Acceptance Criteria.
- d. Construction Issue. An inspection result that is dispositioned in accordance with the guidance in IMC 0613.
- e. Escalated Enforcement Action. Severity Level I, II, and III Notice of Violation (NOV); civil penalties; NOVs to individuals; Orders to modify, suspend, or revoke NRC licenses or the authority to engage in NRC-licensed activities; and Orders issued to impose civil penalties.
- f. Finding. A violation of regulatory requirements that has greater-than-minor significance. Examples of findings include a Construction Finding, an ITAAC-

Related Construction Finding, or an ITAAC Finding, per the definitions and guidance in this manual chapter.

- g. ITAAC Finding. A violation of regulatory requirements that is of greater-than-minor significance is associated with a specific ITAAC for which the licensee has submitted the ITAAC closeout letter, and is material to the ITAAC acceptance criteria. This type of finding could prevent the ITAAC from being verified as met by the NRC and could require that previously closed ITAAC be re-opened. An ITAAC finding may be related to a single ITAAC or a family of ITAAC.
- h. ITAAC-Related Construction Finding. A violation of regulatory requirements that is of greater-than-minor significance, is associated with a specific ITAAC for which the licensee has not yet submitted the ITAAC closeout letter, and is material to the ITAAC acceptance criteria. This type of finding could prevent the ITAAC from being closed out and therefore must be corrected and addressed in the licensee's ITAAC closure letter. An ITAAC-Related Construction finding may be related to a single ITAAC or a family of ITAAC.
- i. Licensee-Identified. For cROP, licensee-identified findings are those findings that are not NRC-identified or self-revealing. Most, but not all, licensee-identified findings are discovered through a licensee program or process. Some examples of licensee programs or processes that will likely result in such findings are the identification and documentation of findings (e.g., procedural violations, procedure inadequacies, etc.) by craft workers and/or licensee/contractor supervision during routine construction activities, construction quality assurance activities, self-assessments, independent assessments, audits and surveillances. Additional examples may include preoperational testing, start-up testing, hydrostatic testing, non-destructive testing, EP drills, and critiques conducted by or for the licensee.
- j. Minor Violation: A violation that is of such low significance that documentation in an NRC inspection report is not normally warranted. Although minor violations must be entered into the licensee's corrective action program and corrected, they are not usually described in inspection reports.
- k. Non-Cited Violation (NCV). A non-recurring, typically non-willful, Severity Level IV violation that is not subject to formal enforcement action if, for a reactor licensee, the licensee places the violation in a corrective action program to address recurrence and restores compliance within a reasonable period of time and, for all other licensees, the licensee corrects or commits to correcting the violation within a reasonable period of time. The use of NCVs as part of the enforcement process is predicated on a licensee having an adequate CAP into which identified issues are entered and effectively resolved in a timely manner. Because the CAP at construction sites will be new and implemented initially by individuals with limited experience with the new program and because construction will involve program implementation by contractors, the NRC will delay the use of NCVs pending confirmation that the new program is adequate and being effectively implemented

- i. Notice of Deviation (NOD). A written notice describing a licensee's failure to satisfy a commitment where the commitment involved has not been made a legally binding requirement. An NOD requests that a licensee provide a written explanation or statement describing corrective steps taken (or planned), the results achieved, and the date when corrective action will be completed.
- m. Notice of Nonconformance (NON). A written notice describing the failure of a licensee's contractor to meet commitments that have not been made legally binding requirements by the NRC (e.g., a commitment made in a procurement contract with a licensee or applicant as required by 10 CFR Part 50, Appendix B). (If the contractor deliberately fails to meet the terms of a procurement contract, the NRC may issue a violation under the Deliberate Misconduct Rule in 10 CFR 50.5.) NONs request that non-licensees provide written explanations or statements describing corrective steps (taken or planned), the results achieved, the dates when corrective actions will be completed, and measures taken to preclude recurrence.
- n. Notice of Violation. A formal, written citation in accordance with 10 CFR 2.201 that sets forth one or more violations of a regulatory requirement.
- o. NRC-Identified: For the cROP, NRC-Identified findings are those that are found by NRC inspectors that the licensee was not previously aware of or had not been previously documented in the licensee's corrective action program. NRC-identified findings also include previously documented licensee findings to which the inspector has significantly added value. Added value means that the inspector has identified a previously unknown significant weakness in the licensee's classification, evaluation, or corrective actions associated with the licensee's correction of a finding.
- p. Regulatory Commitment. An explicit statement of "intent" or "agreement" to take a specific action agreed to or volunteered by a licensee, where the statement has been submitted in writing on the docket to the NRC. This may include a commitment in the licensee's application, a response to a Notice of Violation, etc.
- q. Requirement. A legally binding obligation such as a statute, regulation, license condition, technical specification, or an order.
- r. Self-Revealing. For the cROP, self-revealing findings are those that become self-evident and require no active and deliberate observation by the licensee or NRC inspectors to determine whether a change in process or equipment capability or function has occurred. Self-revealing findings become readily apparent to either NRC or licensee personnel through a readily detectable degradation in the material condition, capability, or functionality of equipment and require minimal analysis to detect. Some examples of self-revealing findings include failure of equipment or instrumentation to operate properly during testing that was not related to the purpose of the test (e.g., inadequate foreign material controls cause the failure) and violation of radiography exclusion

area requirements that are subsequently identified through an electronic dosimeter alarm.

- s. Unresolved Item (URI). An issue of concern about which more information is required to determine if a violation exists or if a violation is greater-than-minor. Such a matter may require additional information from the licensee or cannot be resolved without additional guidance or clarification/interpretation of the existing guidance.
- t. Violation. The failure to comply with a requirement.

## 2506-05 RESPONSIBILITIES AND AUTHORITIES

### 05.01 Director, Office of New Reactors (NRO).

- a. Provides overall program direction for the cROP.
- b. Develops and directs the implementation of policies, programs, and procedures for inspecting applicants, licensees, and other entities subject to NRC jurisdiction.
- c. Assesses the effectiveness, uniformity, and completeness of implementation of the cROP.
- d. Provides overall direction for the NRC vendor inspection program.
- e. In the event of a pandemic, concurs on the regions' recommendations to the modification to the inspection program in accordance with the direction provided under Appendix A of this IMC.

### 05.02 Director, Division of Construction Inspection and Operational Programs (DCIP).

Manages inspection program development within NRO, develops and prepares revisions to the cROP, oversees regional implementation, and serves as the NRO contact with the regional offices for program development and implementation.

### 05.03 Directors, Technical Divisions, NRO.

- a. Assists the Director, DCIP in developing the technical content of and reviewing periodic revisions to the requirements and guidance contained in inspection procedures related to their areas of technical expertise.
- b. Ensures their staff inspects technical documents in support of ITAAC closure and other inspection activities.

### 05.04 Deputy Regional Administrator for Construction, Region II.

- a. Provides program direction for management and implementation of the cROP elements performed by the Center for Construction Inspection, Region II (CCI).

- b. Ensures, within budget limitations, that the regional office staff includes adequate numbers of inspectors in the various disciplines necessary to carry out the inspection program described in this chapter, including that which may be needed for regional supplemental and reactive inspections.
- c. Directs the implementation of the supplemental inspection program.
- d. Applies inspection resources, as necessary, to deal with significant issues and problems at specific plants.
- e. Ensures that line managers assign inspectors who are appropriately trained and have the necessary knowledge and skills to successfully implement inspection procedures.
- f. Determines that a pandemic situation which affects inspection resource availability has occurred and recommends modification to the inspection program.

05.05 Regional Administrators, Host Regions.

- a. Provides assistance with construction inspections to CCI for plants in their respective region within budgeted resources.
- b. Ensures, within budgeted resources, that their staff leads inspections of select operational program inspections at facilities under construction in their respective region as assigned by this IMC.

2506-06 CONSTRUCTION INSPECTION PROGRAM (CIP)

The CIP is an integral part of the NRC's cROP and supports the goals and objectives of that process. The objectives of the CIP are to:

- a. Determine whether or not appropriate quality controls are implemented in the development of applications that will be or have been submitted to the NRC; and
- b. Provide reasonable assurance that the facility has been constructed and will be operated in conformity with the license, the provisions of the Act, and the Commission's rules and regulations.

The CIP has four phases. The first and second phases support a licensing decision for an ESP and the COL application. Inspections will initially be conducted to verify effective implementation of the QA program, as described in the application for an ESP and/or COL, to provide reasonable assurance of the integrity and reliability of the ESP and/or COL data or analyses that would affect the performance of safety-related systems, structures, and components SSCs. The third and fourth phases support construction activities and the preparations for operation. Prior to and during plant construction, inspections will be conducted to review vendor activities and licensee

oversight of these activities. During plant construction, inspections will be conducted to verify satisfactory completion of ITAAC, adequate development and implementation of construction and operational programs, and to review the transition to power operations. Guidelines for conduct of the CIP are contained in Appendix A to this IMC.

06.01 Early Site Permit Audits/Inspections. IMC 2501 describes the ESP phase of reactor licensing under Part 52. It provides guidance for inspectors to use in conducting inspections during the pre-application and post-application phase in support of the hearing required by the Atomic Energy Act. Enforcement actions associated with an ESP application are not anticipated in the pre-docketing application phase. However, the information submitted with the application will become subject to NRC regulations, including enforcement actions for willful, wrongdoing, or fraudulent information. During the post-docketing phase, the applicant will be subject to 10 CFR Part 21 (Part 21) and 10 CFR 50, Appendix B (Appendix B) requirements and may be subject to enforcement actions, such as notices of violation and nonconformance.

06.02 Pre-Combined License (Pre-COL) Inspections. IMC 2502, "Construction Inspection Program: Pre-Combined License (Pre-COL) Phase," provides inspection policy and guidance for the implementation of the inspection program during licensee preparation and NRC review of COL applications submitted under Part 52. Similar to inspections conducted to review ESP activities, NRC will conduct inspections of an applicant once the COL application is tendered. These inspections will continue to be applied during the application review process until a COL is issued. This timeframe is referred to as the pre-COL phase. During the pre-COL phase, the applicant is subject to Part 21 and Appendix B requirements and may be subject to enforcement actions, as deemed appropriate.

In addition to pre-COL inspections conducted in support of the COL licensing process, the CCI staff and the NRO Quality and Vendor branches (CQV) vendor inspection staff will inspect the applicant's oversight of limited pre-construction activities that may support the NRC's future closure verification of ITAAC. The CCI staff will identify limited pre-construction activities that are ongoing both in proximity to the construction site, and at remote locations. Pursuant to Appendix B requirements, the applicant may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program but shall retain the responsibility for its successful implementation. Therefore, the applicant's oversight of such supplier's activities will be evaluated during these inspections. Results of these inspections will be documented in accordance with IMC 0613.

Inspection of the applicant's oversight of limited pre-construction activities that are ongoing in proximity to the construction site will primarily be conducted by the construction resident inspector staff. Coordination with DCIP is not routinely required for the conduct of these inspections. Although these inspections will be evaluating the applicant's oversight of their supplier's activities, these inspections do not have to occur concurrently with an applicant's presence.

Inspection of limited pre-construction activities that are ongoing at remote locations may be conducted either by personnel in the CQV or CCI staff. The conduct of these inspections will require coordination with DCIP, including a review of the activity

identified for inspection and an assessment of whether the inspection should be a vendor inspection (IMC 2507, "Construction Inspection Program: Vendor Inspections"), or a regional pre-COL inspection (IMC 2502). Although inspections conducted by CCI will be evaluating the applicant's oversight of their supplier's activities, these inspections do not have to occur concurrently with an applicant's presence.

It is anticipated that NRC oversight of most limited pre-construction activities that occur at remote locations (i.e., vendors) and warrant inspection will be accomplished through vendor inspections. An example of such activities that may warrant inspection includes measurements and/or testing that can only be conducted at the vendor site due to the configuration of equipment or modules or the nature of the test, i.e., where access to the component for inspection or test is impractical after installation in the plant (e.g., measurements of reactor vessel internals).

### 06.03 Inspections Subsequent to LWA/COL Issuance.

Upon issuance of an LWA and/or a COL for a new reactor, the staff begins inspections pursuant to IMC 2503, "Construction Inspection Program: Inspections of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)" and IMC 2504, "Construction Inspection Program - Inspection of Construction and Operational Programs." IMC 2503 and 2504 inspections continue until the 10 CFR Part 52.103(g) finding is made by the Commission.

This phase of the CIP is primarily implemented by CCI, which dispatches construction resident inspectors (CRIs) to a new reactor site to oversee the day-to-day activities of the licensee and its contractors (the guidelines for assigning resident inspectors to operating reactors (N+1 policy) do not apply to reactors under construction). The CRIs will be supplemented with additional personnel from CCI, other regional offices, and Headquarters technical staff, as needed, to implement this phase of the CIP and provide reasonable assurance that the as-built facility conforms to the conditions of the COL. NRC resources are carefully managed to ensure that construction inspection activities do not in any way detract from the ongoing oversight of operating reactors. The CRI program guidelines are contained in Appendix B to this IMC.

IMC 2503 describes the program for inspecting ITAAC-related work activities. With ITAAC structured as they are, the staff will need to make determinations regarding the completion of individual ITAAC as the licensee indicates completion of them. Performing inspections of ITAAC-related activities during the construction of SSCs, rather than waiting until the licensee submits an ITAAC closure letter to perform inspections, provides the NRC confidence that SSCs were constructed in accordance with the design or that means exist to implement the licensee's program elements. Therefore, a phased verification program was developed to assess completion of ITAAC-related work activities. This includes, but is not limited to, inspections of procedures, procurement, receipt, storage, handling, installation, craft qualification, corrective action program implementation, and quality control (QC) oversight of the SSCs which are covered by ITAAC.

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 group of ITAAC based upon an examination of some representative ITAAC within the group. Such an inspection approach would allow for the efficient use of NRC inspection resources not only for the ITAAC examinations, but also for the routine evaluation of the construction processes that result in the ITAAC products and completion.

To direct and govern this ITAAC focus, a methodology was developed using a sampling inspection approach. Based upon an analysis and estimate of the NRC inspection resources required to review and conduct direct inspection of the ITAAC-related work for two certified designs (the AP1000 and ABWR), it was determined that the CIP would rely upon an ITAAC sampling inspection process. This decision was based upon the perspective that complete coverage and direct inspection of the activities associated with the entire population of the AP1000 and ABWR ITAACs is an inefficient and unnecessary use of dedicated NRC inspection resources. In order to facilitate the use of sampling inspections to confirm adequate licensee control and completion of the ITAAC, an inspection planning tool, identified as the ITAAC Matrix, was developed. The sampling methodology and the ITAAC Matrix are described in detail in Appendix B to this IMC, and in IMC 2503.

An additional ITAAC inspection area concerns DAC, which are part of the ITAAC inventory for a given design. For specific disciplines, design details are not provided at the time of DCD certification. These design details will be verified as part of the ITAAC to demonstrate that the system design and as-built configuration conformed to the licensing basis. The DAC apply in three specific disciplines as outlined in SECY 92-053. They are: digital instrumentation and control design; piping design; and human factors engineering. Additionally, the ABWR design includes some limited radiation protection DAC.

All DAC related ITAAC will be inspected as the design implementation detail is made available by a COL applicant or licensee. The complexities of the DAC dictate that inspections of DAC will normally be led by CCI staff with support by NRO technical staff, which will provide an inspection report feeder to CCI. Since DAC inspection will be required to satisfy the associated ITAAC, all DAC inspection will be required prior to the 10 CFR Part 52.103(g) finding.

IMC 2504, which is conducted in parallel with IMC 2503, defines the inspection program for the evaluation of the licensee's construction programs, including QA, ITAAC closure, and security (including FFD); operational programs prior to fuel load; and pre-operational testing. The purpose of construction program inspections is to verify that the licensee has programs established and implemented to:

- a. Control construction activities at the site
- b. Identify problems and resolve them
- c. Report deficiencies and identify failures to do so
- d. Ensure design requirements are translated to construction documentation



- e. Ensure the adequacy of ITAAC determination packages for submittal to the NRC.

The purpose of operational program inspections is to verify that operational programs required for low-power testing have been established and are being implemented, to the degree required, in accordance with the COL license conditions related to operational programs, and to determine the operational readiness of a plant licensed in accordance with 10 CFR Part 52.

Completion of this phase of the CIP is intended to provide the NRC with reasonable assurance that the facility is constructed and will operate in conformity with the license. Inspections related to IMCs 2503 and 2504 will end when the Commission has made its finding that all acceptance criteria in the COL are met.

06.04 Vendor Inspection Program. IMC 2507 describes the vendor inspection program for inspecting the activities at facilities where basic components are designed, manufactured, or stored. The CQV staff is responsible for implementing the vendor inspection program. Routine and reactive inspections are conducted to verify that the vendor QA programs are implemented and comply with the applicable regulatory requirements of Appendix B and Part 21.

The CQV staff will focus on the content and implementation of the QA program and may be supported by CCI when the inspections involve the fabrication of modules and components at vendor locations. To the extent possible, CCI will use the results of vendor inspections and reviews to inform its inspections at specific sites. By maintaining a broad awareness of vendors and their activities, CQV and CCI will be improving their abilities to effectively and efficiently conduct the CIP inspections for which they have assigned responsibility.

The CQV staff will also conduct Engineering Design Verification (EDV) inspections. These inspections verify that the design authority (1) has developed processes that allow for the complete and accurate transfer of the high level design information and performance requirements specified in the final safety analysis report (FSAR) in a manner consistent with the requirements of Appendix B, (2) has developed processes to ensure changes to the design are adequately controlled and (3) has produced detailed procedures, specifications, calculations, drawings, procurement, and/or construction documents that are consistent with NRC regulations, the FSAR, and the NRC's Safety Evaluation Report (if issued). EDV inspections are conducted pursuant to IMC 2507 and IP 37805, "Engineering Design Verification Inspections."

06.05 Baseline Inspection Program. The CIP consists of a construction baseline inspection program and construction reactive inspection program.

The overall objectives of the baseline inspection program are (1) to provide a sufficient basis to support the Commission determination, in accordance with 10 CFR 52.103(g), that the acceptance criteria in a combined license have been met; and (2) to develop confidence in the licensee's programmatic controls. To meet the first objective, the baseline program is designed to provide confidence that licensee ITAAC completion and verification processes are effective and provide reasonable assurance that licensee

ITAAC completion notifications are sufficient and accurate. To meet the second objective, the baseline program confirms an adequate level of quality in construction products and verifies that operational programs are consistent with the FSAR.

In implementing these objectives, the program allows for flexible scheduling to permit the adjustment, including expansion or reduction of inspection scope, and includes ITAAC across a full range of significance with effort being weighted toward those with higher significance. The baseline inspection program also informs the Commission of the status of operational programs before the anticipated date for loading fuel.

The baseline inspection program delineates specific inspection activities to evaluate aspects of licensee programs and processes and their implementation by identifying findings that are indicative of licensee performance problems. Inspection findings from the baseline program are evaluated for significance and used to assess licensee performance. The baseline inspections are not diagnostic assessments of licensee performance leading to a root cause determination. Those assessments and root cause determinations are intended to be reviewed or independently made during supplemental inspections that are outside the scope of the baseline inspection program. The baseline inspection program is risk informed. The risk informed approach means that inspectable areas were selected based partly on their significance from a risk perspective. Risk has been factored into the baseline inspection program primarily by the ranking of ITAAC.

The baseline inspection program consists of inspections in the following areas:

a. ITAAC-Related Work Inspections.

As described earlier, the staff has developed a sample based approach and methodology for selecting those ITAAC that will be part of the baseline inspection program. There are three key elements to ITAAC-related inspections. The first element is inspection of a broad range of ITAAC-related work. This includes inspection of activities and SSCs associated with the following ITAAC:

1. Targeted ITAAC
2. If there are no targeted ITAAC in a family, at least one ITAAC from that family will be selected for inspection.
3. DAC
4. Emergency Preparedness ITAAC
5. Security ITAAC
6. A representative sample of Site-Specific ITAAC

The second element of ITAAC-related work inspections is inspection of ITAAC-related construction processes. This is accomplished by the top level (i.e.

numbered) steps from the inspection procedures. The staff developed inspection procedures for each of the rows and columns in the ITAAC matrix. These procedures constitute the construction baseline inspection procedures applicable to ITAAC inspections and are written to provide inspection requirements and guidance for a wide range of SSCs from all reactor types. Therefore, not every step will apply to every SSC nor will every step apply to each reactor type. Since the inspection procedures are broadly written, using the top level steps ensures that all applicable processes are inspected. During the planning for ITAAC inspections, inspectors will identify those steps that apply to a given ITAAC and use those to implement the inspections.

The third element of ITAAC-related work inspections is the adjustment of the number of SSCs planned to be inspected for any given ITAAC. The number of SSCs planned for inspection can be increased or decreased based on inspection program results. Sample adjustments will be made as part of the continuous, quarterly, or semi-annual performance review assessment process described in IMC 2505 and should be based on licensee performance, resources, or other ITAAC-related issues, such as generic items and allegations.

During the planning for ITAAC-related work inspections, each ITAAC included in the baseline inspection program will be assigned to a lead inspection branch that will be responsible for planning, conducting, and documenting the inspection of the assigned ITAAC. When satisfied that a sufficient sample of SSCs related to each ITAAC have been inspected, all issues have been dispositioned, and the appropriate IP steps have been addressed, the lead branch chief will formally recommend completion of ITAAC-related work inspections based on direct inspection (e.g. observation, document review, etc). These recommendations will be rolled up by the assessment process in IMC 2505 as part of making the final recommendation to the Commission that the acceptance criteria in the COL have been met.

b. Construction Program Inspections (including Pre-operational Testing Inspections).

Guidance for construction program inspections is contained in IMC-2504. As described in IMC-2504, the following construction program inspections must be completed in accordance with the governing inspection procedure as part of the construction baseline inspection program. These inspections will be coordinated through CCI and, with the exception of the fitness for duty and security inspections, will be led by CCI. The fitness for duty and security inspections will be led by the host region DRS.

1. Quality Assurance (QA) Program During Construction.

The NRC program to review the licensee's QA program during construction has two parts. An initial team inspection will be conducted to review the QA program implementing documents within the first six months after construction begins. If construction is started under an

ESP/LWA, then the focus of the review will be on LWA activities and the full licensee program will be reviewed after the COL is issued. After the initial team inspection, periodic inspections will be performed of selected criteria of Appendix B to 10 CFR Part 50. The QA program inspection requirements and frequencies are contained in Inspection Procedure 35007, "Quality Assurance Program Implementation During Construction." All inspections conducted under this procedure will typically be led by CCI.

The NRC's confidence in the corrective action program portion (finding and fixing problems) of a licensee's QA program is one basis for dispositioning Severity Level IV violations as non-cited violations (NCVs). Severity Level IV violations will not be dispositioned as NCVs unless the licensee's corrective action program has been determined to be effective and all other NCV criteria are met.

## 2. Reporting of Defects

The inspection requirements to ensure the licensee has established a program and procedures to effectively implement 10 CFR Part 21 and 10 CFR 50.55(e) requirements for reporting defects and failures to comply associated with a substantial safety hazard are contained in Inspection Procedure 36100, "Inspection of 10 CFR Part 21 and 10 CFR 50.55(E) Programs for Reporting Defects and Noncompliance." All inspections conducted under this procedure will be led by CCI.

## 3. Commercial Grade Dedication

The inspection requirements to ensure the dedicating entity's commercial-grade dedication program satisfies the requirements of Appendix B to 10 CFR Part 50 with regard to the procurement and acceptance of commercial-grade items (CGIs) for use as basic components in accordance with 10 CFR Part 21, are contained in Inspection Procedure 43004, "Inspection Of Commercial-Grade Dedication Programs." All inspections conducted under this procedure will be led by CCI.

## 4. ITAAC Management

The inspection requirements to ensure the licensee has established a program and procedures to ensure the acceptance criteria for inspections, tests and analyses remain met following ITAAC closure are under development. All inspections conducted under this procedure will be led by CCI.

## 5. Construction Fitness for Duty

The inspection requirements to verify that the licensee or other entity is properly implementing the requirements contained in 10 CFR Part 26, Subpart K, "Fitness for Duty (FFD) Programs for Construction," are contained in Inspection Procedure 81504, "Fitness for Duty Program for

Construction.” 10 CFR 26.401(a) permits a licensee to implement a full testing program (i.e., compliant with subparts A through H, N, and O of 10 CFR Part 26) instead of a Subpart K program. If a full program is implemented, the inspectors should use Inspection Procedure 71130.08 (operating reactors). This inspection should be completed before construction begins, with a goal of completion within 30 days prior to start of construction because the licensee is required to have the program in place within 30 days of start of construction. All inspections conducted under this procedure will be led by the host region.

6. Pre-Operational Testing.

Pre-operational testing will be inspected under IMC-2504. Regulatory Guide 1.68, “Initial Test Programs (ITP) for Water-Cooled Nuclear Power Plants,” describes the general scope and depth that the NRC staff considers acceptable for ITPs for light-water-cooled nuclear power plants. The ITP consists of pre-operational and initial startup tests. Pre-operational testing consists of those tests conducted following completion of construction and construction-related inspections and tests, but prior to fuel loading, to demonstrate, to the extent practical, the capability of SSCs to meet the performance requirements to satisfy the design criteria. Initial startup testing consists of those test activities that are scheduled to be performed during and following fuel loading and are not part of the construction baseline inspection program. These activities include fuel loading, pre-critical tests, initial criticality, low-power tests, and power-ascension tests. Initial startup testing will be inspected under IMC 2514.

IMC-2504, Appendix A identifies the general inspection procedures to be used for evaluating the pre-operational test program. Design-specific inspection procedures will also be used to verify that a sample of important-to-safety systems and components are tested fully and meet their design requirements. Appendix A identifies the procedure for each reactor design that specifies which tests will be inspected. Those pre-operational tests that contain targeted ITAAC will be inspected and additional tests, informed by risk, will also be inspected. While pre-operational test inspections will be led by CCI, operating resident inspectors and operator licensing examiners from the host region will be considered for support.

c. Operational Program Inspections.

Program guidance for operational program inspections is contained in IMC-2504. Operational program inspections are one-time inspections to verify the status of the implementation of the program. CCI has overall responsibility to ensure that operational program inspections are completed for operational programs required to be implemented prior to the 10 CFR 52.103(g) finding. While CCI has overall responsibility for these operational programs, selected operational program inspections will be led by the host region, which will closely coordinate their efforts with and report inspection results to CCI so that they can be considered in the assessment of licensee performance. It is probable that

some operational program inspections will not have been developed and/or implemented at the time of the 10 CFR 52.103(g) finding. Those programs that have not been developed and/or implemented at the time of the 10 CFR 52.103(g) finding will remain license conditions and will become the responsibility of the host region. The staff is committed to inform the Commission on the status of operational programs at the time of the 10 CFR 52.103(g).

06.06 Plant Specific Supplemental and Reactive Inspections. Plant performance will be assessed using IMC-2505. Plants whose performance is outside the licensee response band in the Construction Action Matrix will receive plant specific supplemental inspections based on their assessed performance. The depth and breadth of specific supplemental inspections chosen for implementation will depend upon the significance of the identified issues and will be conducted pursuant to the inspection procedure specified in the construction action matrix.

In addition, the staff may conduct reactive inspections in response to non-performance events and issues that occur at the facility. Reactive Inspections include inspections required for allegation response and event follow-up. Guidance for reactive inspections will be contained in IMC 2504.

06.07 Inspection Planning. To implement the baseline CIP, inspection planning should occur well in advance of actual inspection. This begins with the inspection strategy documents, which are developed by CCI personnel, for each ITAAC family. Inspection strategy documents include a description of the ITAAC family, inspection procedures to be used, applicable SSCs to be inspected, attributes of the inspection procedures to be completed to credit an inspection sample, a representative sample for each targeted ITAAC, inspection frequency including a sample range and resource estimate, other planning considerations, and references.

For those ITAAC that require complex technical analyses, the strategy document will also be reviewed by a technical division in NRO. After the strategy document is approved, CCI personnel will use it to begin detailed planning. To do this, CCI should assemble teams of inspectors and schedulers and task them with developing a plan that implements the CIP. This planning effort should start with the inspection strategy document and develop a database that, for each ITAAC in the family, contains the information from the strategy plus the following:

- a. A lead branch responsible for planning, conducting, and documenting the inspections. This would distinguish between resident and region based inspectors and, if regional inspectors are responsible, which discipline.
- b. Any necessary support personnel (e.g., NRO Technical Expert) that would be needed.
- c. The applicable high level steps from the specified inspection procedures. These steps should be those needed to ensure that the representative number of SSCs is properly inspected and that construction processes, such as QA, welding, etc. are properly implemented to ensure the ITAAC is completed. If IPs beyond

those listed in the strategy are needed, they should be included. It should not be assumed that each step must be performed on each SSC.

- d. The estimated number of hours to complete the inspection.

After the ITAAC in all the families along a given row of the ITAAC matrix have been reviewed, the team should verify that the assigned inspection procedure steps effectively inspect all the necessary construction processes needed to ensure that the SSCs are constructed in accordance with the licensed design. This can be done by ensuring that each high level (i.e. numbered) step in the applicable row and column procedures is addressed by the plan. The output of this process would be a generic inspection plan for that particular design (AP1000, ABWR, etc).

The generic plan can then be implemented on a site specific basis by overlaying the planned inspections on the construction schedule. Each targeted ITAAC would be considered complete when the site specific plan was complete. This means that, after adjustment by the assessment process, the necessary targeted ITAAC will have been inspected, the SSCs designated in the plan will have been inspected, the designated steps of each row procedure will have been addressed, and the designated steps of each column procedure will have been addressed.

**06.08 Inspection Roles and Responsibilities.** Since the formation of CCI and NRO in late 2006, the staff has evaluated the roles and responsibilities for the inspections needed to support the successful implementation of the CIP. Exhibit 2, "Responsibilities for Inspection Activities", is based on a table included in SECY 07-0049, "Construction Inspection Roles and Responsibilities," dated March 8, 2007. Exhibit 2 summarizes the inspections required by IMCs 2501, 2502, 2503, 2504, and 2507, shows the inspections in the approximate order that they will occur, and identifies the organization assigned lead and support responsibility for each type of inspection.

The first two entries in Exhibit 2 are inspections and reviews of QA activities that will occur in the early phases of the ESP process. QA inspections and reviews are used here and throughout the CIP to gain confidence that the QA program is being used effectively to monitor the quality of the materials and services. The ESP inspections and reviews provide regulatory oversight of the actions taken by the applicant to ensure that the information in the application is accurate and was collected with appropriate methods. The inspections consider the applicant's plans for monitoring a variety of activities including analyzing performance, designing, fabricating, handling, shipping, storing, installing, testing, and maintaining SSCs.

The next four entries in Exhibit 2 are inspections to monitor QA program implementation by both the applicant and the various vendors and contractors who are providing equipment or services to the specific project. QA inspections are conducted under both IMC-2501 and IMC-2502. In addition to inspecting the applicant's QA program, the CIP will review quality oversight of vendors supplying safety-related structures, systems, and components. Personnel from CQV will lead the QA inspections supporting the review of an ESP and a COL. Assigning this responsibility to CQV organization in NRO is appropriate because there is a direct connection between the technical reviews and CIP inspections performed by that group. Key to this decision are the synergistic effects

realized through routine direct interactions among CQV staff and other new reactor licensing technical reviewers, particularly in the area of codes and standards.

The next two entries in Exhibit 2 apply to inspections of vendor activities. These inspections were described above in section 06.04. As indicated in Exhibit 2, CQV will lead and CCI and NRO Technical Staff will provide support to inspections of vendors related to the fabrication of components or modules for a specific application or license. Participation by CCI will help their staff to maintain an awareness of the on-going activities and to develop a comprehensive view of licensee oversight of work activities related to the construction of a specific plant, which may contribute to the successful completion of the acceptance criteria of the combined license.

The next six entries in Exhibit 2 are the major inspections to be led by the CCI construction inspection staff. These inspections will cover (1) applicant's QA program implementation related to the fabrication of components or modules both on and off site; (2) licensee's program implementation related to the fabrication of components or modules both on and off site; (3) the installation and testing of structures, systems, and components; (4) the development and implementation of licensee operational programs. ITAAC-related work inspections will be conducted under IMC-2503 typically by CCI with support as necessary from the NRO Technical Staff. On occasion, the host region may be requested by CCI to conduct ITAAC-related work inspections. Construction and operational program inspections will be conducted under IMC-2504.

The nature of the acceptance criteria of some of the ITAAC targeted for inspection under IMC-2503 will result in CCI requiring technical assistance from NRO in assessing the success of some installation activities and reviewing the adequacy of some test outcomes. For example, some ITAAC have design commitments requiring that the components be designed and constructed in accordance with the requirements of Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. Although the inspection program can collect information about the installation practices, the NRO technical staff will be needed to evaluate the as-built design to ensure that required detailed design or changes that might have been needed to accommodate field conditions continue to meet the acceptance criteria. There are approximately 100 ITAAC for the AP1000 and approximately 170 ITAAC for the ABWR that fall into this category. In addition, CCI may require technical assistance from NRO technical staff for inspection issues that may arise. Such support will be facilitated through the Technical Assistance Request process.

CCI will lead the IMC-2504 inspections of site-specific construction programs including the implementation of the construction QA program and the development and implementation of the operational programs. CCI may require assistance from NRO technical staff to ensure that the operational programs being developed and implemented are consistent with the program descriptions and development schedules approved when the COL was issued. No specific areas for assistance have been identified.

The final entry in Exhibit 2 concerns the DAC inspections. As mentioned above in Section 06.03, DAC inspections are led by CCI with support from the NRO technical staff, and the results of these inspections will be forwarded to CCI.



Region II CCI will have the overall lead for IMC 2504 construction and operational program inspections. Several of these inspections will require assistance from the host region for their completion. In many cases, the host region will lead the inspection and report the results to CCI for consideration in the overall assessment of licensee construction activities. The IMC-2504 inspection leads are listed in Exhibit 3, "Construction Program Inspection Leads," and Exhibit 4, "Operational Program Inspection Leads."

A combined effort by the CCI construction inspection staff, the headquarters CQV staff, the NRO technical staff, and host region staff will be needed to ensure adequate inspection of construction and construction-related activities. However, the scope of the inspection effort associated with each item will vary significantly.

06.09 Documenting Inspection Results. The purpose of reporting the results of baseline inspections is to document the scope of inspections and any findings in support of the assessment process. The NRC does not have objective criteria for evaluating positive findings. Therefore, the assessment process does not incorporate positive findings and they will not be documented in baseline inspection reports. The scope of daily activities conducted by the resident inspectors does not require documentation in inspection reports. Issues identified during inspections will be documented in accordance with the guidance and requirements in IMC 0613, "Documenting 10 CFR Part 52 Construction and Test Inspections."

06.10 Construction Project Resource Estimate. The initial inspection effort estimate is 35,000 hours per unit over the life of the construction project. This number includes 15,000 hours for ITAAC-Closure inspections, 10,000 hours for programmatic and operational readiness inspections, 5,000 hours for reactive inspections above the baseline program in response to licensee performance issues and allegations and non-performance issues/events, and 5,000 hours for engineering design verification and technical support for ITAAC closure. See the following table for a summation of the inspection effort estimate:

Inspection Activity	Hour Estimate Per Plant
ITAAC-related Inspections	15,000 hours
Program inspections (construction and operational programs)	10,000 hours
Reactive Inspections	5,000 hours
Technical Support	5,000 hours
TOTAL	35,000 hours

Notes:

- a. Headquarters engineering resources needed for ITAAC inspections are approximately 3,000 hours for both the ABWR and AP-1000 designs. This is then assumed to be one inspection element included in the 15,000 hours for ITAAC inspections listed above.
- b. ITAAC inspections include all the necessary vendor or field inspections, engineering analyses, technical assistance requests, report reviews needed to close the ITAAC, pre and post-COL inspections, DAC follow-up, and design change reviews (15,000 inspector hours).
- c. Inspection of Construction and Operational Programs include QA verifications, IMC-2504 construction programs, pre-operational inspections, and operational program readiness reviews (10,000 hours)
- d. Reactive Inspections include inspections required for allegation response, baseline inspection sample expansion, or the follow-up of performance problems and non-performance issues/events (5,000 hours, including an estimated 500 hours for engineering inspection).
- e. Technical support includes 4,000 inspection hours and 1,000 hours of ITAAC closure letter review.
- f. Engineering resources for EDV inspections, non-ITAAC inspections, reactive inspections, and design verification may be used, in part, to verify licensee compliance with post-COL FSAR commitments and/or license conditions. A panel of technical experts will provide a recommendation to management about which, if any, of these post-COL commitments warrant independent verification. If needed, the panel will also recommend what type of verification (e.g. direct inspection, engineering inspection) is most appropriate.

Of this 35,000 hour estimate, a total of 6,000 hours is projected for detailed engineering inspection, analyses, verification, and design follow-up. It is noted that only 3,000 of the 6,000 hours are projected for ITAAC inspections, with the remaining 3,000 hours budgeted for EDV and reactive inspections, respectively. The estimate for engineering resource needs do not project where those resources will be budgeted, whether from NRO or contract hiring or other sources (like qualified engineering inspectors that reside with Region II). All NRC HQ reviews are categorized as engineering resources. Therefore, this estimate does not attempt to project where these resources will be allocated.

## 2506-07 ITAAC CLOSEOUT PROCESS, ITAAC MAINTENANCE AND REQUIRED NOTIFICATIONS

07.01 ITAAC Closeout Process. For each ITAAC, in accordance with 10 CFR 52.99(c)(1), the licensee is required to notify the NRC that the prescribed inspections, tests, and analyses have been performed and that the prescribed acceptance criteria

have been met. The notification must contain sufficient information to demonstrate that the prescribed inspections, tests, and analyses have been performed and that the prescribed acceptance criteria have been met. This notification is commonly referred to as an ITAAC Closeout Letter (ICL). These notifications facilitate the staff recommendation regarding the 10 CFR 52.103(g) finding on whether all of the acceptance criteria are met.

All ICLs are reviewed by the staff to determine whether or not the ITAAC can be closed. This process will be led by DCIP and closely coordinated with CCI, OGC, other NRO divisions, and NSIR. During the ICL review, the staff will verify NRC inspection results related to the respective ITAAC, review all information that could bear on the ITAAC from other sources, and make a determination of whether or not the ITAAC should be closed. As part of the ITAAC closure strategy, the staff plans to ensure that a majority of ITAAC targeted for direct inspection have been inspected prior to closing other ITAAC in the same family that were not directly inspected.

The staff is required, at appropriate intervals during construction, to publish Federal Register notices of successful ITAAC completion. The periodic notices will not only inform the public that the licensee has completed the inspections, tests, and analyses in one or more ITAAC, but also that the staff has completed its review of the involved ITAAC and has found that the licensee successfully completed the ITAAC.

In October 2009, the NRC issued Regulatory Guide 1.215, "Guidance for ITAAC Closure under 10 CFR Part 52." This guide describes a method that the staff considers acceptable for use in satisfying the requirements for documenting the completion of ITAAC. In particular, this guide endorses the methodologies described in NEI 08-01, "Industry Guideline for ITAAC Closure Process under 10 CFR Part 52," which provides an approach that COL holders may use to satisfy NRC regulatory requirements under 10 CFR 52.99 related to the completion and closure of ITAAC for new nuclear power plants.

The next step in the ITAAC closeout process occurs at 225 days before fuel load. In accordance with 10 CFR 52.99(c)(2), no later than 225 days prior to initial fuel loading, the licensee is required to notify the NRC that the inspections, tests and analyses will be performed and the acceptance criteria will be met for all uncompleted ITAAC prior to operation. The uncompleted ITAAC notification must provide sufficient information to demonstrate that the prescribed inspections, tests and analyses will be performed and the prescribed acceptance criteria will be met, including, but not limited to, a description of the specific procedures and analytical methods to be used for performing the prescribed inspections, tests and analyses and determining that the prescribed acceptance criteria have been.

After all ITAAC have been completed, the Director of NRO, in consultation with the appropriate Regional Administrators, will inform the Commission that all ITAAC have been met. NRC inspection results, together with the information submitted by the licensee, will be the foundation of the staff's recommendation to the Commission in support of its finding on whether the acceptance criteria in the COL have been met.

07.02 ITAAC Maintenance. Completion of ITAAC will be accomplished by the licensee over a prolonged period. For some ITAAC, this will mean significant time will elapse between the initial determination that an individual ITAAC is closed and the Commission finding, in accordance with 10 CFR 52.103(g), on whether all of the acceptance criteria are met. An important aspect of the 10 CFR 52.103(g) process is to confirm that the acceptance criteria continue to be met for ITAAC that were completed well before the Commission makes the 10 CFR 52.103(g) finding. The staff recognizes that in such cases, normal maintenance will be needed on SSCs with associated ITAAC or program elements, and such SSCs may also need repairs. The inspection program will confirm, on a sampling basis, that the surveillance and post-maintenance testing performed in this interim period are focused not only on technical specification operability and similar operational concerns, but also on maintaining the validity of ITAAC determinations.

The ITAAC Maintenance Process inspection program and required notifications will be described in detail in an NRO Office Instruction, Inspection Procedure 40600, "Licensee Program for Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Management", and in Regulatory Guide 1.215.

#### 2506-08 CONSTRUCTION ALLEGATION PROGRAM

The NRC's allegations program is described in Management Directive (MD) 8.8, "Management of Allegations," and is implemented using the guidance in NRR Office Instruction OVRST-200, "Management of Allegations." The objective of OVRST-200 is to discuss the process by which NRR staff and managers implement the requirements of MD 8.8. Adherence to OVRST-200 ensures consistency in performing various allegation-related activities and functions and thereby ensures safety and improves public confidence. OVRST-200 also describes the roles and responsibilities of the NRR Allegations Team. The NRO allegation program is administered by the NRR Allegations Team.

NRO developed and issued an office instruction to establish the NRO procedures to implement the requirements of MD 8.8 and OVRST-200. This instruction incorporates by reference the guidance outlined in MD 8.8 and OVRST-200 for the receipt and processing of allegations associated with new reactors.

#### 2506-09 CONSTRUCTION ENFORCEMENT PROGRAM

The NRC Enforcement Policy governs the processes and procedures for the initiation and review of violations of NRC requirements and the NRC Enforcement Manual contains implementation guidance. Both documents are owned and issued by the Office of Enforcement (OE). In addition, for Part 52 new reactors, IMCs 0613 and 2505 provide guidance for assigning significance to findings and the NRC response to findings associated with new reactors under construction.

## 2506-10 CONSTRUCTION EXPERIENCE PROGRAM (ConE)

In 2007, NRO began developing a ConE program to collect, evaluate, communicate, and apply lessons learned from the design and construction of new reactors. To achieve this goal, the staff developed a risk-informed process to obtain, screen, evaluate, communicate, and incorporate construction experience insights into its new reactor licensing and construction oversight activities. In March 2009, the staff documented this process in an Office Instruction, NRO-REG-112, "New Reactor Construction Experience Program." Since then, the NRO staff has actively been obtaining and evaluating ConE information from various domestic and international sources.

The ConE program also reviews all the operating experience from operating reactors since the root causes of events at current operating reactors could date back to the period when these plants were being designed and constructed. These insights are then incorporated into the NRC's oversight activities. To maximize the efficiency of the program and to maintain the technical consistency between NRO and NRR, the ConE program fully incorporates the processes and tools developed for the operating reactors' operating experience (OpE) program. The NRC's OpE program is described in Management Directive 8.7, "Reactor Operating Experience Program" and is implemented using the guidance in NRR Office Instruction LIC-401, "NRR Reactor Operating Experience Program."

## 2506-11 CONSTRUCTION ASSESSMENT PROGRAM

A construction assessment program was developed by NRO through interactions with its stakeholders. Details regarding implementation of the construction assessment program are contained in IMC 2505, "Periodic Assessment of Construction Inspection Program Results," which was initially issued on October 20, 2008. IMC 2505 includes a construction action matrix, which provides guidance for NRC response to degraded licensee performance. The significance of findings is determined using a traditional enforcement approach. Periodic assessments of licensee performance will begin once significant construction inspections have started and will continue throughout the construction period. The periodic assessments will continue until construction activities are complete, the Commission has made an affirmative 10 CFR Part 52.103(g) determination, and the plant transitions to being monitored under the ROP. Within the CIP assessment process, NRC managers will periodically review inspection results that have been collected and reported in NRC inspection reports. These reviews will result in an overall assessment of activities as the plant is being constructed and will be a means for assessing the success of the licensee's programmatic controls. This assessment will also monitor NRC's progress in completing the CIP.

A description of the construction assessment program was provided to the Commission in SECY-08-0155, "Update on the Development of the Construction Inspection Program for New Reactor Construction under 10 CFR Part 52," dated October 17, 2008. On December 5, 2008, the Commission issued SRM M081022, which directed the staff to reconsider the construction assessment process as presented in IMC 2505 and propose policy options to the Commission. The Commission further directed that the staff

proposal should address the inclusion in the construction oversight process of objective elements such as construction program performance indicators (PIs) and significance determination processes (SDPs) analogous to those used in the ROP.

The staff issued IMC 2505, Revision 1, on December 24, 2009, to provide assessment program guidance to be implemented for construction activities ongoing while the Commission makes a final determination of how the assessment program should be implemented. This revision retained much of the guidance from the initial issuance of IMC 2505, and added a safety culture approach which is similar to the approach taken in the ROP.

In response to SRM M081022, NRO, other program offices, and the regional offices formed an interoffice working group to develop construction assessment program options for Commission consideration. Extensive interactions have been and are planned to be taken with external stakeholders in the development of construction assessment program options for Commission consideration. Once the Commission provides the staff with assessment program direction, implementing procedures and an update to IMC 2505 will be developed by NRO.

## 2506-12      TRANSITION FROM cROP TO ROP

By Regulation 10 CFR 52.103(g), license holders are not allowed to operate a new reactor facility until the Commission finds that all the acceptance criteria in the combined license are met. The appendices to Part 52 further define facility operation as beginning at fuel load (Appendix D, IX.B.2 for the AP1000). Also by Regulation 10 CFR 52.103(h), ITAAC are no longer requirements after the Commission has found the acceptance criteria to be met.

Because 10 CFR 52.103(h) removes ITAAC as regulatory requirements after all acceptance criteria are met, the operation of the facility will be governed by the technical specifications and all other applicable regulatory requirements from 10 CFR Parts 50 and 52, including license conditions. This then becomes the basis for the transition to the ROP. Once the Commission finds that all acceptance criteria in the license have been met the CIP will end and inspections under the ROP will begin. At that time the lead inspection responsibility will switch from CCI to the host region. Implementation of the ROP for newly constructed facilities may involve changes from that used on current plants due to the lack of historical data for most performance indicators and the lower risk profile for the new plants. Inspections will be conducted under the guidance of IMC 2514, "Light Water Reactor Inspection Program -- Startup Testing Phase," and IMC 2515, "Light-Water Reactor Inspection Program -- Operations Phase". Findings identified during these inspections would be handled under the provisions of the ROP and documented using IMC 0612, "Power Reactor Inspection Reports". Assessment of the facility will transition from the construction assessment program described in IMC 2505 to the operating reactor assessment program described in IMC 0305.

It is recognized that some operational programs will not be fully implemented at the time of initial fuel loading. These are governed by license conditions with set implementation

milestones and will be inspected under IMC 2514 before the program implementation date. The anticipated operational program inspection leads are contained in Exhibit 4 to this IMC.

END

Exhibits:

1. Construction Reactor Oversight Process Overview
2. Responsibilities for Inspection Activities
3. Construction Program Inspection Leads
4. Operational Program Inspection Leads

Appendices

- A. Construction Inspection Program Guidance
- B. Construction Inspection Program Bases

Attachments:

1. Acronyms
2. Revision History for IMC 2506

## Construction Reactor Oversight Process Overview

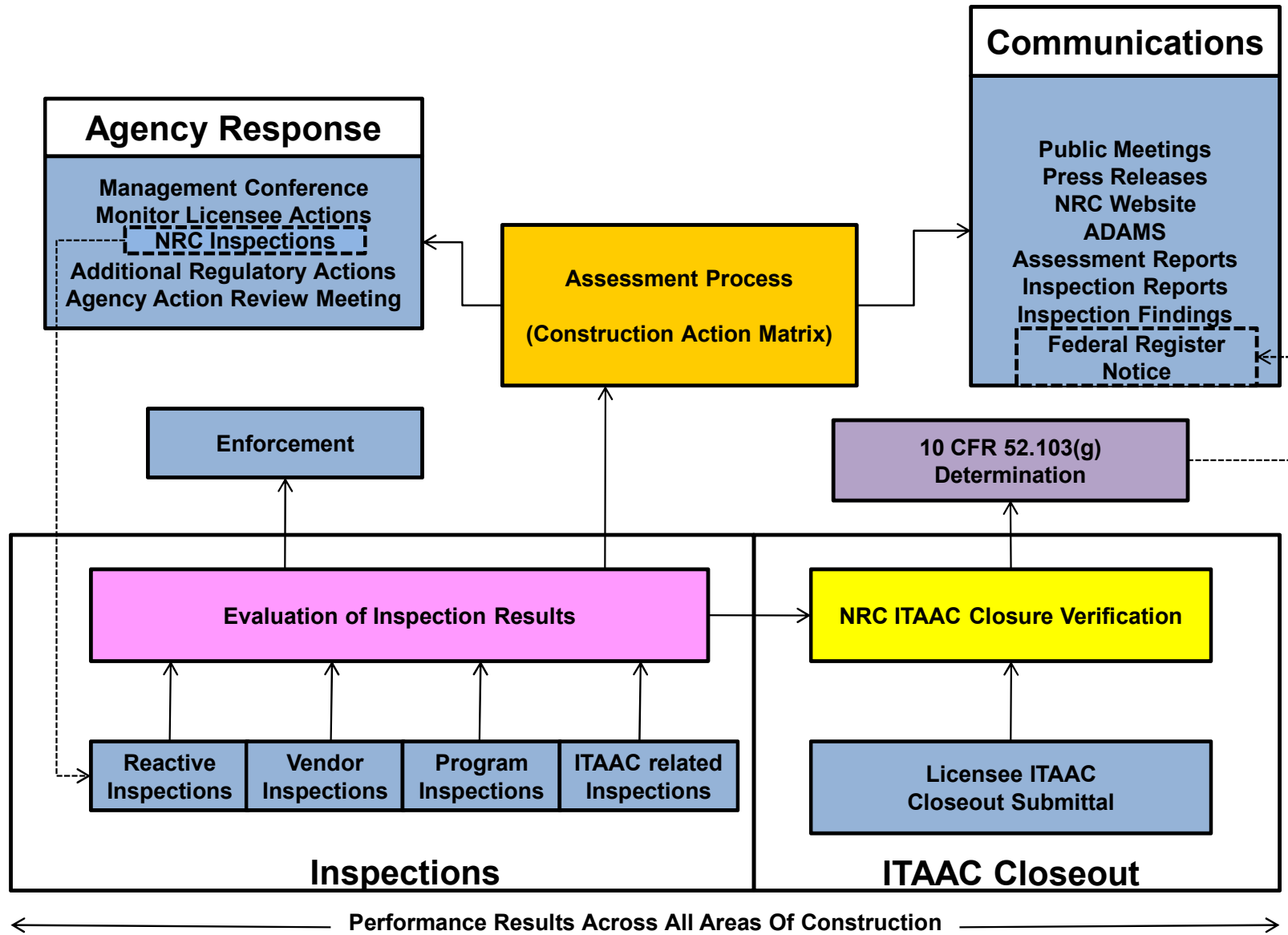




Exhibit 2 - Responsibilities for Inspection Activities

Inspection Focus	RESPONSIBILITIES Legend: L = Lead S = Support			
	<i>Region II</i>	<i>NRO QVB Staff</i>	<i>NRO Tech Staff</i>	<i>Host Region</i>
QA program implementation used for development of an ESP application (IMC-2501)	S	L		
Data collection, analysis and use of data in support of the ESP application (IMC-2501)	S	S	L	
Geotechnical /foundation activity in support of an ESP (IMC-2501)	L	S	S	
Procedures used for Geotechnical /foundation activity in support of a COL (IMC-2502)	S	L	S	
Inspection of Applicant QA Programs related to COLA/LWA licensing review (IMC 2502)	S	L	S	
Implementation of Architect /Engineer QA program including Engineering Design Verification (IMC-2502)	S	L	S	
Inspection of Vendor Programs related to on-site fabrication and testing of components and modules (IMC-2507)	S	L	S	
Inspection of Vendor Programs related to off-site fabrication and testing of components and modules (IMC-2507)	S	L	S	
Inspection of Applicant QA Programs related to off-site fabrication and testing of components and modules (IMC-2502)	L	S	S	
Inspection of Applicant QA Programs related to on-site fabrication and testing of components and modules (IMC-2502)	L	S	S	
Inspection of Licensee Programs related to on-site fabrication and testing of components and modules (IMC-2503)	L	S	S	
Inspection of Licensee Programs related to off-site fabrication and testing of components and modules (IMC-2503)	L	S	S	
The installation and testing of structures, systems, and components (IMC-2503)	L		S	S
Development and implementation of licensee operational programs (IMC-2504)	L	S	S	S
Design Acceptance Criteria Inspections (IMC-2503)	L		S	

### Exhibit 3 - Construction Program Inspection Leads

Program	Inspection Lead
Quality Assurance (Construction)	RII CCI
Reporting of Defects and Non-Compliance	RII CCI
Commercial Grade Dedication	RII CCI
ITAAC Management	RII CCI
Security	Host Region
Pre-operational Testing	RII CCI

Exhibit 4 - Operational Program Inspection Leads

<b>Program</b>	<b>Milestone</b>	<b>Inspection Lead</b>
Inservice Inspection	Commercial Service	Host Region
Inservice Testing	Generator On-Line	Host Region
Environmental Qualification	Fuel Load	RII CCI
Preservice Inspection	Initial Plant Startup	RII CCI
Reactor Vessel Material Surveillance	Initial Criticality	Host Region
Preservice Testing	Fuel Load	RII CCI
Containment Leak Rate Testing	Mode 4	RII CCI
Fire Protection	Fuel Receipt/Load	Host Region
Process and Effluent Monitoring	Fuel Load	Host Region
Radiation Protection	Material or Fuel Receipt/Load	Host Region
Non-Licensed Plant Staff Training	18 Months Prior to Fuel Load	Host Region
Reactor Operator Training	18 Months Prior to Fuel Load	Host Region
Reactor Operator Requalification	Three Months After 103(g)	Host Region
Emergency Preparedness	Two Years Prior to Fuel Load	Host Region
Security	Fuel Receipt/Load	Host Region
Quality Assurance (Operations)	30 Days Prior to Fuel Load	RII CCI
Maintenance Rule	Prior to 103(g)	Host Region
Motor Operated Valves	Fuel Load	RII CCI

Note: Fire Protection, Radiation Protection and Security Programs have multiple implementation milestones.

## Appendix A – Construction Inspection Program Guidance

### A-01 PURPOSE

The purpose of this appendix is to provide detailed guidance for the construction inspection program (CIP).

### A-02 BACKGROUND

As a general rule, inspections should be conducted in accordance with inspection procedures. However, it is not possible to anticipate all the unique circumstances that might be encountered during the course of a particular inspection and, therefore, individual inspectors are expected to exercise initiative in conducting inspections, based on their expertise, experience and risk insights, as needed, to assure that all the inspection objectives are met.

### A-03 DISCUSSION

#### A.03.01 Inspector Policy

##### A03.01.01 Construction Resident Inspector (CRI) Policy

The CRIs provide the major onsite NRC presence for direct observation and verification of licensees' ongoing activities and shall be qualified under IMC-1252, "Construction Inspector Training and Qualification Program." CRIs are responsible for being aware of major activities and the status of construction activities. The CRIs also are primary NRC onsite evaluators for events or incidents. The greater part of initial event-related inspection effort will be performed by the resident inspectors, who may be augmented by other inspectors depending on the type and significance of the event. Regional managers will decide when normal inspection activities will be resumed by those involved with inspecting events.

##### A03.01.02 Regional and Vendor Inspector Policy

Inspectors conduct inspections as directed by their supervisors and shall be qualified under IMC-1252 or 1245. In addition to baseline inspection program procedures, inspectors often will conduct inspections under other program elements such as allegation follow-up, etc. Certain aspects of their inspection activities may be conducted in the office (e.g., portions of procedure review and administrative program inspection). Other aspects will be conducted on site.

##### A03.01.03 Inspection Coordination

The senior CRI and the Region II Division of Construction Projects must be kept advised of regional and headquarters inspectors' activities at the facility. The associated regional branch chief must ensure coordination of regional and headquarters inspection activities using the guidance for visits to operating sites provided in IMC 0301, "Coordination of NRC Visits to Commercial Reactor Sites."

Regional and headquarters-based inspectors should contact the senior CRI or the Senior Project Inspector before each inspection to get information concerning the availability of specific licensee personnel, the status of construction activities that may affect the planned inspection and the status of allegations at the facility. In addition, they should contact the senior CRI as soon as is convenient after they arrive at the site

to ensure a coordinated NRC presence at the facility. The visiting inspectors should advise the senior CRI of changes to their planned inspection effort and schedule for the exit interview with the licensee. The senior CRI should inform the regional and headquarters inspectors of any unique activities in progress and offer specific inspection suggestions. The regional and headquarters inspectors should brief the senior CRI about the results of their inspection before the exit meeting with the licensee's management. The senior CRI (or CRI in his/her absence) should attend all exit meetings where significant issues are expected to be discussed.

#### A03.01.04 Third Party Assistance

Refer to IMC 2515, "Light-Water Reactor Inspection Program Operations Phase," for guidance regarding third party assistance requests.

### A03.02 GENERAL INSPECTION POLICIES

#### A03.02.01 Management Entrance and Exit Meetings

Inspectors are required to meet with licensee management as part of every inspection. Region-based inspectors should hold an entrance meeting with the senior licensee representative who has responsibility for the areas to be inspected. Each inspection conducted by resident inspectors and region-based inspectors must include discussing inspection results with licensee management. At the conclusion of an inspection, inspectors must discuss their preliminary findings with the licensee's management at a scheduled exit meeting. Management and exit meetings with licensee personnel should be scheduled to have the minimum impact on other licensee activities necessary to assure the safe construction of the plant.

The duration of exit meetings, the level of detail involved in the meetings, and the level of interest of the licensee in the exit meeting (as manifested by the number of attendees or their positions in the licensee's organization) will vary from one inspection to another; however, the following guidelines should be considered when preparing for exit meetings:

- Throughout the inspection process, the principle of "no surprises" should be observed. Through a combination of regular communications during the course of the inspection and pre-exit status meetings (for those licensees who wish them) the licensee should have knowledge of the issues which will be summarized in the exit meeting before the meeting occurs.
- The inspection exit meeting is an NRC-led meeting convened to allow the inspector(s) to present preliminary inspection results to the licensee. As such, the NRC representative tasked with leading the meeting must maintain control of the meeting, ensuring that the discussion remains professional, on-track and efficient. The meeting must not be allowed to degrade into a technical debate, a lecture, or a discussion of non-inspection-related issues. If the NRC exit leader finds that the purpose of the exit meeting cannot be realized (due, for example, to an overly argumentative licensee), the meeting should be terminated and the appropriate NRC manager should be notified.

- The NRC representative tasked with leading the exit meeting may allow the licensee to record the exit meeting (either in audio or audio/video formats) provided the NRC is given a copy of the recording.
- The exit meeting should be summary in nature. It is not necessary to go into great detail on inspection items that meet regulatory requirements; a statement describing the scope of inspection and reporting satisfactory performance can suffice.
- The information presented at an exit meeting is pre-decisional in nature and subsequent management review of the inspection results may lead to changes in the characterization of issues; this should be made clear at the outset of the meeting. The inspector should also point out that if changes are made in the characterization of issues, NRC will communicate the changes to the licensee prior to the issuance of the inspection report.
- When findings are involved, the exit meeting should include a description of the finding, and the standard which was not met. If there is a construction cross-cutting aspect associated with the finding, it needs to be presented at the exit meeting to ensure licensee awareness of the construction cross-cutting aspect.
- When discussing findings which are potentially significant, the inspector should communicate the information needed in order to assess the significance.
- If the licensee expresses strong opinions or disagreement with the characterization of an issue presented at the exit meeting, the inspector should inform regional management. Such a licensee response is not documented in the inspection report.
- If proprietary information is reviewed in the course of an inspection, the inspector should confirm with the licensee at the exit meeting that NRC has (or has not) returned proprietary materials used during the inspection.
- Time spent on scheduled and periodic entrance and exit meetings (including preparing for the meetings) is considered part of preparation and documentation of inspections. Daily communication with licensee management is considered to be an integral part of every inspection procedure and the time used for such routine communications should be charged to the inspection procedures used.

Communicating inspection observations also is an integral and important part of every inspection, whether done daily during the course of an inspection, or periodically with status meetings. Many licensees have expressed the desire to hear inspector insights related to safety/regulatory performance even in instances where they do not reach the threshold for documentation in an inspection report (see IMC 0613, "Documenting 10 CFR Part 52 Construction Inspections"). When deciding which observations and insights to pass on to the licensee, inspectors should consider the following:

- Inspectors should share the same insights with their regional managers and the senior CRI.
- The insights must relate to areas within NRC's jurisdiction and responsibilities.

- Comments should be objective and supported with examples when possible. Avoid generalizations such as “procedure adherence was good.” Instead, just state the objective facts: “Procedures were followed in each case we observed.” Negative observations or insights must be supported with specific examples.
- Inspectors should not express an expectation for actions taken by licensee managers. The inspector may comment on whether or not the actions comply with NRC requirements.
- Inspectors should determine before the exit if the licensee wants to hear the observations and insights. If the licensee does not want the observations or insights at the exit meeting, the inspectors should not discuss them.
- Inspectors must avoid “consulting” for the licensee and not advise them on how to improve draft documents or in-process work, or pass on to licensees how other licensees do the same thing.

#### A03.02.02 Findings Outside of Inspector’s Qualifications

Inspectors sometimes identify issues or violations outside of the inspector’s qualifications or expertise. In these cases the inspector is responsible for (1) determining if an immediate threat to public or worker health or safety exists, and if one does exist to notify licensee management immediately; and (2) determining if the issue is better addressed by an inspector with different qualifications (i.e., a specialist inspector). Inspectors may follow issues outside of their qualifications or expertise with the concurrence of a regional manager responsible for the area associated with the issue and the inspector’s supervisor.

#### A03.02.03 Event Response

Licensees often notify inspectors of events or conditions in anticipation of the inspectors’ interest in the issue, but such notifications do not exempt the licensee from reporting events and conditions through the required regulatory processes. The licensee should be made aware that documents that it gives to inspectors are subject to Freedom of Information Act requests and may be placed in the Public Document Room.

#### A03.02.04 Communication With Local Public Officials

As a matter of management philosophy, the NRC maintains an “open door” policy with regard to access by the public or state and local officials to the NRC staff or to publicly available electronic documentation concerning a licensee’s performance. Some local officials may desire increased interaction with the NRC’s regional offices and CRIs. The degree of interaction that is considered necessary to enhance openness in the NRC is expected to vary widely dependent upon the situation at each plant. In each case where inspectors are utilized for this purpose, regional management must carefully balance the use of inspection resources to complete inspections with the need to enhance openness. Any meeting between local emergency preparedness officials and the NRC must be coordinated with the Federal Emergency Management Agency (FEMA) in accordance with the Memorandum of Understanding between FEMA and the NRC.

#### A03.02.05 Witnessing Unsafe Situations

When NRC personnel identify unsafe work practices or violations which could lead to an unsafe situation, they shall make every reasonable attempt to prevent them from occurring or continuing in their presence. When such situations are identified, a licensee representative shall promptly be notified so that corrective or preventive measures can be taken.

A goal of the NRC inspection program is to witness licensee activities in as close to a normal environment as possible. From the assessment of these observations, conclusions are drawn relative to the licensee's ability to properly conduct licensed activities. Notwithstanding this goal, under no circumstances will an NRC inspector knowingly allow an unsafe work practice or a violation which could lead to an unsafe situation to occur or continue in his/her presence in order to provide a basis for enforcement action. If such a work practice or violation is in progress, or about to occur, the NRC inspector shall immediately bring the situation to the attention of the appropriate licensee personnel. This action shall be taken without regard for any impact it may have on the ability of the NRC to take future enforcement action.

#### A03.02.06 Memoranda of Understanding with the Occupational Safety and Health Administration

There are two Memoranda of Understanding (MOUs), dated October 21, 1988, and July 26, 1996, between the NRC and the Occupational Safety and Health Administration (OSHA). In general, OSHA has jurisdiction over plant conditions that result in an occupational risk, but do not affect the safety of licensed radioactive materials. For example, in a construction environment, there might be exposure to toxic non-radioactive materials and other industrial hazards. Although OSHA has authority and responsibilities regarding these activities, NRC supports them by reporting any such conditions it learns about to the licensee, NRC, and OSHA so appropriate action(s) can be initiated. IMC 1007, "Interfacing Activities Between Regional Offices of NRC and OSHA," contains specific guidance to be used to implement the MOUs.

#### A03.03 CONSTRUCTION RESIDENT INSPECTOR PROGRAM

The CRI program requires the selectees to be qualified under IMC 1252, "Construction Inspector Training and Qualification Program." The selection of CRIs will be made by CCI management personnel. Staffing levels at the construction resident offices will depend on many factors but will largely be based on the amount and type of safety-related (ITAAC) activities occurring on-site. Placing CRIs on site typically coincides with the start of significant safety-related construction activities at the site. There must be enough construction activity subject to NRC regulations that is occurring at the site to justify assigning a CRI. Prior to that time, safety-related activities can be overseen by inspectors based at the NRC regional or headquarters offices.

The number of CRIs will depend on the amount and type of safety-related construction work going on at the site. Projects that proceed more quickly and have numerous safety-related construction activities ongoing simultaneously will probably warrant more CRIs than projects that proceed more slowly with few simultaneous safety-related activities. At this time, the basic model for CRIs at a site will consist of one senior CRI who will oversee and manage the resident inspection activities for that site, and at least two CRIs for each unit under construction at the site during the bulk of the construction activity. Additional CRIs may be added as needed to supplement the inspection effort when an increase in construction activities warrant.



To get regional operational inspectors familiar with the new reactor facility and its operation, an operations SRI, selected by the host region, will be added to the construction resident staff at about the time the licensee begins pre-operational testing, to assist with inspection of the testing. This inspector will also evaluate and assess the adequacy of plant procedures and the readiness of various operational programs for full power operations prior to fuel load.

At approximately 6 months before the end of the pre-operational testing program, an additional operations RI will be assigned to the site by the host region to support pre-operational testing and to become familiar with plant operations. This double encumbering of the resident inspector positions is intended to provide appropriate overlap between the construction and operational inspectors and provide for an orderly turnover of inspection and assessment responsibilities to the host region at fuel load. At least one construction inspector will remain onsite after the transition to assist with startup testing inspection.

Most construction sites will be co-located with an existing operating reactor site that will have its own resident inspection staff. The activities at the construction sites must not be allowed to detract from the safety oversight responsibilities the NRC has toward the nearby operating facilities. In addition, the inspection programs for construction and operating sites are significantly different from each other; and the training and qualifications for CRIs are different than for operating reactor resident inspectors. Thus, the NRC has committed to keeping the CIP separate from the operational inspection program.

The amount of official interaction between the construction and operating facilities should be minimal. There may be a need for both the construction and operational resident inspectors to be knowledgeable about issues that can affect both areas. Allegations, environmental issues, security and emergency response programs, etc., are examples of potentially common issues. Generally, the construction resident inspector will not be expected to provide backup site coverage for the operations resident inspector(s). The construction resident inspectors will not normally be expected to respond to a plant event and will not be designated as a back-up responder for the operating reactor. However, the construction residents (as well as any other qualified NRC inspectors) could be directed to provide coverage for a site event if they are on site and no operating resident inspectors are available, at least until the operating resident inspection staff can arrive on site.

Site coverage requirements and back shift inspections by resident and regional inspectors during construction will be determined by Region II management.

All CRIs will stipulate a seven-year maximum tour length. This policy does not preclude CRIs from relocating for promotions, voluntary reassignments, or management-directed reassignments.

CRIs are expected to relocate site assignment after 7 years. CRIs due to rotate during the winter months or early spring may be granted an extension to the summer months with Regional Administrator approval. CRIs may be extended to no later than one year beyond completion of start-up testing of the last unit completed at a construction site with Regional Administrator approval. Any extensions beyond one year after start-up testing of the last unit completed at the site must be approved by the Deputy Executive Director for Reactor and Preparedness Programs (DEDR).

As CRIs approach the 7-year point at a site, the agency will consider inspector requests for a lateral transfer. Earlier transfers can be made when consistent with agency needs. In either case, CRIs are encouraged to make their desires and career goals known to their management as far in advance as possible.

As CRIs approach the completion of construction, the agency will consider inspector requests for a lateral transfer or reassignment to an Operational Resident Inspector (ORI). In either case, CRIs are encouraged to make their desires and career goals known to their management as far in advance as possible.

CRIs should not normally be reassigned to the same facility (after having been an ORI or CRI) even after an intervening assignment. Reassignments may be made to co-located facilities that would cause CRIs to interact with a different licensee.

This policy applies to total site tour length and it is not affected by a promotion from resident inspector to senior resident inspector at an operating or construction site.

CRIs should not be assigned to a different location within the first four years after relocating unless specifically approved by the DEDR or based on identified agency needs.

This policy applies to the Resident and Senior Resident Inspectors assigned at any of the reactor sites (construction or operating), fuel facilities, and gaseous diffusion plants.

#### A03.04 INSPECTION PROGRAM MODIFICATIONS IN EVENT OF A PANDEMIC

In the event of a pandemic, the NRC's Pandemic Response Plan (PRP) requires that aspects of the inspection program, identified as priority functions, be maintained. Additionally, the NRC's PRP allows modifications to less critical aspects of the inspection program in order to address limited inspection resources.

Therefore, "supplemental" and "generic safety" inspections may be postponed when authorized by the regional administrator. Baseline inspection activities may be reduced commensurate with available inspection and licensee resources. Event response inspections will continue. If necessary, the baseline inspection program will be reduced such that only monitoring of key construction activities will be reviewed by inspectors, if available, or by remote means, if no inspectors are available. Normal inspection activities will resume once the pandemic has passed and reasonable efforts will be made to complete missed baseline inspection activities in a reasonable timeframe.

## Appendix B – Construction Inspection Program Bases

### B-01 PURPOSE

The purpose of this appendix is to provide bases used in the development of the construction inspection program.

### B-02 BACKGROUND

The staff has interacted with stakeholders and the Commission in developing the construction inspection and licensing programs. This appendix captures the bases for the significant decisions made in developing the current programs in place for oversight of reactors licensed under 10 CFR Part 52.

### B-03 DISCUSSION

B03.01 Organizational Structure. The current fleet of operating reactors was constructed pursuant to regulations contained in 10 CFR Part 50. The Office of Nuclear Reactor Regulation (NRR) is responsible for the oversight of reactor construction activities under 10 CFR Part 50. Similarly, NRR had responsibility for oversight of construction activities under 10 CFR Part 52, which was first issued in 1989. Renewed interest in reactor construction was expressed by the industry in the late 1990's and early 2000's. As workload increased and to prepare for and manage future reactor and site licensing applications, the Future Licensing Organization was established as a temporary organization in NRR in March 2001. In July 2001, the organization was permanently established as the New Reactor Licensing Project Office.

On August 12, 2005, in SECY-05-0146, the staff proposed a reorganization of NRR to be in the best organizational (programmatic and technical) position to review new reactor license applications. In this proposal, which was approved by the Commission on August 25, 2005, the Division of New Reactor Licensing was created to place greater organizational emphasis in this area.

On February 26, 2006, in SECY-06-0041, the staff proposed strategies to support implementation of the new reactor construction inspection program. On April 21, 2006, the Commission approved the formation of a dedicated organization for new reactor construction inspection in the Region II Office in Atlanta, Georgia. The Commission stated that this organization will have total responsibility for all construction inspection activities across the country, including both the day-to-day onsite inspections and the specialized inspection resources needed to support NRC oversight of the construction of any new nuclear power plants. This approach is intended to ensure consistency in implementing the new inspection program and quickly incorporate ongoing lessons learned into the entire program.

On July 21, 2006, the Commission approved the staff's recommendation as described in SECY-06-0144 to reorganize the Office of Nuclear Reactor Regulation into two offices: the Office of New Reactors (NRO) with responsibility and authority for new reactor licensing and the Office of Nuclear Reactor Regulation (NRR) with responsibility for operating reactor licensing. The Commission also approved the staff's recommendation to create a Deputy Regional Administrator for Construction in Region II.

B03.02 Construction Licensing and Inspection Programs. In the aftermath of the accident at Three Mile Island in March 1979, the NRC suspended the granting of operating licenses for plants that were in the pipeline. The licensing pause for fuel loading and low-power testing ended in February 1980. In August 1980 the NRC issued the first full-power operating license (to North Anna-2 in Virginia) since TMI. In the following nine years it granted full-power licenses to over forty other reactors, most of which had received construction permits in the mid-1970s.

The lengthy and laborious licensing procedures that applicants had to undergo in the cases of Shoreham and Seabrook and other reactors stirred new interest in simplifying and streamlining the regulatory process. Specifically, obtaining an operating license after construction was complete (two-step process) increased the risk and complexity of the licensing process. This risk and complexity was a major deterrent to utilities who considered building nuclear plants. The NRC proposed to simplify the traditional two-step licensing process with a one-step process. After much deliberation the Commissioners, staff, and nuclear vendors, converged on the one-step licensing process (10 CFR Part 52) that was authorized in 1989.

NUREG-1055, "Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants: A Report to Congress," was issued May 1984 and detailed lessons learned during the early days of construction under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities". This report concluded that the U.S. Nuclear Regulatory Commission (NRC) was slow to detect and take strong action on significant quality problems that developed during nuclear power plant construction projects. In addition, the NRC did not have a formal assessment process in place to evaluate the performance of construction permit holders.

Following the accident at Three Mile Island, the NRC initiated an effort to better address licensee performance through the Systematic Assessment of Licensee Performance (SALP) program. Under the SALP program, the NRC periodically reviewed the overall performance of each nuclear power plant licensee (both construction permit holders and operating license holders) in a number of different functional areas. Each functional area evaluated was assigned to one of three categories to indicate whether more, less, or about the same level of NRC inspection and licensee attention was appropriate for the coming period. The SALP assessment was intended to be sufficiently diagnostic to provide a rational basis for assessing licensee performance, allocating NRC inspection resources, and providing meaningful guidance to licensee management.

In 1991, the NRC began work to revise the construction inspection program (CIP) to address programmatic weaknesses that had been identified during the inspection and licensing of plants in the 1980s. This project had two purposes: to address NRC construction inspection programmatic weaknesses that had been identified during the licensing of several plants, and to develop an inspection program for evolutionary and advanced reactors. This project was suspended in late 1994 because of the lack of nuclear power plant construction activities. In October 1996, "Draft report on the Revised Construction Inspection Program," was issued and presented a framework from which the CIP could be reactivated to support NRC inspections at future nuclear power plants. This framework included recommendations for continuous NRC onsite

inspection presence that matches inspector expertise to inspection needs, an inspection procedure format that clearly defines the attributes and associated acceptance criteria that must be inspected, and a dedicated CIP Information Management System (CIPIMS) proposed to be used to implement the CIP in concert with the inspection manual.

Late in 2000, the NRC was informed through various channels of renewed industry interest in constructing new nuclear power plants. On February 13, 2001, the Commission issued a staff requirements memorandum (SRM) for COMJSM-00-0003, in which the staff was directed to assess its technical, licensing, and inspection capabilities and identify enhancements, if any, that would be necessary to ensure that the agency can effectively carry out its responsibilities associated with an early site permit application, a license application, and the construction of a new nuclear power plant.

The staff first responded to this SRM in a memorandum dated May 1, 2001 from the EDO to the Commission. This memo outlined several organizational changes, including the temporary establishment of the Future Licensing Organization in NRR, which was responsible for coordinating the preparations for the review of new applications (i.e., early site permits, design certifications, and combined licenses). This memo also informed the Commission that NRR would reactivate the construction inspection program revision effort suspended in 1994, and that this effort would include review and revisions of applicable inspection manual chapters and development of the associated inspection guidance and training for inspection of critical attributes of construction processes and activities.

On October 12, 2001, the staff further responded to COMJSM-00-0003 by submitting SECY-01-0188, "Future Licensing and Inspection Readiness Assessment." This SECY paper included the "Future Licensing and Inspection Readiness Assessment Report," summarizing the efforts of an interoffice working group. This report included resource estimates for revising IMCs 2511, 2512, 2513, and 2514; indicated that the NRR Inspection Program Branch (IPB) would lead CIP revisions; and discussed the formation of the New Reactor Licensing Project Office in NRR. IPB formed the CIP team, composed of representatives from each region, new reactor licensing staff, and inspection program management, and tasked it with updating the inspection and assessment program for use in inspecting reactors to be licensed and constructed under 10 CFR Part 52. The work of this team is described in NUREG 1789, "10 CFR Part 52 Construction Inspection Program Framework Documents," which was issued in April 2004.

The CIP developed by this team has four phases. The first and second phases support a licensing decision for an early site permit (ESP) and the COL application. Inspections will initially be performed to confirm the accuracy of data submitted to the NRC in support of safety evaluations for an ESP and COL. The third and fourth phases support construction activities and the preparations for operation. Prior to and during plant construction, off-site inspections will be conducted to review vendor activities and licensee oversight of these activities. During plant construction, on-site inspections will focus on verifying satisfactory completion of ITAAC, as specified in the final safety analysis report (FSAR), and also on inspecting programs for operational readiness and transition to power operations.

B03.03 ITAAC and Operational Programs History. The history of ITAAC is coupled with the history of nuclear power plant standardization, particularly with the standardization of the processes for issuing combined construction permits and conditional operating licenses. Early in the commercial nuclear power industry, there were many first-time nuclear plant applicants, designers, and consultants, and many novel design concepts. Accordingly, the process was structured to allow licensing decisions to be made while design work was still in progress and to focus reviews on individual plant-specific and site-specific considerations. Construction permits were commonly issued with the understanding that open safety issues would be addressed and resolved during construction and that issuance of a construction permit did not constitute Commission approval of any design feature. Consequently, the operating license review was very broad in scope.

The fundamental premise of 10 CFR Part 52 Subpart C is that with a mature nuclear industry, it is possible to describe and evaluate plant designs on a generic basis, and to have designs essentially complete in scope and level of detail prior to construction. This makes it possible to combine the construction permit with much of the operating license. This concept was incorporated into 10 CFR Part 52 .97(b)(1), which states that the Commission shall 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. Full-power operation can then be authorized under the combined license following an opportunity for a hearing on a more limited set of issues related to whether acceptance criteria for an ITAAC have not or will not be met.

It was not clear in 10 CFR Part 52 whether COLs should contain programmatic ITAAC. Concerns related to programmatic areas started in the early 1990s. Several SECY papers at this time address the ITAAC issue, as did several letters from industry. The issue of programmatic ITAAC is discussed in some of these papers and letters. This issue was formally discussed with the Commission when, on April 20, 2000, the staff submitted SECY-00-0092, "Combined License Review Process," which discussed requiring programmatic ITAAC in COLs. In the SRM for this SECY, the Commission directed the staff to interact with stakeholders on the need for and scope of programmatic ITAAC and formally provide the Commission with a recommendation as to how to proceed on programmatic ITAAC.

Subsequently, the staff submitted SECY-02-0067, "Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) for Operational Programs (Programmatic ITAAC)," in which the staff requested the Commission's approval that COLs submitted in accordance with 10 CFR Part 52 contain programmatic ITAAC. In the SRM for this paper, the Commission disapproved the staff's proposal that the COL applications submitted in accordance with 10 CFR Part 52 contain ITAAC for a wide range of operational programs such as training, quality assurance, fitness for duty, and others.

On February 26, 2004, the staff submitted SECY-04-0032, "Programmatic Information Needed for Approval of a Combined License without ITAAC," which requested the

Commission's approval of a staff proposal regarding the level of programmatic information needed for approval of a COL without ITAAC for any particular program. Specifically, the staff recommended that the Commission approve the categorization of operational programs into five different categories (A-E) and, that procedure-level information be provided or available to the NRC to support review of a COL application. The staff further stated that if such information cannot be provided or made available during the COL application review, ITAAC would be necessary for that program.

In the SRM associated with SECY-04-0032, the Commission approved the categorization of operational programs into five categories but disapproved the staff's recommendation concerning the need for procedure-level information to support review of a COL application. The Commission further stated that the staff should continue the practice of inspecting relevant licensee procedures and programs in a similar manner as was done in the past and consistent with applicable inspection programs. The Commission also stated that the staff should continue to ensure, consistent with the inspection and enforcement processes, that licensees address pertinent issues prior to fuel loading. The Commission directed the staff to complete its work on the information necessary for the COL application for each of the programs for which the staff had previously assumed ITAACs would be required (fire protection, training, quality assurance during operation, fitness for duty, access authorization, radiation protection, physical security, licensed operator, and reportability programs) by December 31, 2005, and present its results to the Commission.

On October 28, 2005, the staff submitted SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," which requested Commission approval of a staff proposal to include license conditions for operational programs in a COL. The staff concluded that a COL applicant could fully describe all operational programs and their implementation in the COL application, with the exception of EP, and that, if these programs and their implementation are fully described, they would not require ITAAC. The staff stated its intentions to inspect operational programs and their implementation as they are developed and put into place. These inspections will verify that the program being implemented is consistent with the FSAR. In addition, these inspections would verify that any changes made to the programs as described have not adversely impacted the bases for the Commission's findings of reasonable assurance. Any adverse impacts discovered during inspection will be subject to enforcement action. In the SRM associated with SECY-05-0197, the Commission approved the use of license conditions for operational program development and implementation.

The development of the 10 CFR Part 52 combined construction and operating license (COL) regulatory and inspection framework introduced the concept of "inspections, tests, analyses, and acceptance criteria" (ITAAC) as a codified, pre approved set of performance standards that a COL licensee is required to certify as acceptable and complete. Thus, in turn, the NRC developed a new construction inspection program (CIP) that focused inspection and verification activities upon the ITAAC for those facilities licensed and constructed in accordance with Part 52. 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 group of ITAAC based upon an examination of some representative ITAAC within the group.

Such an inspection approach would allow for the efficient use of NRC inspection resources not only for the ITAAC examinations, but also for the routine evaluation of the construction processes that result in the ITAAC products and completion.

To direct and govern this "ITAAC focus," a methodology was developed using a sampling inspection approach. Based upon an analysis and estimate of the NRC inspection resources required to review and conduct direct inspection of the ITAAC for two certified designs (the AP1000 and ABWR), it was determined that the new CIP would rely upon an ITAAC sampling inspection process. This decision was based upon the perspective that complete coverage and direct inspection of the entire population of ITAAC for any given certified design is not only an unrealistic goal, but also an inefficient and unnecessary use of dedicated NRC inspection resources. In order to facilitate the use of sampling inspections to confirm adequate licensee control and completion of the ITAAC, an inspection planning tool, identified as the ITAAC Matrix, was developed.

**B03.04 ITAAC Matrix Objectives.** The ITAAC Matrix is considered both an inspection methodology, as well as an inspection planning tool. The Matrix was created to classify and combine ITAAC by common characteristics and activities. 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 into the NRC inspection program certain complementary inspection activities that evaluate the licensee's control of the relevant construction processes for product quality, QA verification, and assessment activities. Central to the NRC's CIP for construction under 10 CFR Part 52 is the ITAAC Matrix which provides a coherent approach to the adequate coverage and completion of the ITAAC inspections. As a planning tool, the ITAAC Matrix identifies the 25 core inspection procedures that comprise a comprehensive set of construction programs and construction processes that the NRC believes encompass those COL licensee activities involved in the quality construction of a nuclear power plant. A review of the six matrix column titles (i.e., the programmatic activities) and the 19 matrix row titles (i.e., the process activities) reveals those activities that represent the technical disciplines and programmatic controls that not only fabricate and install the structures, systems, and components (SSCs) inherent in the design, but also check, test, and confirm that the completed, as built facility will perform as designed as well as program elements that are required to be implemented by the licensees. While the ITAAC Matrix does not contain a prescribed set of directions of what needs to be inspected, the matrix format does establish a logical way to group the ITAAC into "families" for inspection sampling purposes. The commonality of the ITAAC within any specific matrix family is defined by the intersection of the matrix column (i.e., a construction program) and the matrix row (i.e., a construction process or resulting product) for that group of ITAAC. The use of a matrix format facilitates identification of common ITAAC families and provides a foundation for establishment of an efficient inspection sampling approach.

**B03.05 ITAAC Matrix Structure.** The ITAAC Matrix provides a means for assigning each ITAAC into an applicable matrix block. Each single matrix block represents a combination of ITAAC characteristics related to the specific construction disciplines and its related interdisciplinary inspection process.



Each of the nineteen rows of the matrix represent specific construction disciplines (i.e., the construction processes and resulting products) and those listed in the six columns represent general interdisciplinary inspection activities (including the relevant acceptance criteria). The 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 baseline IPs developed to address all Matrix categories provide a template not only for ITAAC inspections, but also for the inspections of the adequacy of the licensee control of the construction processes and also of the resultant construction quality.

The matrix structure facilitates the process of inspecting the selected sample of ITAAC, but also ensures adequate coverage of all construction disciplines, whether directed to a specific category of construction products (e.g., [03] Piping), or more generally, to an interdisciplinary construction process (e.g., [B] Welding). For example, all ITAAC within a specific plant design that discuss instrumentation and control (I&C) components and systems in concert with specific as built inspection criteria would be "binned" in the matrix block formed at the intersection of row (10) and column (A). The ITAAC that are binned in any particular matrix block are considered to represent an ITAAC family. The ITAAC within a family are connected by their common characteristics.

**B03.06 ITAAC Matrix Contents.** The grouping of the ITAAC for any particular plant design into the various matrix families is defined as the process of populating the matrix. In implementing this process, a panel of NRC experts reviewed all the ITAAC for the relevant plant design and selected the one, and only one, matrix family that best covers and envelopes the construction activities involved with each ITAAC. The matrix population process would only need to be performed once for any certified design having codified ITAAC, with plant specific ITAAC reviewed as necessary for placement within the proper matrix families. The matrix should be reviewed and updated following each certified revision to a design.

Each ITAAC for a specific design is evaluated by an expert panel and assigned to the appropriate family by selecting the combination of row (programmatic functions) and column (process attributes) applicable to that ITAAC. Site specific ITAAC will also be added to the population once they have been identified. The process is summarized as follows:

- An NRC expert panel reviews all the ITAAC for each certified design and for each custom design. An expert panel generally consists of three NRC personnel with some combination of expertise in plant construction, reactor risk, and project licensing, including relevant plant design and ITAAC experience or knowledge.
- The expert panel convened to populate the matrix reviews each of the ITAAC and places it in one of the blocks of the ITAAC Matrix.
- 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 specific, populated ITAAC Matrix.

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

B03.07 What the Matrix Provides. The Matrix is a mechanism for utilizing the guidance and knowledge base learned from the existing NRC inspection program successfully used for Part 50 operating plant inspections. The Matrix incorporates this knowledge base into a related Part 52 ITAAC inspection framework which provides:

- An NRC inspection planning tool for identifying related groups (i.e., "families") of ITAAC, based upon common characteristics
- A logical, convenient basis to facilitate ITAAC inspection sampling
- A consistent model for the inspection of ITAAC at plants of similar design
- A methodology that establishes a documented process for the NRC completion of ITAAC inspections
- A framework for assessment of how many ITAAC require direct inspection, and when the ITAAC inspection program can be considered complete
- Ongoing and after the fact review of how ITAAC inspection decisions were reached
- Utilization of related program and process inspections to assess the quality of plant construction, with necessary focus on the ITAAC.

This matrix set of 25 core inspection procedures, supplemented by some complementary supporting procedures, is a significantly smaller number of inspection procedures than were used as part of IMC 2512 for the NRC inspection of the existing operating plants licensed under 10 CFR Part 50. Furthermore, use of standard numerology (as in the IP 65001.xx format) to represent each matrix column or row IP facilitates tracking and documentation of the inspection results in the new Construction Inspection Program Information Management System (CIPIMS).

B03.08 Matrix Implementation. The matrix row procedures focus on inspection of quality processes for specific construction disciplines which result in installation of various plant SSCs as well as program elements that are required to be implemented by the licensees. The matrix column procedures address inspection criteria which transcend specific disciplinary boundaries, and represent ITAAC characteristics which may be common to several of the row processes. When implementing this inspection philosophy, an NRC inspector conducts an inspection of an installation process and the resulting SSC, as defined and controlled by one of the matrix row inspection procedures. Portions of other row and column procedures may be used as appropriate for an individual ITAAC.

The inspector can focus on the available ITAAC populating that matrix row. Similarly, when an inspector reviews the program attributes defined by one of the matrix columns,

and is therefore guided by one of the column inspection procedures, the inspector can focus on the available ITAAC populating that matrix column. As the inspector evaluates the quality process and programmatic criteria identified by an intersection of a matrix row and column, that inspection is focused on the ITAAC within a specific family. This allows certain relevant inspection findings and conclusions to be extrapolated to the other ITAAC in that same family, which may not have received direct NRC inspection. In effect, this inspection philosophy of using the ITAAC Matrix population as a foundation and the sample rating process for ITAAC prioritization which defines the sample for inspection creates an informed NRC ITAAC sample inspection planning process.

**B03.09 ITAAC Matrix Summary.** The ITAAC Matrix format for controlling 10 CFR Part 52 COL construction inspections was developed to facilitate the ITAAC inspection sampling process. While providing the necessary sampling inspection framework, the matrix also maintains a structured approach for NRC inspections of plant SSCs that covers all the relevant construction programs and processes involved in the construction of a quality facility. NRC inspections guided by the matrix format, similar to inspections of the Part 50 operating plants, continue to verify the quality of the construction programs and processes (and the resultant SSC quality); while the ITAAC, as viewed within each matrix family, provide the focus for these NRC inspection activities. The matrix identification of ITAAC families provides the logical connectivity to the programmatic and process inspections necessary for efficient inspection of the entire range of ITAAC for advanced reactor designs. The matrix framework adequately specifies groups of homogeneous ITAAC, or ITAAC families, which facilitates development of the ITAAC sampling inspection process. The matrix provides the means for grouping ITAAC having common characteristics, and provides a basis from which inspection samples can be determined.

**B03.10 Inspection Sample Selection Process** . The CIP for Part 52 licensees will target the SSCs which are the subject of ITAAC. In order for NRC inspections to assess the programs, the processes, and the products while focusing on ITAAC-related work, the staff formulated an integrated inspection strategy. Part of the CIP strategy was the development of an inspection planning tool that organizes and groups the ITAAC into families for each reactor design based on common characteristics. The grouping of ITAAC into an "ITAAC Matrix" supports the identification and use of consistent inspection guidance for similar ITAAC within a single design. The ITAAC Matrix also provides a consistent approach across other reactor designs by imposing the same framework on the existing certified designs and future designs. In addition, the Matrix represents those processes and programs needed to verify that construction of the plants is correct and complete. Therefore, the intent was to establish a set of IPs (regardless of the ITAAC) which would check the adequacy of the construction and of the as-built plant.

Recognizing that the CIP does not inspect all licensee activities, but rather uses a sampling process, the staff has also developed an ITAAC sample selection process, which prioritizes the ITAAC within each matrix group based on the value of inspecting work related to that ITAAC. The prioritization process, which was described in SECY-07-0047, "Staff Approach to Verifying the Closure of Inspections, Tests, Analyses, and Acceptance Criteria Through a Sample-Based Inspection Program," uses a structured

decision making process to rate each ITAAC using four attributes. Those attributes are: error propensity; opportunity to confirm by means other than direct observation of the ITAAC; construction and testing experience; and safety significance.

In November 2005, an expert panel of NRC staff with extensive nuclear construction and NRC inspection experience was convened to weight the four attributes. The outcome of the expert panel was a numerical ranking for each attribute for each ITAAC. These rankings were then used as part of a mathematical analysis to assign a rating for each ITAAC. The rating corresponds to the importance of inspecting work related to that ITAAC. The prioritization has been completed for the ABWR ITAAC and the AP1000, Revision 15 ITAAC.

The final step in the methodology includes a coverage check to ensure that at least one ITAAC from every family be inspected. The ITAAC selection approach assures that work related to a diverse set of ITAAC have been inspected, such that the results of the inspection process are representative of the entire ITAAC population.

On May 16, 2007, in the SRM for SECY-07-0047, the Commission approved the staff's approach for selecting ITACC to be given priority for inspection.

In addition to the ITAAC listed in the design certification rules for approved reactor designs, each combined license application (COLA) contains site-specific ITAAC that consist of systems that are outside the scope of the standard design. In SECY-08-0117, "Staff Approach to Verify Closure of ITAAC and to Implement Title 10 CFR 52.99, "Inspection During Construction," and Related Portion of 10 CFR 52.103(g) on the Commission Finding," the staff indicated that it will review and inspect work related to the site-specific ITAAC using a method similar to the prioritization methodology described in SECY-07-0047. NRC Region II construction staff leads the effort to prioritize site-specific ITAAC contained in the COLs. NRO/DCIP retains the lead to prioritize the ITAAC contained in the DCDs. The staff will form expert panels that will select the site-specific ITAAC samples based on safety significance and the ability to inspect. The COLAs also contain ITAAC for emergency preparedness (EP) and physical security. The staff will inspect work activities related to all physical security and EP ITAAC. The staff based this decision on the relatively small number of physical security and EP ITAAC, the qualitative nature of the Security and EP ITAAC, and their high relative importance. In addition to the ITAAC-related work inspections, the staff is planning comprehensive inspections of the operational programs for security and EP. This will include force-on-force security inspections and NRC observations of EP exercises.

An additional ITAAC inspection area concerns Design Acceptance Criteria (DAC). DAC are a subset of the ITAAC for a given design, which means they are considered ITAAC. The DAC are design details that were not provided at the time of DCD submittal, with the understanding that these design details would be available during construction and verified as part of the ITAAC to demonstrate that the system design and as-built configuration conformed to the licensing basis. The DAC is designated in three specific disciplines as outlined in SECY 92-053. They are: Digital I&C design; Piping design; and Human Factors engineering. Additionally, the ABWR design includes some limited Radiation Protection DAC.

It is the Staff's intention that DAC associated with an ITAAC will be inspected as the design detail is made available by a COL applicant or licensee. The complexities of the DAC dictate that these inspections will normally be led by CCI with support from NRO technical staff, which will provide an inspection report feeder to CCI. Since DAC inspection will be required to satisfy the associated ITAAC, all DAC inspection will be required prior to the 10 CFR Part 52.103(g) finding.

While the ITAAC will be the focus when selecting which activities to inspect, the NRC staff will inspect more than just ITAAC-related work. Licensees are required by regulation to develop and implement construction programs. These programs are listed in IMC 2504. In the first years of a project, the licensee's construction programs will be inspected. The staff's verification that the licensee has properly implemented required construction is directly related to the NRC's use of sampling during inspections and is the foundation of the assumption that the specific construction activities inspected by NRC are representative of similar activities that did not receive direct NRC inspection.

As the project progresses, the NRC will inspect the development and implementation of testing programs and operational programs. The scope and content of the operational programs will have been reviewed by the technical staff during the COL application review process and approved when the COL was issued. The COL will contain milestones by which operational programs must be developed and implemented. The approved operational programs must be developed and implemented prior to the milestones listed in the COL and these will be license conditions. The staff intends to inform the Commission of the status of operational programs at the time of the 10 CFR 52.103(g) decision.

The CIP has been developed in a way that links the ITAAC Matrix, the selection of ITAAC-related work activities for direct inspection, and periodic NRC assessment activities. Their use, along with the inspection activities discussed in IMC-2504, will look at the construction of a new nuclear power plant in a way that efficiently uses the available inspection resources to provide reasonable assurance that the ITAAC are complete, that the construction of the overall facility is complete, and that the plant and its staff are ready for operation. The information collected through the CIP will allow the NRC to determine, with reasonable assurance that the plant has been constructed and will operate in conformity with the COL.

In addition to populating the matrix, an ITAAC prioritization methodology was needed for inspection-sampling purposes. The NRC contracted with Information Systems Laboratories, Inc. (ISL) to develop such a methodology. The concept was to develop a selection process that could work with the ITAAC Matrix to rank the ITAAC of any particular design. This rank would be based upon the value that NRC inspection provides to the assurance that the completed ITAAC could be accepted without need for additional confirmation. ISL recommended and NRO endorsed an ITAAC sample selection process that uses a prioritization methodology. The overall objective of this process is to optimize NRC inspection resources, while providing reasonable assurance that a significant flaw in the completion of the ITAAC by the licensee will not go undetected.

A prioritization methodology was chosen for resource optimization as opposed to acceptance sampling. Simple statistical sampling would call for inspection at random, whereas the proposed methodology provides an educated and dynamic inspection. Further, the procedure-based nature of ITAAC activities call for periodic inspections over the course of the entire inspection program that correspond with current licensee performance. A prioritization methodology will be able to account for the inspection history more so than acceptance sampling.

The methodology requires that the ITAAC be classified and grouped based on the activity required to satisfy the ITAAC. This is necessary to create groupings of ITAAC that all involve the same activity. Judgment is needed to decide exactly what “same activity” should involve and has been determined to correspond to an intersection of the NRC ITAAC Matrix. Once grouped, the ITAAC may then be prioritized within the group. The overall approach is that observing licensee performance of the activity with one component (or ITAAC) provides insights on licensee performance regarding other components.

The first step in prioritization involves rank-ordering the ITAAC based upon certain defined attributes that make one ITAAC more or less important to inspect than the others. Attributes are considered to be some of the representative characteristics of any particular ITAAC. The following five attributes were selected for ranking consideration:

- a. Complexity or Difficulty of Activity. The degree of likelihood of errors occurring in the process of fabrication, installation, or testing. As an example, a bimetallic weld on the reactor vessel safe end might be more difficult than welding structural steel for a seismic pipe support. The degree of training or certification required of the “doer” such as a Level III NDE technician is an indicator of the complexity. This typically is also related to the concept of a special process which has requirements associated with it per 10CFR50, Appendix B.
- b. Construction and Testing/Training Experience. To the extent known, whether the testing or construction activity is a “first of a kind” for construction or a new test conducted by a group with little experience. Experience in this case may mean limited work in the nuclear field, in a field with quality assurance requirements, or in strict adherence to procedural controls. Additionally this includes whether there is a history of quality or other performance deficiencies associated with the company or the activity.
- c. Difficulty of Verifying by Other Means. The degree that the activity can be verified by observing other functional, pre-operational tests, or performance tests. This would also include the degree to which the sequence is a factor; for example, the lack of access associated with buried piping or cables, coatings inside tanks, or physical interferences. This would result in a preference to inspect now while the opportunity exists, or to defer the inspection until later when it may be just as useful to witness the pre-operational test instead.
- d. Safety Significance. The safety significance assigned to the system, component, or structure included in the ITAAC. This attribute will be defined by

a PRA weighting factor which will be assigned separate to expert panel evaluation of the other attributes.

- e. Licensee (or applicant) Oversight Attention. The amount and effectiveness of the applicant's or licensee's oversight attention and quality assurance efforts, including those of its contractors and suppliers. This also includes those self-assessment reviews or independent audits in addition to the specific QA effort. Note this may not be known early in the sequence of construction activities or until NRC has experience inspecting the licensee's QA efforts and other self-assessment activities and generated an opinion of their performance. It is assigned periodically based on inspection results.

The attributes are weighted according to their impact on the overall objective. Then, each ITAAC is rated for each attribute by use of expert panels.

In November 2005, an expert panel of NRC managers with extensive nuclear construction and NRC inspection experience was convened to weight each of the five ITAAC attributes. The expert panel then chose utility values for the level of inspection related to each attribute. This attribute weighting/utility selection process is part of the Analytic Hierarchy Process, which was chosen by ISL as an integral part of the ITAAC prioritization process. The results of this expert panel were provided as input to the algorithm that was created by ISL to establish the basis for the subsequent evaluation of the ITAAC against each of the five attributes. This weighting/utility process was performed for the five pre-selected attributes and will apply to any reactor design; therefore, these expert panel deliberations do not have to be repeated.

This prioritization process is managed such that the rating given each ITAAC will correlate to the amount of assurance one can obtain from inspecting that ITAAC. In this way, it is not the ITAAC that are prioritized, but rather the value of inspecting that ITAAC to the overall objective of optimizing resources to ensure that no significant construction flaw is undetected. The second step used in the methodology includes a portfolio perspective or a coverage check for all ITAAC. It requires that at least one ITAAC from every group be inspected. Further, the approach assures that a diverse set of ITAAC have been inspected such that it represents the entire ITAAC population.

The output of this process has been used to target for inspection those ITAAC that had a numerical ranking at or above a selected value and has been completed for the AP1000 and ABWR. It is expected that the numerical data for each reactor design will be different and therefore that the numerical cut off value will also be different. The selected value will be selected to provide reasonable coverage of all ITAAC for the planned NRC inspection activities for direct NRC inspection.

## Acronyms and References

ABWR - Advanced Boiling Water Reactor  
AP1000 - Advanced Passive 1000  
AV - Apparent Violation  
CCI - Center for Construction Inspection  
CGIs - Commercial Grade Items  
CIP - Construction Inspection Program  
CIPIMs - Construction Inspection Program Information Management System  
COL - Combined License  
ConE - Construction Experience  
CQV - NRO Quality and Vendor Branches  
CRIs - Construction Resident Inspectors  
cROP - Construction Reactor Oversight Process  
cSCCI - Construction Substantive Cross-Cutting Issue  
DAC - Design Acceptance Criteria  
DC - Design Certification  
DCD - Design Control Document  
DCIP - Division of Construction, Inspection, & Operational Programs  
DCRA - Design-Centered Review Approach  
DEDR - Deputy Executive Director for Reactor and Preparedness Programs  
EDV - Engineering Design Verification  
EPR - Evolutionary Power Reactor  
ESBWR - Economic Simplified Boiling Water Reactor  
ESP - Early Site Permit  
FEMA - Federal Emergency Management Agency  
FSAR - Final Safety Analysis Report  
ICL - ITAAC Closure Letter  
IMC - Inspection Manual Chapter  
IP - Inspection Procedure  
ITAAC - Inspections, Tests, Analyses and Acceptance Criteria  
ITP - Initial Test Program  
LWA - Limited Work Authorization  
MOU – Memorandum of Understanding  
NCV - Non-Cited Violation  
NOV - Notice of Violation  
NRC - Nuclear Regulatory Commission  
NRO - Office of New Reactors  
NRR - Office of Nuclear Reactor Regulation  
OE - Office of Enforcement  
OpE - Operating Experience  
OSHA – Occupational Safety and Health Administration  
PRP – Pandemic Response Plan  
QA - Quality Assurance  
QC - Quality Control  
R-COL - Reference Combined License  
ROP - Reactor Oversight Process  
S-COL - Subsequent Combined License  
SCWE - Safety Conscious Work Environment



## Acronyms and References

SSCs - Structures, Systems, and Components

URI - Unresolved Item

Attachment 2 - Revision History for IMC 2506

Commitment Tracking Number	Issue Date	Description of Change	Training Required	Training Completion Date	Comment Resolution Accession Number
N/A	10/27/10 CN 10-022	<p>New Issue to support reactor licensing and construction oversight activities under 10 CFR Part 52.</p> <p>Incorporated guidance for:</p> <ol style="list-style-type: none"> <li>1. Field Policy Manual (FPM) Chapter 8 - RI Relocation Policy</li> <li>2. FPM Chapter 13 – Witnessing Unsafe Situations</li> <li>2. FPM Chapter 18 - Guidelines for Granting Exceptions... Multi-Unit Reactors</li> <li>3. FPM Chapter 19 - Guidance for Recommending Third-Party Assistance to Licensees (WITS item 201000103 (EDATS: OEDO-2010-0230))</li> </ol> <p>Completed 4 year historical CN search – no commitments found.</p>	None	N/A	ML102170345