
MANUAL CHAPTER 2504

CONSTRUCTION INSPECTION PROGRAM - NON-ITAAC INSPECTIONS

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2504-01 PURPOSE

01.01 To specify the inspection policies for reviewing the programs supporting construction and operational readiness of a plant licensed under 10 CFR Part 52 **that are not directly related to Inspections, Tests, Analysis and Acceptance Criteria (ITAAC)**.

01.02 To furnish the inspection policies to assess whether a licensee conforms to and correctly implements the initial test program contained in the **Final Safety Analysis Report (FSAR)** for pre-operational and startup testing.

01.03 To provide guidance for a plant licensed under 10 CFR Part 52 **for** transition to oversight **under** the Reactor Oversight Program (ROP) for power operations.

2504-02 OBJECTIVES

02.01 To assess whether the licensee has a construction program which addresses quality assurance (QA), problem identification and resolution (**PI&R**), reporting of defects and failures to comply under 10 CFR 50.55(e), qualification and training of construction staff, work planning, oversight and control of contractors, and completion and submittal of ITAAC for verification by the NRC.

02.02 To assess whether management controls and procedures, including quality assurance and problem identification and resolution programs, necessary for operation of the facility have been documented and effectively implemented.

02.03 To verify that the licensee is meeting the requirements and conditions of the facility license for initial fuel loading, initial criticality, low-power testing, and power ascension tests, **including the required operational programs be functioning**.

02.04 To determine the operational readiness of a plant licensed under 10 CFR Part 52 for commercial operation.

02.05 To provide an objective basis, for a plant licensed under 10 CFR Part 52, to transition to **monitoring by the ROP**.

02.06 To provide for engineering design verification, with special focus on the the design change management process.

2504-03 APPLICABILITY

This phase of the construction inspection program may become effective before issuance of the combined license (COL), **e.g.**, when the licensee is placing bids for major components, and will be applicable until the new plant transitions to the ROP.

This phase of the **Construction Inspection Program (CIP)** includes those inspection activities directed toward assessing a licensee's construction programs; operational programs; PI&R program; pre-operational and startup testing; and operational readiness of the plant. Inspection Manual Chapter (IMC) 2504 will no longer be applicable, as determined by regional management, when the following conditions are met:

- a. all significant construction and testing activities are complete.
- b. licensee corrective actions for significant deficiencies for construction, testing, and startup activities have been implemented and have been effective.

- c. all other construction, testing, and startup open items have been placed in the licensee's corrective action program.
- d. the licensee has established a program to benchmark and to collect performance indicator (PI) data.
- e. the programs are mature enough that ROP metrics can be correctly applied thereby determining licensee performance in each of the seven cornerstones of safety with validity.
- f. the plant has completed a minimum of 100 hours of commercial operation.

This manual chapter is not applicable to operational programs that are addressed by ITAAC. This manual chapter will be performed in parallel with, but independent of, IMC 2503, "Inspections Of Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Related Work." All inspections for ITAAC related activities will be performed under IMC 2503.

A verification of the implementation of the operational programs submitted for review in the COL application will be performed prior to the authorization to load fuel or the initiation of low-power testing to assess the licensee's operational readiness.

The general requirements identified in this IMC are applicable to all COL designs. However, the detailed inspection procedures to be implemented may differ, depending upon the type of plant design contained in the COL. Design-specific guidance is provided for certified designs in the appendices. Additional design-specific guidance will be added as new designs are certified.

The new plant falls within the full scope of the Commission's current risk-informed Enforcement Policy for commercially operating nuclear power plants under Supplement II - Facility Construction. Inspection findings may be classified in accordance with the four Severity Levels during construction. Once a cornerstone is able to be monitored under the ROP, the enforcement for any performance deficiency from NRC inspections for that cornerstone will be administered in accordance with the Commission's current Enforcement Policy. IMC 0609, "Significance Determination Process" (SDP) will be used to characterize the significance of a noncompliance resulting from the routine inspection effort.

2504-04 DEFINITIONS

04.01 General.

- a. Able to be Monitored Under the ROP. For an individual cornerstone of safety, it means that ROP inspections and metrics can provide sufficient information for determining licensee performance.
- b. **Combined Operating License (COL) Design.** COL design (or design information contained in a COL application) means the entire body of design information, including licensee programs, provided in a COL application or license. To encompass the variations that a COL application could take based on the options available under Part 52, the term "COL design" is used in this IMC to refer to all design and program information contained in the COL application or license regardless of whether it is generic DCD information, plant-specific DCD information, or site-specific design information. For a COL application that does not reference a certified design, the definitions "Tier 1" and "Tier 2" are not applicable.

- c. **Construction Activity.** An NRC regulated activity associated with the construction, fabrication, or testing of structures, components, subcomponents, subsystems, or systems either at the construction site or at remote fabrication or testing facilities. Construction activity also includes related design and engineering activities for the structures, systems, and components.
- d. **Construction Inspection Program Information Management System (CIPIMS).** The computer database that provides the means to document, report, and track all NRC inspection activities and their results. It provides the means to integrate designated NRC inspections with their associated ITAAC and ultimately the results of those inspections with ITAAC determinations.
- e. **Contractor.** Any organization under contract for furnishing items or services to a licensee. It includes the terms consultant, vendor, supplier, fabricator, constructor, and subtier levels of these organizations.
- f. **Cornerstone of Safety.** One of the elements of the ROP that form the foundation for meeting the overall NRC mission for the safe operation of nuclear reactors.
- g. **Problem Identification and Resolution (PI&R) Program.** The licensee's program for evaluating problems to determine their root causes, to assess the extent to which the condition exists, to identify resolutions, to ensure those resolutions are implemented, and finally to document the overall assessment.
- h. **Full Oversight of the ROP.** The point when all cornerstones of safety are being monitored by the ROP and the regulatory response for inspection findings is in accordance with the Action Matrix in IMC 0305.
- i. **Generic Design Control Document (generic DCD).** A generic DCD means the document containing the NRC approved and certified information (Tier 1) and approved but not certified information (Tier 2) and generic technical specifications that is incorporated by reference into 10 CFR Part 52. Design information certified by the NRC may not be changed by a license holder or applicant without prior NRC approval. Design information that is not certified by the NRC may be changed by the license holder or applicant using a prescribed change process.
- j. **Initial Test Program.** The combined pre-operational and startup test programs.
- k. **ITAAC.** Those inspections, tests, analyses, and acceptance criteria identified in the combined license that if met are necessary and sufficient to provide reasonable assurance that the facility has been constructed and will operate in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's rules and regulations. The ITAAC identified in a combined license referencing a certified design will include the ITAAC defined in the Tier 1 documentation. Site-specific ITAAC, which include emergency planning ITAAC and ITAAC that are not part of the certified design, will also be included in a combined license. ITAAC are conditions of the license and must be met before fuel load.
- l. **Licensee's Construction Programs.** Those programs that support and provide oversight over a licensee's construction activities at a given nuclear plant under construction.
- m. **Open Item.** Any inspection finding warranting additional followup by the NRC.

- n. Operational Programs. Those licensee programs specified in the license or by regulation and therefore considered essential to the operational readiness of a new plant and also for its safe commercial operation.
- o. Performance Indicators (PIs). Within the ROP, selected indicators in each cornerstone area that provide a valid and verifiable indication of a plant's performance in that area being measured.
- p. Plant-specific DCD. The document maintained by an applicant or licensee that references one of the design certification appendices in 10 CFR Part 52. This document consists of the generic DCD as modified and supplemented by the plant-specific departures and exemptions allowed per Section VIII of each design certification appendix.
- q. Pre-operational Testing Program. For the purposes of this manual chapter, the Pre-operational Testing Program includes the testing categories normally identified as construction tests, and pre-operational tests as defined below:
 - 1. Construction and Installation Tests. Tests performed under the direction of the licensee or its contractor personnel before system or component turnover to the operating group for pre-operational testing. These tests include those activities such as chemical cleaning, flushing, continuity testing, and the initial calibration of instrumentation necessary to prepare a system for operation. Such tests also include containment integrity and hydrostatic testing of piping systems, valve testing, and energizing and operating equipment and components necessary to demonstrate component, system or structure design and construction adequacy. Baseline in-service inspection is also included in this category.
 - 2. Pre-operational Tests. Tests performed by or under the direction of the licensee's operations staff to demonstrate the proper functioning and conformance to design requirements of components, systems and structures. Containment leak rate tests may fall in this category or may be combined with the containment integrity test. Pre-operational testing frequently forms the contractual basis for custody transfer from the licensee's or its contractor's construction staff to the licensee's operations department.
- r. 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. Quality Assurance includes quality control.
- s. Startup Testing Program. The testing program conducted after the authorization to load fuel. It starts with initial fuel loading and pre-criticality tests, and continues until the plant reaches commercial operating status at or near its licensed power rating. This testing is normally performed by the operating staff, usually under the technical guidance of a contractor's startup test organization. The Startup Testing Program consists of the tests as defined below:
 - 1. Low Power Tests. Pre-criticality testing, initial criticality, critical reactor operation up to 5% of full power for the purposes of verification of the adequacy of reactor core physics and hydraulics design.
 - 2. Power Ascension Tests. A portion of the startup testing program performed following the low-power tests which involves testing and data recording at increasing reactor power levels, temperatures, pressures, and flows.

- t. **Tier 1 Material.** Tier 1 means the portion of the design related information contained in the generic Design Control Document that is approved and certified by the NRC through the rulemaking process. Tier 1 information includes : Definitions and general provisions; design descriptions; ITAAC; significant site parameters; and significant interface requirements.
- u. **Tier 2 Material.** Tier 2 means the portion of the design related information contained in the generic design control document that is approved but not certified by the NRC through the rulemaking process. Tier 2 information includes : Information required by 10 CFR52.47 with the exception of generic technical specifications and conceptual design information; Information required for a final safety analysis report under 10 CFR 50.34; supporting information on ITAAC that will be performed to demonstrate that the acceptance criteria have been met; and Combined License (COL) information items which identify certain matters that are addressed by a COL applicant that references a certified design. Tier 1 material is derived from Tier 2 material. Compliance with Tier 2 is required and demonstrates a sufficient but not the only method for complying with Tier 1.
- v. **Transition Plan.** The listing of inspections and reviews to be performed to ensure that the cornerstones of safety are able to be monitored using the ROP. The plan will document the completion of the listed inspections and reviews and their results, periodic assessments of inspection findings, and the licensee's correction of inspection findings and will be used to justify the completion of IMC 2504 and the start of inspection under the ROP.
- w. **Transition(ing) to the ROP .** The period during which the application of the ROP is being tested to determine whether it can measure the performance of the new plant in each of the seven cornerstones of safety.

04.02 Inspection Terms.

- a. **Baseline Inspection.** The lowest level of required NRC inspections at each facility, which are implemented at a given frequency stated in the respective inspection procedures. An increase in the level of effort above the baseline will be IAW assessments performed per IMC 2505.
- b. **Inspection.** (1) An NRC activity consisting of examination, observation or measurement to determine applicant/contractor conformance to requirements and/or standards. (2) Applicant/contractor quality control measures consisting of examination, observation or measurements to determine the conformance of materials, supplies, components, parts, systems, processes or structures to pre-determined quality standards.
- c. **Inspection Assessment.** Periodic reviews of inspection findings by NRC management to determine if the current level of inspection effort should change. This process is described in IMC2505.
- d. **Inspection Observation.** A documented evaluation regarding the acceptability of licensee construction activities.
- e. **Inspection Plan and Schedule (IP&S).** The document containing planning and scheduling information for implementing all construction inspections for a particular plant with a portion of it being appropriate to this manual chapter.

05.01 Director, Office of **New Reactors**.

- a. **Concurs with Regional Administrator assessment of plant readiness to transition to ROP.**
- b. Informs the Commission on the operational readiness of the plant and implementation status of the operational programs to support loading of fuel.

05.02 Regional Administrator, **Region II**.

- a. Provides overall direction for the implementation of the construction inspection program for **all new construction** sites.
- b. Informs the Director, NRO, when the inspection staff has completed inspections of required operational programs.
- c. Provides an assessment of the overall operational readiness to load fuel to the Director, NRO.
- d. Makes the decision to allow a plant to transition completely to the full oversight of the ROP with the concurrence of the Director, Division of Inspection and Regional Support (DIRS), **NRO, Director, Division of Construction Inspection and Operational Programs (DCIP), NRR, and the home regional administrator for ROP oversight.**

05.03 **Construction Inspection Staff, Region II.**

- a. Implements the construction inspection program at the facility and at remote locations.
- b. Coordinates development and review of the site specific **inspection plan and schedule (IP&S)**.
- c. Ensures that inspections are promptly and properly documented.
- d. Periodically assesses inspection findings **in accordance with the IMC 2505, "Periodic Assessment of Construction Inspection Program Results" process.**
- e. Assesses inspection records and licensee corrective actions to determine the operational readiness of the new plant.
- f. Conducts inspections to determine the readiness of a plant to transition to the ROP.
- g. Provides post-startup oversight until all startup issues are closed.
- h. Recommends to the respective Regional Administrator(s) **when the ROP and IMC0305, "Operating Reactor Assessment Program", can be fully implemented.**

05.04 Director, Division of **Construction Inspection and Operational Programs (NRO/DCIP)**

- a. Provides overall program direction for the construction inspection program.
- b. Develops and directs the implementation of policies, programs, and procedures for inspecting the licensee within or in addition to the construction inspection program.
- c. Concurs with the decision of the Regional Administrator(s) to allow the new plant to transition into the ROP.

2504-06 BACKGROUND AND OVERVIEW

This manual chapter establishes policy for the construction inspection program for the following:

- Licensee's Construction Programs
- Operational Programs Without ITAAC
- Engineering Design Verification
- Pre-operational Testing
- Startup Testing
- Transition to the ROP

Inspections associated with ITAAC will be conducted in accordance with IMC 2503.

The NRC will evaluate the programmatic aspects of the licensee's construction programs to ensure that construction activities are conducted in accordance **with an established QA program and** NRC regulations (See Appendix A).

The evaluation of operational programs during the COL application review process will ensure that the scope of the operational programs are appropriate and consistent with regulations. Any inspection required to support that review will be conducted in accordance with IMC 2502. Operational programs that do not have ITAAC will be listed in Chapter 13 of the FSAR and will be fully described in the COL application. Any operational program without implementation requirements in the regulations will be subject to a license condition which will require the licensee to provide implementation milestones and to maintain an updated implementation schedule.

Inspections will be performed under this manual chapter to assess the licensee's development and implementation of the operational programs. The majority of operational programs will be established by initial fuel loading (see Attachment B) and the remainder prior to low-power testing (see Attachment C). The regulations, the licensee's Technical Specifications, and license conditions, as applicable, will dictate the timing for the licensee's implementation of operational programs.

Inspections of engineering design verification along with inspections of a licensee's design change process and engineering program will be completed under this manual chapter (See Appendix D).

The licensee's oversight of construction activities and QA implementation will be reviewed during all NRC inspections of construction and testing. In accordance with 10 CFR 52.83, all provisions of 10 CFR Part 50 and its appendices apply unless otherwise specified in 10 CFR Part 52. General Design Criterion 1, "Quality Standards and Records," 10 CFR Part 50, Appendix A, requires that nuclear power plant SSCs important to safety be tested to quality standards commensurate with the importance of the safety functions to be performed.

Criterion XI, "Test Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires that a program be established to ensure that all testing necessary to demonstrate that structures, systems, and components will perform satisfactorily in service be identified and conducted. 10 CFR 50.34(b)(6)(iii) requires that plans for pre-operational testing and initial operation be included in the plant-specific design control document which will be part of the application for a COL. Regulatory Guide 1.68, "Initial Startup Test Programs for Water-Cooled Reactor Power Plants," describes a method acceptable to the NRC staff for complying with the regulations with regard to pre-operational and initial startup testing of nuclear power plant structures, systems, and components.

In parallel with the determination on ITAAC inspections, Region II will determine if operational programs listed in Appendix B of this manual chapter are properly established and that the appropriate amount of pre-operational testing has been completed. The Commission will be informed on the operational readiness of the plant and implementation status of the operational programs.

The construction inspection staff will ensure that the operational programs in Appendix C are properly established and that the pre-operational testing and all required corrective actions have been completed prior to the licensee initially starting up the plant.

The licensee will perform low-power testing and operate the facility at reactor power levels as stated in the COL after initial criticality testing. When the licensee is nearing completion of low-power startup testing, the construction inspection staff will ensure that the licensee has successfully implemented the low-power testing and addressed any necessary corrective actions prior to the licensee testing at higher power levels.

The decision to allow a plant to fully transition into the ROP and to fully implement the ROP assessment process (all cornerstones of safety able to be monitored) will be made by the Regional Administrator **over construction with the concurrence of the Director, DIRS/NRR based on the recommendation of the inspection staff, Director DCIP/NRO, and the Regional Administrator for ROP oversight.**

2504-07 GENERAL INSPECTION POLICY

07.01 Inspection Program Scheduling and Planning.

- a. This manual chapter contains the inspection procedures that may be implemented by the site-specific inspection plan and schedule (IP&S) developed by the construction inspection staff. The IP&S should be detailed but flexible and optimize the number of inspections (group various issues and programs together).
- b. The construction inspection staff should ensure that the IP&S differentiates between the inspections performed before fuel load and those performed after fuel load.
- c. The construction inspection staff must be aware of the status of construction and testing activities in order to achieve appropriate inspection planning and to update the IP&S which will coordinate NRC inspection activities with licensee construction and startup activities.
- d. The construction inspection staff establishes the appropriate inspection effort in the IP&S. The inspection procedures listed in this manual may not need to be implemented entirely in order to meet specific inspection requirements.

07.02 Construction Inspection Policy and Scope.

- a. The construction inspection staff will implement inspections of the licensee's construction programs, operational programs, pre-operational and startup testing, engineering design verification, the operational readiness of the plant, the readiness of the plant to transition to the ROP, and any open items.
- b. The construction inspection staff will review the construction activities and programs listed in this manual chapter. The staff will also identify the sample size for each inspection procedure and the number of times to implement each inspection procedure. This will establish the overall scope of the portion of the construction inspection program governed by this manual chapter.

- c. The respective NRO licensing project manager, in conjunction with the construction inspection staff, will coordinate NRO licensing activities and any needed technical support from the regional inspection staff.
- d. The construction inspection staff will periodically assess previous inspection findings to determine if the current level of inspection effort should remain **at the baseline level**, or be increased **in accordance with IMC 2505, "Periodic Assessment of Construction Inspection Program Results."**
- e. The construction inspection staff will use sampling inspections. The sample selection for the non-ITAAC inspections will be based on the methods indicated in the inspection procedures implemented by this manual chapter.
- f. Completion of construction inspection requirements relative to the observation of work activities and the review of quality records is required for each unit of the plant under construction.
- g. The policies and guidance set forth in this manual chapter will be applicable regardless of the work location, whether onsite or offsite at remote fabrication facilities. This is also true whether the organization performing the work is the licensee or a contractor for the licensee.
- h. Some of the inspection procedures implemented by this manual chapter, within each major construction discipline, include requirements to complete Inspection Procedure (IP) 35101, **"QA Program Implementation Inspection for Operational Programs."** Even though this procedure is referenced numerous times in those procedures, it should not be repeated for a given organization if the same QA procedures and personnel were previously examined. However, IP 35101 should be repeated, as needed, to review initial implementation of activities covered by different aspects of the QA program. During followup inspections in each area, an inspector should review any changes to the QA Manual for a contractor or licensee every 3 months to determine if the changes are appropriate. Inspection effort should be recorded against the procedures referencing IP 35101. Inspectors should review the inspection history contained in CIPIMS when planning inspections to identify appropriate scope for inspections.

07.03 Transition to the ROP. This manual chapter establishes the basis for each cornerstone of safety to transition to monitoring by the ROP. To facilitate that, the construction inspection staff will develop a Transition Plan for transferring the cornerstones of safety from the construction inspection program to the oversight of the ROP.

The major steps in the Transition Plan will be:

- a. verifying that construction and testing activities for each cornerstone of safety are complete with exceptions as noted below.
- b. verifying that all significant deficiencies are resolved.
- c. verifying that all other open items are placed in the licensee's corrective action program with a date for their resolution.
- d. verifying that the licensee has developed a program to benchmark and collect PI data.
- e. verifying that the ROP is ready to be implemented by the Regional Staff.

- f. verifying that the licensee's performance in all seven cornerstones of safety meets regulatory standards for operation.

2504-08 DISCUSSION

This chapter provides guidance for implementing the non-ITAAC portion of the construction inspection program. It establishes uniform inspection methodology but leaves sufficient latitude for the construction inspection staff to optimize the use of inspection resources. This chapter defines the inspection program for the evaluation of the licensee's construction programs; operational programs both prior to fuel load and prior to plant operation; pre-operational and startup testing; engineering design verification; and the plant's overall operational readiness.

08.01 Licensee's Construction Programs. The inspection of the licensee's construction program will focus on its programmatic elements. Those include but are not limited to construction QA, the program for reporting defects under 10 CFR 50.55e, problem identification and resolution for construction activities, training and qualification of all construction workers, oversight and control of all contractors, planning of significant work activities including adequacy of construction procedures, and the process used to submit an ITAAC determination to the NRC for verification of its successful completion. Additionally, the handling of allegations related to plant construction and the readiness for operations will be included in the review of the licensee's construction programs. The inspection procedures for reviewing the licensee's construction programs are provided in Appendix A.

- a. Construction QA Program - Sound construction and testing controls are assured by the licensee establishing and implementing a construction QA program, which focuses on the timely identification of problems with construction activities; by the inspection and surveillance of construction, test, and operational programs; and by the early recognition of QA program deficiencies and adverse trends. As a result, the NRC will continually validate that the licensee's QA program is operating as intended and that the appropriate corrective measures for identified problems are achieved by the successful implementation of the licensee's problem identification and resolution (PI&R) program.

The NRC will observe the implementation of the construction QA program during the performance of most NRC inspections. The review of the licensee construction QA program will also include the review of the QA programs of contractors, no matter where the work is being performed, whether onsite or at remote locations. This will allow the construction inspection staff to become aware of any QA program deficiencies that are relevant and that must be corrected before the NRC can find that a ITAAC work-related activity or an operational program is acceptable.

The NRC programmatic review and acceptance of the licensee's QA audits and surveillance activities, which verify the administration and implementation of work-related, operational, and test programs will be integral to the NRC's assessments of the acceptability of those programs. However, once NRC programmatic reviews of the licensee's QA program have been completed, further NRC inspections will be necessary to confirm acceptable construction activities and will check the licensee's implementation of effective QA controls over construction activities.

For multi-unit facilities, the review of the QA procedures may be reduced for subsequent units when no substantive changes have been made to those procedures. However, it should be noted that revisions to QA procedures that may have a significant adverse effect on quality should be examined for all units.

Therefore, sufficient inspection is required to ascertain the adequacy of procedures common to each unit.

- b. Problem Identification and Resolution Program (PI&R) for Construction - The NRC will assess whether a licensee's PI&R program identifies problems in a timely manner, **properly** assesses their significance, **determines** resolution, and undertakes appropriate corrective actions. In order to prevent the recurrence of problems, a licensee's PI&R program should **determine** the root and contributing causes of the **problem**, and the extent of conditions are evaluated.
- c. Program for Reporting Defects and Failure to Comply Per 10 CFR 50.55(e) - The NRC will **examine** a licensee's procedures for evaluating and reporting deviations and failure to comply, **to determine that those are** in accordance with 10 CFR 50.55(e). The NRC places emphasis on the reporting of defects and failures to comply because of the potential to create a substantial safety hazard, as defined in 10 CFR 50.2. A licensee's program for compliance with 10 CFR 50.55(e) should be **rigorous and responsive**, and report defects or failures to comply in a timely manner to the NRC.
- d. Program for Training and Qualification of Construction Personnel - The NRC will review the licensee's program for the training and qualification of construction personnel. Construction personnel **must** have the correct qualifications, training, and experience in order to perform the work to which they are assigned. The licensee **must** abide by the standards for training of construction personnel identified in the COL application. Code provisions (e.g., for the qualification of welders) may dictate specific training and/or qualification requirements. Licensee controls for training, the records **retention, and the retrievability of training documentation and worker qualification are considered to be QA requirements and are** covered by the applicable 10 CFR 50, Appendix B criteria.
- e. Program for Planning Significant Work Activities - The NRC will review a licensee's program for planning significant work activities, focusing on any deficiencies **identified** that could impact the safe construction of a nuclear plant. This effort will **include** a review of the adequacy of the licensee's procedures governing the work.
- f. Program for Control and Oversight of Contractors - The licensee **must** provide the appropriate oversight so that construction standards and regulations are adhered to in all work-related activities and licensee programs. The NRC will determine whether the licensee's programs for the control and oversight of contractors and craft personnel **conform to regulatory requirements**.
- g. Program for Developing ITAAC **Closure** Determinations - The NRC will verify the adequacy of the licensee's program for developing ITAAC **closure** determination submittals. This inspection will **evaluate** the process so that the NRC can have confidence in the accuracy and completeness of the information submitted by the licensee. Knowledge of a licensee's program for controlling ITAAC determination submittals will be factored into the level of review performed by the NRC on individual ITAAC Determinations submitted by the licensee.

08.02 Operational Programs. The approach to inspection of operational programs reflects the staff positions detailed in SECY-05-197, "Review of Operational Programs in a Combined License and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria."

- a. List of Operational Programs, **(This list is not exhaustive for all reactor designs)**

1. Access Authorization
2. Equipment Qualification
3. Fire Protection
4. Fitness for Duty
5. In-service Inspection
6. In-service Testing
7. Licensed Operator Training and Re-qualification
8. Maintenance Rule
9. Physical Security
10. Plant Staff Training
11. Quality Assurance for Operations
12. Pre-service Inspection
13. Pre-service Testing
14. Process and Effluent Monitoring
15. Radiation Protection
16. Reactor Vessel Material Surveillance
17. Containment Leak Rate Testing Program

- b. Implementation of Operational Programs - Licensees **must implement** the operational programs necessary to support each milestone of plant preparation for operation before the program is required by regulations or by a license condition in the COL. Some operational programs may have ITAAC based on the COL application and will be covered by IMC 2503. The evaluations of operational programs required before fuel load should be in accordance with the inspection procedures listed in Appendix B.

Emphasis is placed on the quality assurance program because of its relationship to and impact on all other operational programs.

- c. Inspection of Operational Programs - Using the inspection procedures in Appendix B, the NRC will perform inspections on each operational program to assess its development and the effectiveness of the implementation as each program is put into place. Similar aspects among the various operational programs may allow the construction inspection staff to **adjust** the level of inspection of some operational programs based on the inspection results for programs already reviewed. This would be especially true for those aspects of programs which are similar to one another such as management involvement or corrective action.

Site-wide operational programs, such as security, can not be effectively evaluated for just the new unit independent of the existing units at a site. Therefore, the evaluations of these operational programs will consist of reviewing the implementation of the programs and those aspects which are different from the existing operational programs.

The inspection of operational programs required before initial criticality will be in accordance with the inspection procedures listed in Appendix C. The status of operational programs will be reported to the Regional Administrator before the licensee's intent to start low-power testing at the new plant.

- d. Evaluation of the QA Program for Operations - Implementation of the licensee's QA program for operations is important since the safe operation of the plant is predicated on the identification of problems by the licensee's QA program and the timely correction of the problem through the licensee's PI&R program. The NRC will verify that the licensee's QA program for operations is established prior to fuel load. The NRC may observe QA activities for some construction activities to verify the implementation of activities common to both the construction and operations

QA programs. Any QA program deficiencies that are relevant to QA for operations can then be resolved before the NRC makes a determination about the QA program for operations.

The NRC's inspection of the construction QA program will verify the effectiveness of the licensee's QA audit function, which will be considered when assessing the QA program for operations.

- e. Characterization of Operational Programs - The staff **will** inform the Commission of the status of these programs before the Commission makes the determination that the licensee can load fuel. The staff **will** report to the Commission based on the following:
 - 1. The organizational structure is established sufficiently to support implementation of the operational programs.
 - 2. The implementation of operational programs is consistent with regulations, licensee commitments, license conditions, or standard practices.
 - 3. The adequacy of the licensee's procedures for the programs.
 - 4. The licensee's **effective** administration and control of the operational program in meeting the program's objectives and policies.
 - 5. **Management involvement** with the development, revision, implementation, and enforcement of the operational programs.

08.03 Engineering Design Verification Inspections.

- a. Engineering Design Activities - The NRC will inspect the licensee's engineering design activities before issuance of a COL and subsequent to COL issuance. The engineering inspections will be performed prior to the issuance of a COL in order to support the initial licensing decision. The engineering design inspections after COL issuance will be in accordance with the policies and guidance stated in this manual chapter. The inspections of engineering design verification after COL will be for those portions of a licensee's design that were not finalized until after COL, e.g., **licensee's implementation of the process for conformance with** Design Acceptance Criteria (DAC). The NRC will assess the effectiveness of the licensee's process in maintaining the fidelity between high-level COL design information and the translation of that information into construction documentation. Inspections of a licensee's design change process, as stated in **the** next section, will also occur along with inspection of the effectiveness of a licensee's engineering program.
- b. Design Change Process - The design change process, required by 10 CFR 50, Appendix B, Criterion III, will be periodically assessed during construction.

Initial inspections in this area will determine the licensee's control and administration of the design change process. The NRC's level of confidence in the licensee's design change control process, as reflected in the inspection history, will determine the level of inspection effort for subsequent inspections. The NRC will focus primarily on safety-significant and risk-significant design changes closely associated with ITAACs but, operational and testing programs **and procedures will also be reviewed, if affected by design changes.**

The inspections of the design change process will be in accordance with the inspection procedures contained in Appendix D. **Also, they** will be integrated with those for the engineering design verification. The inspections will determine if design changes are:

1. controlled in accordance with licensee's program
2. assessed for their safety impact
3. translated correctly into construction drawings
4. originated and reviewed by separate organizations
5. processed and approved in accordance with the licensee's design control procedures.

08.04 Construction Testing. A licensee **shall** have a construction testing program to demonstrate that components and systems are correctly constructed, installed, and operational; and to assure that those components and systems are ready for pre-operational testing. The NRC will review test procedures, witness some tests, and **independently review** the results of tests for a sample of construction tests **in order to confirm adequate implementation of the construction testing program**.

08.05 Pre-Operational Testing.

a. Goals of Pre-Operational Testing are:

1. Verify that SSCs meet appropriate performance criteria based on the design.
2. Document the performance and condition of SSCs.
3. Collect test and operating data on equipment and systems to use in the future as a baseline.
4. Verify equipment and components performance by operating for a sufficient period of time.
5. Verify that plant systems can operate in an integrated manner.

b. A graded approach toward the inspection of pre-operational testing is beneficial because some SSCs will be ready to be tested before others and some SSCs are more important to safety than others. Portions of some pre-operational tests may be covered by an ITAAC, therefore, those tests may be referenced in and monitored by both IMC 2503 and this manual chapter. The general requirements identified in this manual chapter are applicable to both BWR and PWR facilities, however, the inspection guidance may differ depending on the type of facility. The inspection program for pre-operational testing defines the minimum inspection requirements for determining the state of readiness of the licensee to perform low-power testing and to operate the facility at **full** reactor power levels.

The pre-operational testing portion of the inspection program is implemented when the applicable SSCs are ready for testing or, **if pre-mode change surveillance tests are defined and required** in the facility technical specifications.

c. Delays in Pre-Operational Testing - Delays incurred by the licensee may result in some pre-operational tests not being complete before startup testing **begins**. If the licensee plans to initiate low-power testing prior to performing all pre-operational tests, the NRC will **review the licensee's plan to verify** that the impact of **the revised** pre-operational testing **schedule** on plant safety is acceptable and that public health and safety are not **reduced**.

d. Inspection Program for Pre-Operational Testing - Appendix E lists the general inspection procedures to be used for evaluating the licensee's 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. The schedule for pre-operational testing inspections will be in accordance with the construction inspection staff's IP&S.

The pre-operational test inspection program for a given reactor design consists of the implementation of the general inspection procedures listed in Appendix E and the inspection procedure for that specific design. Inspection procedures for the specific design will be used to review the two classes of pre-operational tests listed below.

Pre-operational tests for an ABWR plant are listed in Appendix F. Pre-operational tests for an AP1000 plant are listed in Appendix G. Additional design-specific inspections will be added to this manual chapter as additional designs are certified.

1. Class I contains “mandatory pre-operational tests.” The NRC will inspect the implementation of each of the pre-operational tests listed in this class. Included in this class are those tests that the NSSS vendors have indicated must be performed on either the first prototype or the first three plants constructed. The Class I tests are listed in the Appendix for each specific design. The inspections of the mandatory Class I pre-operational tests will consist of three activities: 1) test procedure review, 2) test witnessing, and 3) test results evaluation.
 2. Class II consists of the “recommended pre-operational tests.” The Class II tests are listed in the Appendix for each specific design. Within Class II, a minimum of five tests will be selected and inspection activities will focus on 1) test procedure review, 2) test witnessing, and 3) test results evaluation. The Class II tests chosen for procedure review are not required to be the same as either of those selected for test witnessing or for test results evaluation. Therefore, a minimum of five tests could be reviewed entirely or a maximum of fifteen tests could be reviewed in part for the evaluation of the Class II tests. The NRC will verify that the Class II tests not selected for inspection have been performed under approved procedures and that the licensee’s evaluation indicated satisfactory test results.
- f. Review of Draft Test Procedures - The implementation of the inspection procedure for a specific pre-operational test may not by its nature be completed during a single inspection. For example, activities such as review of procedures and manuals may be conducted over a relatively long time period.

The inspection requirements listed in this manual chapter for the test programs reflect Regulatory Guide 1.68. Regulatory Guide 1.68 states that the licensee should make the pre-operational testing procedures available 60 days before the scheduled test. However, startup testing procedures availability may be tied to the scheduled initial fuel loading date. In the case of startup testing, procedures should be available not less than 60 days before scheduled fuel load. The licensee should make drafts of procedures available as soon as possible to provide sufficient time for the inspector to **schedule and properly prepare to witness the test. If inspectors are provided with draft procedures, they should check for any changes when final procedures are provided.**

- g. **Completion of Inspection Requirements in Inspection Procedures - Inspection procedures list the relevant attributes for the procedures’ reviews and evaluations. The inspector should make every effort to fully complete the procedures. However, the inspector is required to complete only those inspection steps to sufficiently evaluate the inspectible area under review.**

08.06 Operational Readiness Assessment Team Inspections. The Operational Readiness Assessment Team Inspection should be conducted **in phases based on licensee implementation of operational and testing programs, (1) prior to commencement**

of pre-operational and start-up testing; (2) required prior to fuel load; and (3) required during low-power testing. The focus of these inspections is on the effectiveness of: licensee management oversight; operator training and experience; corrective action program; the maintenance program; operator response to plant anomalies and off-normal equipment conditions; general plant conditions impacting safety; and the readiness to support operations. Results from this inspection will provide a major input and basis for an NRC determination of startup readiness. The inspection schedule and scope of these inspections is to be tailored to the individual plant circumstances. Regional management may decide to use a phased approach to this inspection based on the licensee's implementation schedule.

08.07 Startup Testing. The inspection program for startup testing will follow the same approach as that outlined for pre-operational testing detailed in section 08.05e. and 08.05f.

- a. Initiation of Startup Testing - This phase of the construction inspection program begins when the licensee begins to perform low-power testing and ends when the licensee completes full-power testing and all the results of that testing have been reviewed and accepted.
- b. Objectives of Startup Testing include (but not limited to):
 1. Install the nuclear fuel in the reactor vessel in a controlled and safe manner.
 2. Verify that reactor core and components, equipment, and systems required for control and shutdown have been assembled according to design and meet specified performance requirements.
 3. Achieve initial criticality and operation at power in a controlled and safe manner.
 4. Verify that the operating characteristics of the reactor core and associated control and protection equipment are consistent with design requirements and accident analysis assumptions.
 5. Obtain required data and calibrate equipment used to control and protect the plant.
 6. Verify that the plant is operating within the limits imposed by the Technical Specifications.
- c. Basis for Licensee's Startup Testing Program - 10 CFR 50, Appendix A, Criterion I, requires that SSCs important to safety be tested to quality standards commensurate with the importance of the safety functions to be performed. The bases for the licensee's startup testing program are contained in Regulatory Guide 1.68, Initial Test Programs for Water-Cooled Nuclear Power Plants. Chapter 14 of the Final Safety Analysis Report (FSAR) and the Safety Evaluation Report (SER) contain the specifics of the licensee's approved program for startup testing.
- d.
 1. Inspection Program for Startup Testing - The startup testing phase inspection program examines tests from each of the following areas:
 - (a) Initial Fuel Loading and Precritical Tests
 - (b) Initial Criticality
 - (c) Low Power Tests
 - (d) Power Ascension Tests
 2. Specific plans should be prepared to accommodate the planned test program, the unique organizational and administrative features, and current regulatory requirements. Inspection requirements for startup testing at dual or twin facilities will not be reduced because of the typical time lag between the two plants

3. The inspection program for startup testing consists of the generic inspection procedures and the reactor-specific inspection **procedures**. The reactor-specific inspection procedure addresses the two classes of startup tests listed below. Startup tests for an ABWR plant are listed in Appendix I. Startup tests for an AP1000 plant are listed in Appendix J. Additional design-specific inspections will be added to this manual chapter as additional designs are certified.

4. The bulk of the Startup Testing Phase Inspection Program is accomplished by three types of inspections: (1) test procedure review; (2) test witnessing; and (3) test data evaluation. The degree of inspection coverage for each inspection type is dependent on the system(s) being tested. **Generally, however, the preferred method is direct witness of the testing.**

(a) Class I contains tests for those systems or subsystems that directly prevent unsafe conditions or that mitigate the consequences of accidents. The tests are split into two groups, Group A and B, **as shown in the Appendix.**

The reactor-specific inspection procedure is used to guide the test procedure review, witnessing, and evaluation of test results for each test for either Group A or B, whichever is selected, within Class I. During power ascension testing, enhanced test observations are required at selected startup test plateaus and data evaluation is also required. With the approval of the Regional Administrator, the construction inspection staff may substitute some Group A tests with Group B tests and vice versa. The NRC will verify that all Class I tests were performed under approved procedures. Using the reactor-specific inspection procedure, the NRC will verify that satisfactory test results were achieved for the remaining group A or B.

(b) Class II contains tests for those systems or subsystems whose failure to operate will either require action from a Class I system or subsystem to prevent or mitigate an unsafe condition or whose failure to operate properly will have a lesser safety significance than for systems or subsystems in Class I. Inspections will focus on ensuring that an approved test procedure exists for every Class II test for that reactor design. The NRC will use the reactor-specific inspection procedure to evaluate the test results for 50% of the Class II tests and to verify that the licensee achieved satisfactory test results for the remaining 50% of the Class II tests.

e. Implementation of Inspection Program for Startup Testing - Inspectors must **coordinate with licensees** on the expected dates of testing in order to witness the licensee tests. Inspectors **and licensees** are cautioned that licensees do not interpret requests for notification of expected tests as "hold points" for the tests. Licensees are not expected to delay a test for an NRC inspector, **unless specifically required to do so.**

f. Delays in Licensee's Startup Testing Program - **It is expected there will be minimal delays in conducting the power ascension testing program, after initial fuel load. In the event that the testing is delayed, the plant may operate at less than full power for an extended period of time.** To ensure the safety of operations, the licensee must conduct a minimum level of testing to demonstrate that safety-related plant systems and equipment meet the design objectives and are capable of controlling the anticipated transients discussed in the FSAR.

The minimum testing that must be conducted if power ascension testing is delayed will normally be documented as a license condition. The licensee is expected to inform the NRC if unanticipated delays occur.

2504-09 POST-STARTUP AND TRANSITION TO ROP INSPECTION ACTIVITIES

09.01 Inspections During Transition. Inspection activities after startup testing and continuing on through the transition of the plant to the ROP will be in accordance with this section of this manual chapter.

- a. Prior to the transition of the plant, the NRC will ensure that the licensee corrects significant startup issues and inspection findings.
- b. Additional Programs for an Operating Plant

The NRC should conduct inspections to determine if a licensee has established the following programs:

1. Inspection of piping systems qualified for leak-before-break
2. Operability of **dynamic restraints**
3. Piping analysis bench-marking
4. **Measurement of hot gaps for piping supports**
5. Pre-service inspection of the reactor vessel **head** closure
6. Steam generator tube surveillance
7. AC power and transmission systems testing and inspection
8. Light and heavy load handling systems in-service inspection
9. Erosion-corrosion monitoring
10. Turbine maintenance and inspection
11. Wet and dry solid waste process control
12. Outage planning and control
13. Boric acid corrosion **control**

09.02 Plant Transitions to the ROP.

- a. The transition will occur when all the cornerstones of safety are able to be monitored by the ROP. That will happen when the following conditions have been met for each cornerstone.
 1. All construction and testing activities are complete, except as noted below.
 2. Licensee corrective actions for deficiencies identified during construction, testing, and startup activities have been implemented and were considered appropriate.
 3. All other construction, testing, and startup open items have been placed in the licensee's corrective action program.
 4. The ROP **metrics** can be used and will provide sufficient information for determining licensee performance for each cornerstone of safety.
- b. The construction inspection staff will develop and use a Transition Plan to guide the transfer of the plant from the construction inspection program to the ROP. The Transition Plan will address the following:
 1. Verifying, by cornerstone, that the construction inspection program required by the IP&S is complete and any deviations have been addressed.
 2. Identifying followup inspections required to closeout inspection findings and open items.

3. Listing any baseline ROP inspections to be performed to demonstrate that those ROP **metrics** can be applied to the seven cornerstones of safety.
 4. Verifying that the licensee has a performance indicator (PI) program consistent with ROP needs.
 5. Assessing whether a licensee's PI&R program meets the needs of an operating plant.
 6. Developing a summary report detailing the results of activities required by the Transition Plan.
 7. Describing the required review of the summary report by regional senior management.
- c. When the cornerstone has been transferred to the ROP, the construction inspection staff responsibility for that cornerstone will end.
 - d. The significance determination process (SDP) will not be used to characterize the risk significance of inspection findings for a cornerstone until that cornerstone is able to be monitored under the ROP. The ROP Web Site will not be updated for either inspection findings or available PI results until all cornerstones are able to be monitored by the ROP and the Action Matrix is put into effect. Prior to implementation of the ROP, baseline and supplemental inspections will be scheduled at the discretion of the Regional Administrator.
 - e. The regulatory responses in accordance with the Action Matrix may be used for risk-significant inspection findings or degraded cornerstones, at the discretion of senior regional management, before the transition of the new plant to the ROP. Regulatory actions in accordance with the Action Matrix will be defined by the regional organization responsible for reactor oversight under the ROP.
 - f. The transfer of the new plant to the full oversight of ROP will be based on the successful completion of the Transition Plan and will require the written approval of the Regional Administrator **over construction, with the concurrence of the Director, DIRS/NRR, Director DCIP/NRO, and the Regional Administrator for ROP oversight.** This transfer may occur even if all PIs are not yet available, provided that compensatory inspections are conducted, as necessary, in accordance with IMC 2515, **"Light Water Reactor Inspection Program Procedures" or equivalent for other technologies.**

2504-10 INSPECTION FINDINGS AND ENFORCEMENT

Construction inspection observations of the licensee's construction programs, operational programs, engineering design verification, the initial test program (pre-operational and startup testing), operational readiness, and the transition to the ROP will be assessed and documented using the criteria in IMC 0613. "Construction Inspection Reports."

The NRC will inform the licensee of all inspection findings whether identified for onsite construction activities or for offsite fabrication activities. The NRC will **verify** that the licensee adequately corrects all deficiencies identified.

Enforcement actions will be in accordance with **IMC 2505**, IMC 0613 and the Commission's Enforcement Policy related to construction.

The NRC will address programmatic findings commensurate with their impact on the successful completion of ITAAC, the quality of plant construction and testing, and operational readiness.

END

- Appendix A, Inspection of Licensee Construction Programs
- Appendix B, Operational Program Inspections Before Fuel Load
- Appendix C, Operational Program Inspections Before Low-Power Testing
- Appendix D, Inspections of the Licensee's Design Change Process
- Appendix E, Procedures for Inspecting Pre-Operational Tests
- Appendix F, ABWR Pre-Operational Tests
- Appendix G, AP1000 Pre-Operational Tests
- | Appendix H, Procedures for Inspecting Startup Tests
- Appendix I, ABWR Startup Tests
- Appendix J, AP 1000 Startup Tests
- Appendix K, Revision History

APPENDIX A

INSPECTIONS OF LICENSEE CONSTRUCTION PROGRAMS

This Appendix lists the inspection procedures to be used when reviewing the licensee construction programs, as outlined in Section 08.01.

The purpose of these inspections is to verify that the licensee has programs established and implemented to:

1. Control construction activities at the site.
2. Identify problems and resolve them.
3. Report deficiencies and identify failures to do so.
4. Control contractors.
5. Train and qualify construction staff.
6. Ensure the adequacy of ITAAC determination packages for **submission** to the NRC.

This appendix is applicable to all types of advanced reactor designs .

| INSPECTIONS OF LICENSEE'S CONSTRUCTION PROGRAM | | |
|---|---------------|--|
| Program | IP No. | IP Title |
| 1. Construction QA Program | 35020 | Inspection of COL Applicant/Holder's Surveillance of Contractor Quality Assurance Activities |
| | 35101 | QA Program Implementation Inspection for Operational Programs |
| 2. PI&R Program | 40504 | Identification & Resolution of Construction Problems |
| 3. Reportability Under 10 CFR 50.55(e) | 36100 | Inspection of 10 CFR Parts 21 and 50.55(e) Programs for Reporting Defects and Noncompliance |
| 4. Training/Qualification of Construction Staff | XXXXX | TBD |
| 5. Planning Work Activities | XXXXX | Review of Licensee Procedures |

INSPECTIONS OF LICENSEE'S CONSTRUCTION PROGRAM

| Program | IP No. | IP Title |
|---|---------------|--|
| 6. Control/Oversight of Contractors | 35020 | Inspection of COL Applicant/Holder's Surveillance of Contractor Quality Assurance Activities |
| | | |
| 7. Licensee Program for Developing ITAAC Determinations | XXXXX | Licensee Program for ITAAC Closure |
| | | |
| 8. Fitness for Duty | 81502 | Fitness for Duty Program During Construction |
| | | |

APPENDIX B

INSPECTIONS BEFORE FUEL LOAD

This Appendix lists the inspection procedures to be used to review programs needed before fuel is loaded, as outlined in Section 08.02.

The purpose of these inspections is to verify operational programs have been developed and are being implemented in accordance with the license.

This appendix is applicable to all types of advanced reactor designs. The listing of procedures in this appendix may not be all inclusive and changes may be required to it at a later date.

| A. OPERATIONAL PROGRAM INSPECTIONS | | |
|---|--------|--|
| Program | IP No. | IP Title |
| 1. Access Authorization | 81070. | Access Control - Personnel |
| | 81072. | Access Control - (Power Reactors) - Packages |
| | 81074. | Access Control - Vehicles |
| 2. Equipment Qualification | 51080 | Equipment Qualification |
| 3. Fire Protection | 64705 | Part 52: Fire Protection Operational Program |
| 4. Fitness for Duty | 81502. | Fitness for Duty Program |
| 5. In-service Inspection | 73753. | Inservice Inspection |
| | 73755. | Inservice Inspection Data Review and Evaluation |
| 6. In-service Testing | 73756. | Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints |
| 7. Training and Qualification of Staff | 36301. | Operational Staffing Inspection |

| Program | IP No. | IP Title |
|-------------------------|---|---|
| 8. Physical Security | 81018. | Security Plan and Implementing Procedures |
| | 81020. | Management Effectiveness |
| | 81022. | Security Organization |
| | 81034. | Security Program Audit |
| | 81038. | Records and Reports |
| | 81042. | Testing and Maintenance |
| | 81046. | Locks, Keys, and Combinations |
| | 81052. | Physical Barriers - Protected Areas |
| | 81054. | Physical Barriers - Vital Areas, Material Access Areas, and Controlled Access Areas |
| | 81058. | Security System Power Supply |
| | 81062. | Lighting |
| | 81064. | Compensatory Measures |
| | 81066. | Assessment Aids |
| | 81078. | Detection Aids - Protected Areas |
| | 81080. | Detection Aids - VA, MAA, and CAA |
| | 81084. | Alarm Stations |
| | 81088. | Communications |
| | 81401. | Plans, Procedures, and Reviews |
| | 81402. | Reports of Safeguard Events |
| | 81403. | Receipt of New Fuel at Reactor Facilities |
| | 81501. | Personnel Training and Qualification -General Requirements |
| 81601. | Safeguards Contingency Plan - Implementation Review | |
| 81810. | Physical Protection Safeguards Information | |
| 85102. | Material Control and Accounting - Reactor | |
| 9. Plant Staff Training | 41500 | Review of Training and Qualification Programs |

| Program | IP No. | IP Title |
|--|--------|---|
| 10. Pre-service Inspection | 73051 | In-service Inspection - Review of Program |
| 11. Pre-service Testing | xxxxx | Integrated in IPs 73051, 73753, and 73755 |
| 12. Process and Effluent Monitoring | 84522 | Solid Waste Management System |
| | 84523 | Liquid Waste Management System |
| | 84524 | Gaseous Waste Management |
| | 84525 | Quality Assurance and Confirmatory Measurements for In-Plant Radiochemical Analysis (Preoperational and Supplemental) |
| 13. Radiation Protection | 80521 | Radiological Environmental Monitoring Program |
| | 83524 | External Occupational Exposure Control and Personal Dosimetry |
| | 83525 | Internal Exposure Control |
| | 83526 | Control of Radioactive Materials and Contamination, Surveys, and Monitoring |
| | 83527 | Facilities and Equipment |
| | 83528 | Maintaining Occupational Exposures ALARA |
| | XXXXX | Offsite Dose Calculation Manual |
| 14. Reactor Vessel Material Surveillance | TBD | Reactor Vessel Material Surveillance Program |
| 15. Containment Leak Rate Testing | 70307 | Containment Leak Rate Testing |

| Program | IP No. | IP Title |
|--|--------|--|
| B. PI&R, FOLLOWUP, AND ORAT INSPECTIONS | | |
| | 40504 | Identification and Resolution of Construction Problems |
| | 92701 | Followup |
| | 92702 | Followup on Corrective Actions for Violations and Deviations |
| | 94300 | Status of 10 CFR 52 Plant Readiness for Fuel Load |
| | 93806 | Operational Readiness Assessment Team Inspection |
| C. LICENSEE PROGRAMS INSPECTIONS | | |
| 1. Initial Fuel Loading | 81403 | Receipt of Fuel at Reactor Facilities |
| | 72500 | Initial Fuel Load Procedure Review |
| | 72524 | Initial Fuel Load Witnessing |
| 2. Maintenance | 35101 | QA Program Implementation Inspection for Operational Programs |
| 3. Operations | 42400 | Plant Procedures Inspection |
| | 42450 | Operating Procedures Inspection |
| | 42452 | Emergency Procedures Inspection |
| | 71301 | Technical Specifications Review |
| | 35753 | QA |
| 5. Plant Water Chemistry Controls | 79501 | LWR Water Chemistry Control and Chemical Analysis (Pre-operational and Supplemental) |
| | 79502 | Plant Systems Affecting Plant Water Chemistry |
| 6. Engineering and Design | 37803 | Engineering Design Verification Inspections After Issuance of a COL |

APPENDIX C

OPERATIONAL PROGRAM INSPECTIONS BEFORE LOW-POWER TESTING

This Appendix lists the inspection procedures to be conducted after fuel is loaded, as outlined in Section 08.02d.

The purpose of these 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.

This appendix is applicable to all types of advanced reactor designs. The listing of procedures in this appendix may not be all inclusive and changes may be required to it at a later date.

| A. OPERATIONAL PROGRAM INSPECTIONS | | |
|------------------------------------|--------|--|
| Program Name | IP No. | IP Title |
| 1. Maintenance | 35101 | QA Program Implementation Inspection for Operational Programs |
| | 62706 | Maintenance Rule Implementation for Part 52 Licensees |
| | | |
| 2. QA for Operations | 35101 | QA Program Implementation Inspection for Operational Programs |
| | 35752 | Part 51: Procurement Control & Receipt, Storage and Handling of Equipment and Materials |
| | 35961 | QA Implementation of Criterion I - Evaluation of Engineering Organization Conducting First Of A Kind Engineering |
| | 36100 | Inspection of 10 CFR Parts 21 and 50.55(e) Programs for Reporting Defects and Noncompliance |
| | XXXXX | Inspection of Commercial Grade Dedication Programs |

APPENDIX D

INSPECTIONS OF THE LICENSEE'S DESIGN CHANGE PROCESS

This Appendix lists the inspection procedures used to verify that the licensee has implemented a process for controlling design changes in accordance with 10 CFR 50, Appendix B, Criterion II, as outlined in Section 08.03.

The construction inspection staff will determine the scope of the effort in this area and will identify the procedures to be used.

This appendix is applicable to all types of advanced reactor designs.

| DESIGN CHANGE PROCESS INSPECTIONS | |
|--|---|
| IP No. | IP Title |
| 35101 | QA Program Implementation Inspection for Operational Programs |
| 37700 | Design, Design Changes, and Modifications |
| 37701 | Facility Modifications |
| 37702 | Design Changes and Modifications Program |
| | |

APPENDIX E

PROCEDURES FOR INSPECTING PRE-OPERATIONAL TESTS

This Appendix lists the inspection procedures to be used to verify that the licensee's pre-operational testing program, as outlined in Section 08.05, is being implemented in accordance with regulations.

This appendix lists general procedures applicable to all designs, and reactor design-specific procedures for the pre-operational test program for an ABWR plant and for the pre-operational test program for an AP1000 plant. Other design-specific guidance will be added as needed.

These procedures are to be used for inspecting the tests in Appendix F for the ABWR design and in Appendix G for the AP1000 design. Appendices F and G provide specific guidance for use of the procedures.

| GENERAL INSPECTION PROCEDURES (IPs) FOR PRE-OPERATIONAL TESTING | |
|--|--|
| IP No. | IP Title |
| 70302 | Pre-operational Test Program Implementation |
| 35301 | Quality Assurance for Pre-operational Testing |
| 70370 | Testing of Pipe Supports and Restraint Systems |
| | |

| ABWR PRE-OPERATIONAL TEST INSPECTION PROCEDURE | |
|---|---|
| IP No. | IP Title |
| 70701 | PRE-OPERATIONAL TESTING FOR ABWR - PROCEDURE REVIEW, WITNESSING, AND RESULTS EVALUATION |
| | |

| AP1000 PRE-OPERATIONAL TEST INSPECTION PROCEDURE | |
|---|--|
| IP No. | IP Title |
| 70702 | PRE-OPERATIONAL TESTING FOR AP 1000 - PROCEDURE REVIEW, WITNESSING, AND RESULTS EVALUATION |

APPENDIX F

ABWR PRE-OPERATIONAL TESTS

This appendix lists the pre-operational tests for the ABWR for which IP 70701 must be performed. Only the tests listed in Classes I and II are required to be inspected by this manual chapter.

| CLASS I: MANDATORY PRE-OP TESTS FOR ABWR | |
|--|--|
| Use IP 70701 to inspect each of the tests listed in this Class. | |
| DCD Test No | Test Title |
| 14.2.12.1.40 | Containment System Integrated Leak Rate and Structural Integrity Tests |
| 14.2.12.1.45.1 | DC Power System Portion of Electrical Systems Tests |
| 14.2.12.1.45.3 | Diesel Generator Portion of Electrical Systems Test |
| 14.2.12.1.10 | High Pressure Core Flooder System Test |
| 14.2.12.1.46 | Integrated ECCS Loss of Preferred Power (LOPP/LOCA) Test |
| 14.2.12.1.1 | Nuclear Boiler System Test |
| 14.2.12.1.29 | Reactor Building Cooling Water System Test |
| 14.2.12.1.9 | Reactor Core Isolation Cooling System Test |
| 14.2.12.1.14 | Reactor Protection System Test |
| 14.2.12.1.61 | Reactor Service Water System Test |
| 14.2.12.1 | Reactor Vessel Flow-induced Vibration Preop Test (Prototype only) |
| 14.2.12.1.18 | Remote Shutdown System Test |
| 14.2.12.1.8 | Residual Heat Removal System Test |
| 14.2.12.1.11 | Safety System Logic and Control Test |
| 14.2.12.1.5 | Standby Liquid Control System Test |

CLASS II: RECOMMENDED PRE-OP TESTS FOR ABWR

Use IP 70701 to review the procedure for five tests in this Class, to witness five tests in this Class, and to review the results for five tests in this Class.

The five tests selected for procedure review may be, but need not be, the same as those selected for either witnessing or results review.

For the remaining tests not selected, verify that tests were performed under approved tests procedures and that the licensee's evaluations indicated satisfactory test results.

| DCD Test No | Test Title |
|----------------|--|
| 14.2.12.1.39 | Containment Airlock Leakage Rate Tests |
| 14.2.12.1.26 | Containment Atmosphere Monitoring System Test |
| 14.2.12.1.37 | Containment Isolation Valve Leakage Rate Tests |
| 14.2.12.1.38 | Containment Penetration Leakage Rate Tests |
| 14.2.12.1.42 | Containment Isolation Valve and MOV Tests |
| 14.2.12.1.6 | Control Rod Drive System Test |
| 14.2.12.1.45.4 | Electrical Power Distribution System Test |
| 14.2.12.1.51 | Expansion, Vibration, and Dynamic Effects Test |
| 14.2.12.1.48 | Fire Protection System Test |
| 14.2.12.1.72 | Flammability Control System Test |
| 14.2.12.1.34 | Heating, Ventilation, and Air Conditioning Systems Tests |
| 14.2.12.1.28 | High Pressure Nitrogen Gas Supply System Test |
| 14.2.12.1.32 | HVAC Emergency Cooling Water System |
| 14.2.12.1.13 | Leak Detection and Isolation System Test |
| 14.2.12.1.12 | Multiplexing System Test (EMS) |
| 14.2.12.1.15 | Neutron Monitoring System Test |
| 14.2.12.1.44 | Post Accident Monitoring System Instrumentation Test |
| 14.2.12.1.41 | Pressure Suppression Containment Bypass Leakage Tests |
| 14.2.12.1.23 | Process Radiation Monitoring System Test |
| 14.2.12.1.3 | Recirculation Flow Control System Test |
| 14.2.12.1.2 | Reactor Recirculation System Test |

| DCD Test No | Test Title |
|--------------|---|
| 14.2.12.1 | Reactor Vessel Flow-Induced Vibration Test |
| 14.2.12.1.19 | Reactor Water Cleanup System Test |
| 14.2.12.1.36 | Standby Gas Treatment System Test |
| 14.2.12.1.20 | Suppression Pool Cleanup System Test |
| 14.2.12.1.77 | Ultimate Heat Sink Test |
| 14.2.12.1.43 | Wetwell-to-Drywell Vacuum Breaker System Test |

REMAINING TESTS FOR ABWR - The tests listed below are the remaining pre-operational tests contained in the ABWR Design Control Document, Section 14.2.12.1. No reviews of these tests are required per this manual chapter.

| | |
|--------------|--|
| 14.2.12.1.4 | Feedwater Control System Test |
| 14.2.12.1.7 | Rod Control and Information System Test |
| 14.2.12.1.12 | Multiplexing System Test (NEMS) |
| 14.2.12.1.16 | Process Computer System Test |
| 14.2.12.1.17 | Automatic Power Regulator Test |
| 14.2.12.1.21 | Fuel Pool Cooling and Cleanup System Test |
| 14.2.12.1.22 | Plant Process Sampling System Test |
| 14.2.12.1.24 | Area Radiation Monitoring System Test |
| 14.2.12.1.27 | Instrument Air and Station Service Air Systems Tests |
| 14.2.12.1.31 | Hot Water Heating System Test |
| 14.2.12.1.33 | HVAC Normal Cooling Water System Test |
| 14.2.12.1.35 | Atmospheric Control System Test |
| 14.2.12.1.47 | Plant Communications System Test |
| 14.2.12.1.49 | Radioactive Drain Transfer System Tests |
| 14.2.12.1.50 | Fuel Handling and Reactor Component Servicing Equipment Test |
| 14.2.12.1.53 | Condensate and Feedwater System Test |
| 14.2.12.1.54 | Condensate Purification System Test |
| 14.2.12.1.55 | Reactor Water Chemistry Control Systems Test |
| 14.2.12.1.56 | Main Condenser Evacuation System Test |
| 14.2.12.1.57 | Offgas System Test |
| 14.2.12.1.58 | Hotwell Level Control System Test |
| 14.2.12.1.59 | Makeup Water Condensate System Test |
| 14.2.12.1.60 | Circulating Water System Test |
| 14.2.12.1.62 | Turbine Building Cooling Water System Test |
| 14.2.12.1.63 | Turbine Service Water System Test |
| 14.2.12.1.64 | Main Turbine Control System Test |
| 14.2.12.1.65 | Main Turbine Bypass System Test |
| 14.2.12.1.66 | Steam Bypass and Pressure Control System Test |
| 14.2.12.1.67 | Feedwater Heater and Drain System Test |
| 14.2.12.1.68 | Extraction Steam System Test |
| 14.2.12.1.69 | Moisture Separator/Reheater System Test |
| 14.2.12.1.70 | Main Turbine and Auxiliaries Test |
| 14.2.12.1.71 | Main Generator and Auxiliary Systems Test |
| 14.2.12.1.73 | Loose Parts Monitoring System Test |
| 14.2.12.1.74 | Seismic Monitoring System Test |
| 14.2.12.1.75 | Liquid and Solid Radwaste Systems Tests |

APPENDIX G

AP1000 PRE-OPERATIONAL TESTS

This appendix lists the AP1000 pre-operational tests for which IP 70702 must be performed. Only the tests listed in Classes I and II are required to be inspected by this manual chapter.

| CLASS I: MANDATORY PRE-OP TESTS FOR AP1000 | |
|--|--|
| Use IP 70702 to inspect each of the tests listed in this Class. | |
| DCD Test No | Test Title |
| 14.2.9.1.3 (s) | ADS Blowdown Test (first 3 plants) |
| 14.2.9.1.14 | Class 1E DC Power and Uninterruptible Power Supply Test |
| 14.2.9.1.10 | Containment Isolation and Leak Rate Test |
| 14.2.9.1.3 (k),(w) | Core Makeup Tank Heated Recirculation Test (first 3 plants) |
| 14.2.9.1.7 (a-c) | Expansion, Vibration, and Dynamic Effects Test |
| 14.2.9.1.13 | Incore Instrumentation System Test |
| 14.2.9.1.3 (h) | IRWST Heatup Test (prototype only) |
| 14.2.9.1.6 | Main Control Room Emergency Habitability System Test |
| 14.2.9.1.3 | Passive Core Cooling System Test (a-g); (i-r); & (t-w) |
| 14.2.9.1.4 | Passive Containment Cooling System Test |
| 14.2.9.1.7 (d) | Pressurizer Surge Line Stratification Test (prototype only) |
| 14.2.9.1.1 | Reactor Coolant System Test |
| 14.2.9.1.12 | Protection and Safety Monitoring System Test |
| 14.2.9.1.9 | Reactor Vessel Internals Vibration Test (prototype only) |
| 14.2.9.1.2 | Steam Generator System Test |

CLASS II: RECOMMENDED PRE-OP TESTS FOR AP 1000

Use IP 70702 to review the procedure for five tests in this Class, to witness five tests in this Class, and to review the results for five tests in this Class.

The five tests selected for procedure review may be, but need not be, the same as those selected for either witnessing or results review.

For the remaining tests not selected, verify that tests were performed under approved tests procedures and that the licensee's evaluations indicated satisfactory test results.

| DCD Test No | Test Title |
|--------------------|--|
| 14.2.9.1.5 | Chemical Volume and Control System Isolation Test |
| 14.2.9.2.3 | Chemical Volume and Control System Test |
| 14.2.9.4.10 | Compressed and Instrument Air System Test |
| 14.2.9.2.5 | Component Cooling Water System Test |
| 14.2.9.4.12 | Containment Air Filtration System Test |
| 14.2.9.1.11 | Containment Hydrogen Control System Test |
| 14.2.9.4.11 | Containment Recirculation Cooling System Test |
| 14.2.9.1.8 | Control Rod Drive System Test |
| 14.2.9.2.14 | Diverse Actuation System Test |
| 14.2.9.2.8 | Fire Protection System Test |
| 14.2.9.1.15 | Fuel Handling and Reactor Component Servicing Equipment Test |
| 14.2.9.3.1 | Liquid Radwaste System Test |
| 14.2.9.1.16 | Long-Term Safety-Related System Support Test |
| 14.2.9.2.4 | Normal Residual Heat Removal System Test |
| 14.2.9.2.12 | Plant Control System Test |
| 14.2.9.2.11 | Radiologically Controlled Area Ventilation System Test |
| 14.2.9.2.18 | Radiation Monitoring System Test |
| 14.2.9.4.20 | Radwaste Building HVAC System |
| 14.2.9.2.6 | Service Water System Test |
| 14.2.9.2.7 | Spent Fuel Pool Cooling System Test |
| 14.2.9.2.17 | Standby Diesel Generator Test |

REMAINING TESTS FOR AP1000 - The tests listed below are the remaining pre-operational tests contained in the AP1000 Design Control Document, Sections 14.2.9.2., 14.2.9.3., and 14.2.9.4. No reviews of these tests are required per this manual chapter.

Defense-in-Depth Functions

- 14.2.9.2.1 Main Steam System Test
- 14.2.9.2.2 Main and Startup Feedwater System Test
- 14.2.9.2.9 Central Chilled Water System Test
- 14.2.9.2.10 Nuclear Island Non-radioactive Ventilation System Test
- 14.2.9.2.13 Data Display Processing System Test
- 14.2.9.2.15 Main AC Power System Test
- 14.2.9.2.16 Non-Class 1E DC and Uninterruptible Power Supply System Test
- 14.2.9.2.19 Plant Lighting System Test
- 14.2.9.2.20 Primary Sampling System Test
- 14.2.9.2.21 Annex/Auxiliary Building Non-radioactive HVAC System Test

Non-Safety-Related Radioactive System Functions

- 14.2.9.3.2 Gaseous Radwaste System Test
- 14.2.9.3.3 Solid Radwaste System Test
- 14.2.9.3.4 Radioactive Waste Drain System Test
- 14.2.9.3.5 Steam Generator Blowdown System Test
- 14.2.9.3.6 Waste Water System Test

Additional Non-Safety-Related Functions

- 14.2.9.4.1 Condensate System Test
- 14.2.9.4.2 Condenser Air Removal System Test
- 14.2.9.4.3 Main Turbine System and Auxiliaries Test
- 14.2.9.4.4 Main Generator System and Auxiliaries Test
- 14.2.9.4.5 Turbine Building Closed Cooling Water System Test
- 14.2.9.4.6 Circulating Water System Test
- 14.2.9.4.7 Turbine Island Chemical Feed System Test
- 14.2.9.4.8 Condensate Polishing System Test
- 14.2.9.4.9 Demineralized Water Transfer and Storage System Test
- 14.2.9.4.13 Plant Communications System Test
- 14.2.9.4.14 Mechanical Handling System Crane Test
- 14.2.9.4.15 Seismic Monitoring System Test
- 14.2.9.4.16 Special Monitoring System Test
- 14.2.9.4.17 Secondary Sampling System Test
- 14.2.9.4.18 Turbine Building Ventilation System Test
- 14.2.9.4.19 Health Physics and Hot Machine Shop HVAC Test
- 14.2.9.4.21 Main, Unit Auxiliary and Reserve Transformer Test

APPENDIX H

PROCEDURES FOR INSPECTING STARTUP TESTS

This Appendix lists the procedures to be used to verify that the licensee's startup testing program, as outlined in Section 08.07, is being implemented in accordance with regulations.

This appendix lists general procedures applicable to all designs, and reactor design-specific procedures for the start-up test program for an ABWR plant and for the start-up test program for an AP1000 plant. Other design-specific guidance will be added as needed.

These procedures are to be used for inspecting the tests in Appendix I for an ABWR and in Appendix J for an AP1000. Appendices I and J provide specific guidance for use of the procedures.

| GENERAL INSPECTION PROCEDURES FOR STARTUP TESTING | |
|--|---|
| IP | IP TITLE |
| 35501 | QA for the Startup Test Program |
| 64100 | Postfire Safe Shutdown, Emergency Lighting, and Oil Collection Capabilities at Operating and Near-Term Operating Reactor Facilities |
| 72400 | Overall Startup Test Program |
| 83521 | Radiation Protection - Startup |
| 84521 | Radwaste - Startup |
| 90501 | Reportable Matters - Test Program |

| ABWR STARTUP TEST INSPECTION PROCEDURE | |
|---|--|
| IP No. | IP Title |
| 72303 | STARTUP TESTING FOR ABWR - TEST PROCEDURE REVIEW, WITNESSING, AND RESULTS EVALUATION |

| AP100 STARTUP TEST INSPECTION PROCEDURE | |
|--|---|
| IP No. | IP Title |
| 72304 | STARTUP TESTING FOR AP 1000 - TEST PROCEDURE REVIEW, WITNESSING, AND RESULTS EVALUATION |

APPENDIX I
ABWR STARTUP TESTS

CLASS I: MANDATORY ABWR S/U TESTS FOR INSPECTION

Select either Group A or Group B as the sample for Startup Testing for Class I Tests for ABWR. Perform IP 70303 for each test within the selected group.

For all tests in the other group, verify that approved test procedures exist and use IP 72303 to determine if satisfactory tests results were achieved.

References are to sections in Regulatory Guide 1.68, Revision 2, Appendix A.

| Group A | Group B | Test Title | Ref. |
|---------|---------|--|--------|
| | X | Control Rod Drive System Performance (14.2.12.2.5) | 4.b. |
| X | X | Core Performance (14.2.12.2.8) | 5.b. |
| | X | Feedwater Control (14.2.12.2.14) | 5.s. |
| X | | Feedwater Pump Trip (14.2.12.2.29) | 5.v. |
| | X | Feedwater System Performance (14.2.12.2.18) | 5.v. |
| X | X | Fuel Loading (14.2.12.2.3) | 2 |
| X | X | Full Core Shutdown Margin Demonstration (Initial Criticality (14.2.12.2.4) | 3 |
| | X | Loss of Turbine/Generator and Offsite Power (14.2.12.2.32) | 5.j.j. |
| X | | Main Steam System Performance (14.2.12.2.19) | 5.v. |
| | X | MSIV Performance (14.2.12.2.26) | 5.u. |
| X | | Neutron Monitoring System Performance (14.2.12.2.6) | 4.d. |
| X | | Plant Automation and Control (14.2.12.2.16) | 4.n. |
| | X | Plant Cooling/Service Water System(s) Performance (14.2.12.2.23) | 5.x. |
| | X | RCIC System Performance (14.2.12.2.22) | 5.l. |
| X | | Reactor Water Cleanup System Performance (14.2.12.2.23) | 4.r. |
| X | | Residual Heat Removal System Performance (14.2.12.2.20) | 5.l. |
| X | | Shutdown From Outside the Main Control Room (14.2.12.2.31) | 5.d.d. |
| | X | Steam and Power Conversion System Performance (14.2.12.2.39) | 5.v. |

CLASS I: MANDATORY ABWR S/U TESTS FOR INSPECTION

Select either Group A or Group B as the sample for Startup Testing for Class I Tests for ABWR. Perform IP 70303 for each test within the selected group.

For all tests in the other group, verify that approved test procedures exist and use IP 72303 to determine if satisfactory tests results were achieved.

References are to sections in Regulatory Guide 1.68, Revision 2, Appendix A.

| Group A | Group B | Test Title | Ref. |
|---------|---------|---|--------|
| | X | Steam Separator/Dryer Performance Test (14.2.12.2.40) | 5.v. |
| X | | Turbine Trip and Load Rejection (14.2.12.3.33) | 5ll,5n |
| X | | Turbine Valve Performance (14.2.12.2.25) | 5.t. |

CLASS II: RECOMMENDED ABWR S/U TESTS FOR INSPECTION

For all ABWR Class II S/U tests, determine if an approved test procedure exists.

Perform IP 72303 to evaluate test results for 50% of the Class II tests listed below. For the remaining Class II tests, use IP 72303 to determine if satisfactory tests results were achieved.

| DCD Test No | Test Title |
|--------------|---|
| 14.2.12.2.1 | Chemical and Radiochemical Measurements |
| 14.2.12.2.3 | Fuel Loading |
| 14.2.12.2.35 | Gaseous Radwaste Management/Offgas System |
| 14.2.12.2.24 | HVAC System Performance |
| 14.2.12.2.9 | Nuclear Boiler Process Monitoring |
| 14.2.12.2.15 | Pressure Control |
| 14.2.12.2.7 | Process Computer System Operation |
| 14.2.12.2.2 | Radiation Measurements |
| 14.2.12.2.34 | Reactor Full Isolation |
| 14.2.12.2.12 | Reactor Internals Vibration |
| 14.2.12.2.17 | Reactor Recirculation System Performance |
| 14.2.12.2.27 | SRV Performance |
| 14.2.12.2.10 | System Expansion |
| 14.2.12.2.11 | System Vibration |

REMAINING TESTS FOR ABWR - The tests listed below are the remaining pre-operational tests contained in the ABWR Design Control Document, Sections 14.2.12.2 not listed as either Class 1 or Class 2. No reviews of these tests are required per this manual chapter.

- 14.2.12.2.37 Concrete Penetration Temperature Surveys
- 14.2.12.2.38 Liquid Radioactive Waste Management System Performance
- 14.2.12.2.36 Loose Parts Monitoring System Baseline Data
- 14.2.12.2.28 Loss of Feedwater Heating
- 14.2.12.2.13 Recirculation Flow Control
- 14.2.12.2.30 Recirculation Pump Trip

APPENDIX J

AP1000 STARTUP TESTS

CLASS I: MANDATORY AP1000 S/U TESTS FOR INSPECTION

Select either Group A or Group B as the sample for Startup Testing for Class I Tests for AP1000. Perform IP 72304 for each test within the selected group.

For all tests in the other group, verify that approved test procedures exist and use IP 72304 to determine if satisfactory tests results were achieved.

References are to sections in Regulatory Guide 1.68, Revision 2, Appendix A.

| Group A | Group B | Test Title | Ref. |
|---------|---------|--|--------|
| X | | Axial Flux Difference Instrumentation Calibration (Flux Asymmetry) - (14.2.10.4.7) | 5.x. |
| X | | Bank Worth Measurement (Rod Worth) (14.2.10.3.5) | 4.b. |
| | X | Boron Endpoint Determination (Boron Reactivity Worth Measurements) - (14.2.10.3.3) | 4.a. |
| | X | Determination of Physics Testing Range (Power Reactivity Coefficient) - (14.2.10.3.2) | 4. |
| X | X | Fuel Loading Prerequisites and Periodic Checks (14.2.10.1.1) | 2. |
| X | X | Incore Instrumentation System (Core Performance) - (14.2.10.4.2) | 5.i. |
| X | X | Initial Criticality (14.2.10.2.2) | 3. |
| X | X | Initial Fuel Loading (14.2.10.1.5) | 2. |
| | X | Isothermal Temperature Coefficient Measurement (Moderator Temperature Coefficient) - (14.2.10.3.4) | 4.a. |
| X | X | Load Follow Demonstration Test (14.2.10.4.22) - prototype only | 5.h.h. |
| X | X | Loss of Offsite Power (14.2.10.4.26) | 5.j.j. |
| X | X | Natural Circulation -prototype only (14.2.10.3.6) | 4.t. |
| X | X | Passive Residual Heat Removal Heat Exchanger - prototype only (14.2.10.3.7) | 4.q. |
| X | | Plant Trip from 100% Power (Generator Trip (14.2.10.4.24) | 5.l.l. |
| | X | Rapid Power Reduction System (Protective Trip Circuit and Manual Scram) (14.2.10.1.15) | 2.c. |
| X | | Reactor Coolant System Flow Measurement (14.2.10.1.17) | 5.m. |
| | X | Reactor Power Control System (14.2.10.4.19) | 5.s. |

CLASS I: MANDATORY AP1000 S/U TESTS FOR INSPECTION

Select either Group A or Group B as the sample for Startup Testing for Class I Tests for AP1000. Perform IP 72304 for each test within the selected group.

For all tests in the other group, verify that approved test procedures exist and use IP 72304 to determine if satisfactory tests results were achieved.

References are to sections in Regulatory Guide 1.68, Revision 2, Appendix A.

| Group A | Group B | Test Title | Ref. |
|---------|---------|---|--------|
| X | X | Remote Shutdown Work Station (14.2.10.4.28) | 5.d.d. |
| X | | Resistance Temperature Detector—Incore Thermocouple Cross Calibration (14.2.10.1.8) | 2. |
| X | X | Rod Cluster Control Assembly Out of Bank Measurements (Pseudo Rod Ejection -prototype only) - (14.2.10.4.6) | 5.y. |
| X | | Rod Drop Measurements (14.2.10.1.14) | 2.b. |
| X | X | Rod Position Indication System (14.2.10.1.12) | 2.b. |
| | X | 100 Percent Load Rejection (14.2.10.4.20) | 5.n.n. |

CLASS II: RECOMMENDED S/U TESTS FOR AP1000

For all AP1000 Class II S/U tests, determine if an approved test procedure exists.

Perform IP 72304 to evaluate test results for 50% of the Class II tests listed below. For the remaining Class II tests, use IP 72304 to determine if satisfactory tests results were achieved.

| DCD Test No | Test Title |
|--------------|--|
| 14.2.10.1.3 | Fuel Loading Instrumentation and Neutron Source Requirements |
| 14.2.10.2.1 | Initial Criticality Test Sequence |
| 14.2.10.1.7 | Incore Instrumentation System Precritical Verification |
| 14.2.10.1.4 | Inverse Count Rate Ratio Monitoring for Fuel Loading |
| 14.2.10.4.3 | Nuclear Instrumentation System |
| 14.2.10.1.9 | Nuclear Instrumentation System Precritical Verifications |
| 14.2.10.2.3 | Nuclear Instrumentation System Verification During Initial Criticality |
| 14.2.10.4.20 | Load Swing Test |
| 14.2.10.3.1 | Low-Power Test Sequence |

| | |
|--------------|---|
| 14.2.10.1.6 | Post-Fuel Loading Precritical Sequence |
| 14.2.10.1.19 | Pressurizer Spray Capability and Continuous Spray Flow Verification (Pressurizer Effectiveness) |
| 14.2.10.1.16 | Process Instrumentation Alignment |
| 14.2.10.4.10 | Process Instrumentation Alignment at Power Conditions |
| 14.2.10.4.9 | Process Measurement Accuracy Verification |
| 14.2.10.4.8 | Primary and Secondary Chemistry |
| 14.2.10.4.11 | Reactor Calibration Coolant System Flow Measurement at Power Conditions |
| 14.2.10.1.18 | Reactor Coolant System Flow Coastdown |
| 14.2.10.1.10 | Setpoint Precritical Verification |
| 14.2.10.4.12 | Steam Dump Control System (Turbine Trip) |
| 14.2.10.4.5 | Startup Adjustments of Reactor Coolant System |
| 14.2.10.4.13 | Steam Generator Level Control System |
| 14.2.10.4.17 | Thermal Power Measurement and Statepoint Data Collection |

REMAINING AP1000 STARTUP TESTS: All of the startup tests shown below are the remaining tests from the AP 1000 Design Control Document, Sections 14.2.10 not selected for the Class I and Class II. No review of these tests is required by this manual chapter.

| | |
|--------------|---|
| 14.2.10.4.16 | Biological Shield Survey |
| 14.2.10.1.13 | Control Rod Drive Mechanism |
| 14.2.10.4.18 | Dynamic Response |
| 14.2.10.4.27 | Feedwater Heater Loss and Out of Service Test |
| 14.2.10.1.20 | Feedwater Valve Stroke Test |
| 14.2.10.4.23 | Hot Full Power Boron Endpoint |
| 14.2.10.2.4 | Post-Criticality Reactivity Computer Checkout |
| 14.2.10.4.14 | Radiation and Effluent Monitoring System |
| 14.2.10.1.2 | Reactor System Sampling for Fuel Loading |
| 14.2.10.4.4 | Setpoint Verification |
| 14.2.10.4.1 | Test Sequence |
| 14.2.10.4.25 | Thermal Expansion |
| 14.2.10.4.15 | Ventilation Capability |

APPENDIX K
Revision History For IMC 2504

| Commitment Tracking Number | Issue Date | Description of Change | Training Needed | Training Completion Date | Comment Resolution Accession Number |
|----------------------------|-----------------------|--|-----------------|--------------------------|--|
| N/A | 04/25/06 | Initial Issuance | None | N/A | N/A |
| N/A | 10/03/07 CN 07-030 | Rev 1, Revised through out to reflect changes in program, IP revisions, and editorial corrections. Researched commitments for 4 years and found none. | None | N/A | ML072620276 ML072620292 ML072620283 ML072620289 |
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