

# NRC INSPECTION MANUAL

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MANUAL CHAPTER 2504

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CONSTRUCTION INSPECTION PROGRAM -  
NON-ITAAC INSPECTIONS

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## CONSTRUCTION INSPECTION PROGRAM - NON-ITAAC INSPECTIONS

### 2504-01 PURPOSE

01.01 To specify the non-ITAAC inspection policies for reviewing the programs supporting construction and operational readiness of a plant licensed under 10 CFR Part 52.

01.02 To furnish the inspections policies to assess whether a licensee conforms to and correctly implements the initial test program contained in the FSAR for pre-operational and startup testing.

01.03 To provide guidance for a plant licensed under 10 CFR Part 52 to be transitioned to the routine oversight of the ROP (Reactor Oversight Process).

01.04 This is the initial issuance of Inspection Manual Chapter 2504. The staff recognizes that this IMC will likely undergo significant revisions during the next several years as both internal and external stakeholders provide feedback. This initial issuance is intended to promote such feedback, in order that the inspection program described in this IMC can benefit from the resulting revisions prior to the start of construction of future plants.

### 2504-02 OBJECTIVES

02.01 To assess whether the licensee has a construction program which addresses quality assurance (QA), problem identification and resolution, 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 determine if the operational programs, required both for the initial loading of the fuel and for the initiation of low-power testing are established and functioning.

02.03 To assess whether management controls and procedures, including quality assurance and problem identification and resolution (PI&R) programs, necessary for operation of the facility have been documented and effectively implemented.

02.04 To determine whether systems and components important to the safety of the plant have been appropriately tested to demonstrate compliance with license requirements.

02.05 To verify that the licensee is meeting the requirements and conditions of the facility license for pre-critical tests, initial fuel loading, initial criticality, low-power testing, and power ascension tests.

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

02.07 To provide an objective basis, for a plant licensed under 10 CFR Part 52, to be transitioned to and monitored by the reactor oversight program (ROP).

### 2504-03 APPLICABILITY

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

Oversight Process (ROP) under IMC 2515 "Light-Water Reactor Inspection Program Operations Phase."

This phase of the CIP includes those inspection activities directed toward assessing a licensee's construction programs; operational programs; PI&R program; engineering design; pre-operational and startup testing; and operational readiness of the plant. 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 ROP tools can be duly applied for determining licensee performance in each of the seven cornerstones of safety.
- f. the plant has completed its warranty run (commercial operation for 100 hours).

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

03.03 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.

03.04 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 ABWR and AP1000. Additional design-specific guidance will be added as new designs are certified.

03.05 The transition of the plant to the full oversight of the ROP will occur when all cornerstones of safety are able to be monitored by the ROP, which is when IMCs 2515 and 0305, "Operating Reactor Assessment Program," can be fully applied.

03.06 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 under IMC 2515 for that cornerstone.

## 2504-04 DEFINITIONS

04.01 Able to be Monitored Under the ROP. For an individual cornerstone of safety, it means that ROP tools can provide sufficient information for determining licensee performance.

04.02 Baseline Inspection. The lowest level of required ROP inspections at each operating plant, in accordance with IMC 2515, which are implemented at a given frequency stated in the respective inspection procedures.

04.03 Combined 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.

04.04 Construction Activity. An 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.

04.05 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.

04.06 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.

04.07 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.

04.08 Problem Identification and Resolution 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.

04.09 Full Oversight of the ROP. The point when all cornerstones of safety are being monitored by the ROP tools in accordance with IMC 2515 and the regulatory response for inspection findings is in accordance with the Action Matrix in IMC 0305.

04.10 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.

- 04.11 Initial Test Program. The combined pre-operational and startup test programs.
- 04.12 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.
- 04.13 Inspection Assessment. Periodic reviews of inspection findings by NRC management to determine if the current level of inspection effort should change.
- 04.14 Inspection Observation. A documented evaluation regarding the acceptability of licensee construction activities.
- 04.15 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.
- 04.16 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.
- 04.17 Licensee's Construction Programs. Those programs that support and provide oversight over a licensee's construction activities at a given nuclear plant under construction.
- 04.18 Minor Issue. Any inspection result that does not affect the successful completion of an ITAAC or the implementation of a licensee program. These results may include issues related to minor record keeping errors; insignificant dimensional, time, calculation, or drawing discrepancies, characterized by minor discrepant values referred to in the licensee's Final Safety Analysis Report (FSAR) or design documents; or insignificant procedural errors that have no impact on the quality of design, fabrication, erecting, or testing.
- 04.19 Open Item. Any inspection finding warranting additional followup by the NRC.
- 04.20 Operational Programs. Those licensee programs specified by regulation and therefore considered essential to the operational readiness of a new plant and also for its safe commercial operation.
- 04.21 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.
- 04.22 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.



04.23 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:

- a. 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.
- b. 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.

04.24 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.

04.25 ROP tools. ROP baseline inspections, PIs, or inspections to supplement the baseline inspections if PIs are not available.

04.26 Startup Testing Program. The testing program conducted after the authorization to load fuel. It starts with initial fuel loading and pre-critical 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:

- a. 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.
- b. 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.

04.27 Tier 1 Material. Tier 1 material refers to the portion of the design-related information contained in the generic DCD 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.

04.28 Tier 2 Material. Tier 2 refers to the portion of the design related information contained in the design control document that is approved but not certified by the NRC. Tier 2 information includes : Information required by 10 CFR 52.47 with the exception of 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 method but not the only method for complying with Tier 1.

04.29 Transition Plan. The listing of inspections and reviews to be performed to ensure that the cornerstones of safety are able to be monitored using ROP tools. 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 problems or concerns associated with open items, deficiencies, and significant deficiencies and will be used to justify the completion of IMC 2504 and the start of IMC 2515.

04.30 Transitioning to the ROP. The period during which the application of the ROP tools is being tested to determine whether they can measure the performance of the new plant in each of the seven cornerstones of safety.

## 2504-05 RESPONSIBILITIES AND AUTHORITIES

### 05.01 Director, Office of Nuclear Reactor Regulation

- a. 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

- a. Provides overall direction for the implementation of the construction inspection program for sites within the Region's area of responsibility.
- b. Informs the Director, NRR, 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, NRR.
- 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), NRR.

### 05.03 Construction Inspection Staff

- a. Implements the construction inspection program at the facility and at remote locations.
- b. Coordinates development and review of the site specific IP&S.
- c. Ensures that inspections are promptly and properly documented.
- d. Periodically assesses inspection findings to determine if the current inspection effort should be reduced, increased, or remain the same for a given construction activity.
- 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 when IMCs 2515 and 0305 can be fully implemented (the ROP assessment process will be put into place).

05.04 Director, Division of Inspection and Regional Support (DIRS)

- 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 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 with quality and in accordance with 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.

An initial assessment of engineering design verification will be accomplished under IMC 2502. Additional 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, the region 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 licensee will progress on to power ascension testing and operation of the facility at reactor core power levels, including full power.

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 with the concurrence of the Director, DIRS/NRR based on the recommendation of the inspection staff.

## 2504-07 GENERAL INSPECTION POLICY

### 07.01 Inspection Program Scheduling and Planning

- a. This manual chapter contains all 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's inspection plan, minus any licensee and NRC proprietary scheduling information, should be a public document to support any interface with external stakeholders and other agencies.

- c. The construction inspection staff should ensure that the IP&S differentiates between the inspections performed before fuel load and those performed after fuel load.
- d. 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.
- e. 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.
- f. The construction inspection staff will coordinate the IP&S and CIPIMS in the most optimum manner so as to allow each to be fully utilized.

#### 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 NRR licensing project manager, in conjunction with the construction inspection staff, will coordinate all required NRR 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 the same, be decreased, or be increased. Once the NRC has derived a level of confidence in a licensee program or construction activity, then the level of inspection effort may be decreased unless new and significant information brings into question the original assessment by the NRC.
- 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) 35100, "Review of QA Manual." 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 35100 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 and adequate. Inspection effort should be recorded against the procedures referencing IP 35100. 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 tools can be appropriately applied.
- 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 initially be included in the review of the licensee's construction programs. The inspection procedure 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 audit and surveillance of construction, test, and operational programs; and by the early recognition of QA program deficiencies. 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 functionality 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.

The evaluation of the licensee's construction QA program will be on-going during construction and testing. The areas of emphasis detailed in Section 08.02 related to the licensee's construction QA program are also appropriate for evaluating the QA program to be used during operation.

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 staff expects the licensee to have a PI&R program for construction (1) to readily identify problems, (2) to determine their root and contributing causes, (3) to independently assess the extent of conditions, and (4) to provide assurance that the licensee's corrective actions are sufficient to address the problems. The construction schedule for plants licensed under 10 CFR Part 52 will be likely tightly controlled, thus providing added incentives for the quick identification and resolution of problems. However, licensee efforts to quickly resolve problems should not take priority over the goals of proper problem resolution and implementation of effective corrective measures.

The NRC will assess whether a licensee's PI&R program identifies problems in a timely manner, assesses their significance and resolution properly, and undertakes the appropriate corrective actions. Also in order to prevent the recurrence of problems which impact the licensee's construction program, a licensee's PI&R program should review problems in depth so that the root and contributing causes of the problems are determined 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 determine if a licensee has adopted procedures for evaluating and

reporting deviations and failure to comply, 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 robust 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 should have the right qualifications, training, and experience in order to perform the work to which they are assigned. The licensee should 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 requisite record retention, and the retrievability of training documentation and worker qualification are considered to be QA requirements and thus covered by the applicable 10 CFR 50, Appendix B criteria.
  - e. Program for Planning Significant Work Activities - Significant work activities need to be planned by the licensee to ensure the quality of work. The NRC will review a licensee's program for planning significant work activities, focusing on any deficiencies that could impact the safe construction of a nuclear plant. Included in this effort will be a review of the adequacy of the licensee's procedures governing the work.
  - f. Program for Control and Oversight of Contractors - The licensee should provide the appropriate oversight so that construction standards and regulations are adhered to in all significant work-related activities and licensee programs. The NRC will determine whether the licensee has the applicable programs for the control and oversight of contractors and craft personnel.
  - g. Quality Program for Developing ITAAC Determinations - The NRC will verify the adequacy of the licensee's quality program for developing ITAAC determination submittals. This inspection will ensure that the process is properly controlled 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
    - 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 should phase in 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 decrease 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. The evaluations of these operational programs will consist of reviewing the implementations 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 the plant beginning the low-power testing period. 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. The NRC will also inspect the operation of the QA program when the plant commences full-power operation to ensure that the program is still functioning as described in the FSAR.

NRC's review of the QA program will also consider how several related programs work in concert with the QA program. Although not required by regulation, the related programs provide greater assurance that the power plant has been built with an appropriate emphasis on quality and will operate safely. The NRC will consider the relationship of the QA program to the PI&R program and any program that fosters an atmosphere at the plant where employees will readily identify work-related problems without the concern of retaliation.

- e. Characterization of Operational Programs - The staff expects to inform the Commission of the status of these programs before the Commission makes the determination that the licensee can load fuel. The staff expects to 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 and comprehensiveness of the licensee's procedures for the programs.
  - 4. The effectiveness of the licensee's administration and control of the operational programs in meeting the program objectives and policies.
  - 5. The extent and sufficiency of 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 under both IMC 2502 and IMC 2504. The first-of-a-kind engineering (FOAK) inspections will be performed prior to the issuance of a COL in accordance with the policies and guidance stated in IMC 2502 in order to support the initial licensing decision. Inspection Procedure 37802, "FOAK Engineering Inspections," describes the inspection details and resources required and is implemented by IMC 2502. The engineering design inspections after COL issuance will be in accordance with the policies and guidance stated in this manual chapter. The details of the inspection of engineering design after COL issuance are contained in IP 37803, "Engineering Design Verification Inspections After Issuance of a COL." The additional 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., 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 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, as appropriate, also for operational and testing programs.

The inspections of the design change process will be in accordance with some or all of the inspection procedures contained in Appendix D and will be integrated with those for the engineering design verification in IP 37803. The inspections will determine if design changes are:

1. processed correctly
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. A licensee should 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 evaluate the results of tests for a sample of construction tests, especially for safety-related components and systems using IP 65001.C, "Construction Testing."

Construction tests include , but are not limited, to the following tests:

- cleaning and flushing piping systems
- hydrostatic testing
- electrical wiring checks
- valve testing
- energization and operation of equipment
- initial calibration of instrumentation

#### 08.05 Pre-Operational Testing

- a. Definition and Prerequisites - Pre-operational tests demonstrate proper functioning and conformance to design requirements of SSCs in all operating modes throughout the full design operating range including loss of power sources and degraded modes of operation. Construction and installation tests for the SSCs should also be complete before pre-operational testing begins.
- b. 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.
- c. 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 reactor power levels.

The pre-operational testing portion of the inspection program is implemented when the applicable SSCs are ready for testing or as defined in the facility technical specifications. Inspection requirements for testing at twin or sister facilities would not normally be reduced because of the typical time lag between construction of the two plants. At dual plant sites a specific objective of the inspection program is to assure that the licensee staff tasked with testing and procedure development maintain an awareness of the lead facility and its status. The construction inspection staff may increase the sample size or extent of this testing program's review based on assessment of inspection results.

- d. Delays in Pre-Operational Testing - Delays incurred by the licensee may result in some pre-operational tests not being complete before startup testing is started. If the licensee plans to initiate low-power testing prior to performing all pre-operational tests, the NRC will ensure that the impact of incomplete pre-operational testing on plant safety is acceptable and that public health and safety are not compromised.
- e. 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 both types of procedures available as soon as possible to provide sufficient time for the inspector to perform the required review function.

- g. Completion of Inspection Requirements in Inspection Procedures - It may not always be necessary to complete each specific item listed in an inspection procedure. Inspection procedures list the relevant attributes for the procedures' reviews and evaluations. The inspector may complete only those inspection steps required to sufficiently evaluate the inspectable area being reviewed.

08.06 Operational Readiness Assessment Team Inspections. The Operational Readiness Assessment Team Inspection (IP 93806) should be conducted before the licensee loads fuel. The focus of this inspection is on the effectiveness of licensee management oversight, operator training and experience, corrective action program, the maintenance program, operator response to annunciators, 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.

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. Goals of Startup Testing are:
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. Inspection Program for Startup Testing

The startup testing phase inspection program examines tests from each of the following areas:

1. Initial Fuel Loading and Precritical Tests
2. Initial Criticality
3. Low Power Tests
4. Power Ascension Tests

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 would not normally be reduced because of the typical time lag between the two plants. In those cases where two reactors at a single site are conducting startup testing, the inspections must ensure that the licensee testing procedures reflect an awareness of the lead facility and its status.

The inspection program for startup testing consists of the generic inspection procedures and the appropriate reactor-specific inspection procedure listed in Appendix H. 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.

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.

- (1) 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.

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.

- (2) 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 keep informed of the expected dates of testing in order to witness the licensee tests. Inspectors are cautioned to be certain that licensees do not interpret requests for notification of expected tests as "hold points" for the tests. Licensees are not expected to delay conduct of a test for an NRC inspector.

f. Delays in Licensee's Startup Testing Program

The power ascension testing program is conducted after initial fuel load, usually with minimal delays. However, power ascension testing may be delayed and the facilities may operate at less than full power levels for extended periods of time. To ensure the safety of operations, licensees 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 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 to the ROP, the NRC will ensure that the licensee corrects significant startup issues and inspection findings.
- b. Additional Programs for an Operating Plant

The NRC will conduct inspections to determine if a licensee has established the following programs whether required for operation or commitments contained in the license.

1. Inspection of piping systems qualified for leak-before-break
2. Operability of snubbers
3. Piping analysis bench-marking
4. Pre-service inspection of the reactor vessel closure head
5. Steam generator tube surveillance

6. AC power and transmission systems testing and inspection
7. Light and heavy load handling systems in-service inspection
8. Erosion-corrosion monitoring
9. Turbine maintenance and inspection
10. Wet and dry solid waste process control
11. Outage planning and control
12. Boric acid corrosion

09.02 The construction inspection program will end when the plant transitions to the ROP.

- a. The transition to the ROP involves a verification and closeout of construction open items, the performance of additional inspections, as needed, to determine if the construction and testing are complete within each cornerstone, and to verification that the plant is operationally ready.
- b. The transition to the ROP will occur when all the cornerstones of safety are able to be monitored by the ROP. That will happen when the following four conditions have been met for each cornerstone.
  1. All construction and testing activities are complete, except as noted below.
  2. Licensee corrective actions for significant 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 tools can be used and will provide sufficient information for determining licensee performance for each cornerstone of safety.
- c. 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 tools 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 properly 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.
- d. A cornerstone will be transferred to the oversight of the ROP when the criteria for transition have been met. When the cornerstone has been transferred to the ROP, the construction inspection staff responsibility for that cornerstone will end.
- e. 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.

- f. 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.
- g. 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 with the concurrence of the Director, DIRS. 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.

## 2504-10 INSPECTION FINDINGS AND ENFORCEMENT

10.01 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."

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

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

10.04 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

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## 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 .

<b>INSPECTIONS OF LICENSEE'S CONSTRUCTION PROGRAM</b>		
<u>Program</u>	<u>IP No.</u>	<u>IP Title</u>
1. Construction QA Program	35001	Review of Changes to Quality Assurance Programs Descriptions
	35020	Audit of Applicant's Surveillance of Contractor QA
	35060	Licensee Management of QA Activities - Initial Inspection
	35061	In-Depth QA Inspection of Performance
	35065	Procurement, Receiving, and Storage - Initial Inspection
	35100	Implementation of Quality Assurance (QA) Program Described in Final Safety Analysis report (FSAR)
2. PI&R Program	40500	Effectiveness of the Licensee Process to Identify, Resolve, and Prevent Problems
3. Reportability Under 10 CFR 50.55(e)	XXXXX	TBD
4. Training/Qualification of Construction Staff	XXXXX	TBD

**INSPECTIONS OF LICENSEE'S CONSTRUCTION PROGRAM**

<u>Program</u>	<u>IP No.</u>	<u>IP Title</u>
5. Planning Work Activities	XXXXX XXXXX	TBD Review of Licensee Procedures
6. Control/Oversight of Contractors	XXXXX	TBD
7. Quality Program for Developing ITAAC Determinations	XXXXX	TBD

## 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.

<b>A. OPERATIONAL PROGRAM INSPECTIONS</b>		
<u>Program</u>	<u>IP No.</u>	<u>IP Title</u>
1. Access Authorization	81070	Access Control - Personnel
	81072	Access Control - (Power Reactors) - Packages
	81074	Access Control - Vehicles
2. Equipment Qualification		(IP to be developed consistent with TI 2515/013)
3. Fire Protection	64704	Fire Protection 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		TBD
7. Training and Qualification of Staff	36301	Operational Staffing Inspection
	41301	Inspection of Operating Staff Training
	71001	Licensed Operator Requalification Program Evaluation

<u>Program</u>	<u>IP No.</u>	<u>IP Title</u>
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 and Procedures for Protecting Fresh Fuel at Reactors
	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	Training and Qualification Effectiveness
10. Pre-service Inspection	73051	In-service Inspection - Review of Program

<u>Program</u>	<u>IP No.</u>	<u>IP Title</u>
11. Pre-service Testing	73052	In-service Inspection - Review of Procedures
12. Process and Effluent Monitoring	84522	Solids - Control, Sampling, Monitoring, and Release
	84523	Liquids - Control, Sampling, Monitoring and Release
	84524	Gases and Particulates - Control, Sampling, Monitoring, and Release
	84525	Quality Assurance and Confirmatory Measurements for In-Plant Radiochemical Analysis (Preoperational and Supplemental)
13. Radiation Protection	80521	Radiological Environmental Protection
	83522	Radiation Protection, Plant Chemistry, Radwaste, and Environmental Organization and Management Controls
	83523	Radiation Protection, Plant Chemistry, and Radwaste Training and Qualifications
	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
	93806	Operational Readiness Assessment Team Inspection
14. Reactor Vessel Material Surveillance	TBD	
15. Containment Leak Rate Testing	TBD	

<u>Program</u>	<u>IP No.</u>	<u>IP Title</u>
<b>B. PI&amp;R, FOLLOWUP, AND ORAT INSPECTIONS</b>		
	40500	Effectiveness of Licensee's Program to Identify, Resolve, and Prevent Problems
	92701	Followup
	92702	Followup on Corrective Actions for Violations and Deviations
	94300	Inspection Preparatory to Low-Power Testing
	93806	Operational Readiness Assessment Team Inspection
<b>C. LICENSEE PROGRAMS INSPECTIONS</b>		
1. Initial Fuel Loading	60501	Fuel Receipt and Storage
	72500	Initial Fuel Load Procedure Review
	72524	Initial Fuel Load Witnessing
2. Maintenance	35742	QA Program - Document Control
	35743	QA Program - Maintenance
3. Operations	42400	Plant Procedures Inspection
	42450	Operating Procedures Inspection
	42452	Emergency Procedures Inspection
	71301	Technical Specifications Review
4. Surveillance	35745	QA Program - Surveillance Testing
	35749	QA Program - Tests and Experiments
	35750	QA Program - Test and Measurement Equipment
5. Plant Water Chemistry Controls	79501	LWR Water Chemistry Control and Chemical Analysis (Pre-operational and Supplemental)
	79502	Plant Systems Affecting Plant Water Chemistry



## 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.

<b>A. OPERATIONAL PROGRAM INSPECTIONS</b>		
<b><u>Program Name</u></b>	<b><u>IP No.</u></b>	<b><u>IP Title</u></b>
1. Maintenance	62706	Maintenance Rule
2. QA for Operations	35100	Implementation of Quality Assurance (QA) Program Described in Final Safety Analysis report (FSAR)
	35740	QA Program - QA Administration
	35741	QA Program - Audits
	35746	QA Program - Procurement Control
	35747	QA Program - Receipt Storage, and Handling of Equipment and Materials
	35748	QA Program - Records
	35960	QA Program Evaluation of Engineering Service Organization

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## 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.

<b>DESIGN CHANGE PROCESS INSPECTIONS</b>	
<b><u>IP No.</u></b>	<b><u>IP Title</u></b>
35744	QA Program - Design Changes and Modifications
37700	Design, Design Changes, and Modifications
37701	Facility Modifications
37702	Design Changes and Modifications Program

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## 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.

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

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

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

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## 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.

<b>CLASS I: MANDATORY PRE-OP TESTS FOR ABWR</b>	
<b>Use IP 70701 to inspect each of the tests listed in this Class.</b>	
<b>DCD Test No</b>	<b>Test Title</b>
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
14.2.12.1.52	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
14.2.12.1.52	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  
14.2.12.1.75

Seismic Monitoring System Test  
Liquid and Solid Radwaste Systems Tests

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## 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.

<b>CLASS I: MANDATORY PRE-OP TESTS FOR AP1000</b>	
<b>Use IP 70702 to inspect each of the tests listed in this Class.</b>	
<b>DCD Test No</b>	<b>Test Title</b>
14.2.9.1.3 (s)	ADS Blowdown Test <b>(first 3 plants)</b>
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 <b>(first 3 plants)</b>
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 <b>(prototype only)</b>
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 <b>(prototype only)</b>
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 <b>(prototype only)</b>
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

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## 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.

<b>GENERAL INSPECTION PROCEDURES FOR STARTUP TESTING</b>	
<b>IP</b>	<b>IP TITLE</b>
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

<b>ABWR STARTUP TEST INSPECTION PROCEDURE</b>	
<b>IP No.</b>	<b>IP Title</b>
72303	STARTUP TESTING FOR ABWR - TEST PROCEDURE REVIEW, WITNESSING, AND RESULTS EVALUATION

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



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**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.

<u>Group A</u>	<u>Group B</u>	<u>Test Title</u>	<u>Ref.</u>
	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.

<u>Group A</u>	<u>Group B</u>	<u>Test Title</u>	<u>Ref.</u>
	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.

<b>DCD Test No</b>	<b>Test Title</b>
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

**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.

<u>Group A</u>	<u>Group B</u>	<u>Test Title</u>	<u>Ref.</u>
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.

<b>DCD Test No</b>	<b>Test Title</b>
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

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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