

AP1000 REACTOR INSPECTION PROGRAM—STARTUP TESTING PHASE

2514-01 PURPOSE

The purpose of startup testing phase inspection activities is to verify that the licensee is meeting the requirements and conditions of the facility license for initial fuel loading, pre-critical tests, initial criticality, low-power testing, and power ascension tests. This verification is achieved through reviewing procedures and records, direct observation and witnessing tests, reviewing test data, and evaluating test results.

2514-02 APPLICABILITY

The startup phase of the inspection program becomes effective approximately 3 months before the staff's timeline for informing the Commission that the acceptance criteria in the combined license are met and that a finding can be made in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 52.103(g). This finding informs the licensee that it is authorized to load fuel. The startup phase of the inspection program will continue until (1) the licensee completes the full-power testing program and (2) selected test results have been reviewed and accepted. It is anticipated to overlap with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program—Operations Phase."

2514-03 DEFINITIONS

This program description uses the following definitions:

03.01 Startup Testing. Testing conducted following the Commission's finding, in accordance with 10 CFR 52.103(g), that the acceptance criteria in the combined license are met. It includes testing related to initial fuel loading, precritical testing after initial fuel loading but before initial criticality, testing performed at initial criticality and low reactor power (less than 5 percent), and testing performed at reactor power levels greater than 5 percent. This testing is typically performed by the operating staff under the guidance of the site startup test organization.

03.02 Initial Fuel Loading Tests. Those tests performed before fuel load to verify readiness for core loading, and tests performed while reactor vessel core load is conducted. Tests verify that the systems necessary to monitor the fuel loading process are operational and that the core loading is conducted safely.

03.03 Precritical Tests. Those tests conducted after initial core load and after installation of the reactor upper internals and reactor vessel head. The reactor coolant system is at hot, no-load pressure and temperature conditions. Testing verifies and confirms instrumentation settings, setpoints, and rod control system performance.

03.04 Initial Criticality Tests. Those tests and verifications conducted following precritical testing as the reactor core is brought to initial criticality.

03.05 Low-Power Testing. Those tests conducted following completion of initial criticality tests, typically conducted at power levels less than 5 percent, to measure physics characteristics of the reactor system and to verify the operability of the plant systems at low power levels.

03.06 Power Ascension Testing. Those tests conducted after low-power testing is completed. Testing is performed at specified elevated power levels to demonstrate the reactor plant operates in accordance with design during normal steady-state operations, and to the extent practical, during and following anticipated transients. During power ascension, tests are performed to obtain operational data and to demonstrate the operational capabilities of the plant.

2514-04 RESPONSIBILITIES AND AUTHORITIES

04.01 Regional Administrator, Region II Office. Overall administration and implementation of the inspection program outlined in this chapter for power reactors within regional boundaries.

04.02 Director, Division of Construction Oversight (Region II). Administration and implementation of the inspection program outlined in this chapter for power reactors assigned.

04.03 Branch Chief (Region II). Administration and implementation of the inspection program outlined in this chapter for power reactors assigned. Provides direction and coordination of test engineers/inspectors performing inspections of testing activities.

2514-05 REQUIREMENTS

Follow the specific requirements of Inspection Procedure (IP) 72304 “AP1000 Startup Test Inspections.”

2514-06 GUIDANCE

06.01 General Discussion

The bases for the licensee’s startup testing program are contained in the licensee’s technical and administrative criteria; combined license commitments; AP1000 Design Control Document, Chapter 14, “Initial Test Program”; the final safety analysis report (FSAR); and regulatory requirements.

Regulatory Guide 1.68, Revision 2, “Initial Test Programs for Water-Cooled Nuclear Power Plants”; Chapter 14 of the FSAR; and the safety evaluation report contain the specifics of the licensee’s approved program for startup testing. The attachments in IP 72304 identify the tests to be performed during different startup phases. The major startup phases are as follows:

- (1) initial fuel load
- (2) pre-criticality
- (3) initial criticality

- (4) low-power
- (5) power ascension

Startup testing inspection requirements for dual or twin facilities would not normally be reduced because of the typical time lag between the two facilities.

06.02 Startup Testing Inspection Program

The startup tests involve inspections related to (1) test procedure adequacy, (2) test observation, and (3) test data evaluation.

Regulatory Guide 1.68, Appendix B, states that, not less than 60 days before initial fuel loading date, the licensee should have available for U.S. Nuclear Regulatory Commission (NRC) inspectors' review copies of the procedures for fuel loading, initial startup testing, and supporting activities.

Inspectors must be kept informed of the expected time and dates of the tests to witness them. However, the inspectors are cautioned that licensees do not interpret requests for inspector notification of startup tests as "hold points" for these tests. Licensees are not expected to delay conduct of a startup test until the inspector arrives.

Following completion of initial fuel loading, the power ascension testing program is normally conducted on a preplanned schedule with minimal delays. However, the schedules for conducting power ascension testing may be delayed for various reasons, 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 certain minimum level of testing to demonstrate that safety-related plant systems and equipment meet the design objectives of the licensed power levels and are capable of controlling the anticipated transient discussed in the FSAR.

The inspector is expected to apply professional judgment about the need for completing each specific inspection requirement described in IP 72304. This means that the inspector is to perform the requirements most appropriate to the activity being inspected to declare an activity as being satisfactorily completed.

06.03 Post 10 CFR Part 52.103(g) Transition Inspection Activities

A significant milestone in the construction of a reactor facility under 10 CFR Part 52 is the finding by the Commission in 52.103(g) that the acceptance criteria (specifically the Inspections, Tests, Analyses and Acceptance Criteria (ITAAC)) in the combined license (COL) have been met, and the licensees may transition from facility construction to **fuel load, startup testing and subsequent** operation. **It is conceivable that startup testing inspection activities could commence prior to 52.103(g) transition to facilitate review of startup testing procedures as they are made available for inspection. Startup testing inspection activities will be documented in a stand-alone Construction Inspection Program Information Management System generated inspection report.** There may be instances where the Commission has granted a hearing under 52.103(a) for specific ITAAC. In those instances, ITAAC hearing-related issues may extend beyond the 52.103(g) finding. Inspections that are required after the 10 CFR 52.103(g) finding for ITAAC that are subject to a hearing during interim operations will be conducted using applicable inspection procedures specified by IMC 2503. Findings identified during these inspections will be dispositioned using the Construction Reactor Oversight Process (cROP) Significance Determination Process in IMC 2519 and will be assigned to the ROP cornerstone

that is most closely related to the finding for consideration in the ROP Action Matrix.

A COL contains license conditions requiring the licensee to develop operational programs containing the key requirements for the respective operational program that were provided in the COL application (e.g., the FSAR). The NRC staff is required to inspect these programs to ensure that key requirements have been incorporated into the operational programs. Certain operational programs have implementation milestones that will occur after the 10 CFR 52.103(g) finding (including, but not limited to, in-service inspection, in-service testing, and preservice testing programs). Therefore, the required inspections of these operational programs may be completed after the 10 CFR 52.103(g) finding, depending on the licensee's readiness for the inspections. Inspections of the operational programs before the 10 CFR 52.103(g) finding will be conducted using applicable inspection procedures specified by IMC 2504, "Construction Inspection Program – Inspection of Construction and Operational Programs." The significance of the **startup testing inspection and** operational program findings identified before the 10 CFR 52.103(g) finding will be determined using the guidance in IMC 2519, "Construction Significance Determination Process." The operational program **inspection** findings identified after the 10 CFR 52.103(g) finding will be assigned to the ROP cornerstone most closely related to the finding and significance of the finding will be considered using IMC 0609, "Significance Determination Process."

06.04 Resident Inspection Philosophy

A resident inspector is assigned to each construction site at which construction is more than 15 percent complete. The resident inspector for construction activities is normally reassigned elsewhere at some point during startup testing. For multiunit sites, units under construction have one dedicated resident inspector assigned for that function. One or two resident inspectors for operations are also assigned, depending on the number of units in operation or in preoperational testing.

The 10 CFR 52.103(g) finding represents the transition point (milestone) where the construction inspection program will end and the startup testing inspection program will begin in accordance with this manual chapter. The resident inspectors are responsible for conduct of inspections required by IMC 2515. In addition, the resident inspectors will likely be called upon to do inspections described in IMC 2514 (this chapter). Inspectors should recognize that many of the inspections required by the startup testing inspection program may also satisfy routine inspection requirements in IMC 2515. For reporting purposes, if an inspection is being accomplished that covers both IMC 2514 and IMC 2515 activities, the inspection hours should be reported with the appropriate IMC 2514 inspection procedure.

The resident inspectors provide the major onsite NRC presence for direct observation and verification of the licensee's activities. The resident inspectors are also the primary onsite evaluators for the NRC inspection effort stemming from events or incidents. It is expected that the greater part of initial event-related inspection efforts will be performed by the resident inspector (who may be supplemented by other inspectors depending on the type of event). Regional managers will decide when normal inspection activities will be resumed by those involved with inspecting the event.

06.05 Regional Inspection Philosophy

Region-based inspectors will conduct inspection procedures as directed by their supervisors. Region-based inspectors will often participate in inspection activities of a more specialized

nature than those inspection activities performed by the resident inspectors. Certain aspects of their inspection activity (i.e., portions of procedure review) may be conducted in the regional office.

The region-based inspector may also conduct independent inspection activities. There is no stated goal for region-based inspections on backshift or for independent inspection. However, backshift inspection will be performed whenever required to complete the inspection.

The appropriate Branch Chief or the assigned regional test lead staff shall ensure coordination of region-based inspection activities and keep the site senior resident inspector apprised of planned inspection activities. Region-based inspectors should engage with the senior resident inspector before a planned inspection to obtain information about the availability of specific licensee personnel and the status of plant conditions that may affect the planned inspection. In addition, region-based inspectors shall make contact with the senior resident inspector as soon as is convenient after their arrival at the site to ensure a coordinated NRC presence at the facility. They should advise the senior resident inspector of changes to their planned inspection effort and schedule for the licensee exit interview. The senior resident inspector will inform the region-based inspectors of any unique activities in progress, and the region-based inspectors will brief the senior resident inspectors about the results of their inspection before the exit interview with licensee management. The senior resident inspector should attend all exit meetings at which significant enforcement action or other significant unresolved issues are expected to be discussed.

2514-07 REFERENCES

IMC 2515, "Light-Water Reactor Inspection Program--Operations Phase"

IP 72304, "AP1000 Startup Test Inspections"

IP 40600, "Licensee Program for Managing Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Closure"

IP 92701, "Followup"

IP 92702, "Followup on Traditional Enforcement Actions Including Violations, Deviations, Confirmatory Action Letters, Confirmatory Orders, and Alternative Dispute Resolution Confirmatory Orders"

END

Revision History for IMC 2514

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
	8/21/1989	MC 2514, (Startup Testing Phase) has been revised to reflect the addition of IP 93806, current organization, and format changes		
	5/31/1991	Cite IP 81502 to IMC 2514		
	6/6/2017	IMC 2514, "Light Water Reactor Inspection Program -- Startup Testing Phase," which was reactivated and used for the Watts Bar Unit 2 construction project, is being deleted now that Watts Bar 2 is in an operating phase. The deletion of this document only relates to Watts Bar Unit 2 construction project.		
	ML18233A367 02/28/19 CN 19-009-	Initial issuance for IMC 2514 that discusses the AP1000 reactor type. Previous versions of IMC 2514 focused on PWR and BWR reactor types. Feedback form 2514-1703 requested adding the following IPs to the reference list of IMC 2514: IP 40600, IP 92701, and IP 92702.		ML18263A014 2514-1703 ML19059A134
	ML20302A462 01/12/21 CN 21-003	Revised to make IMC 2514 consistent with the Vogtle Readiness Group memorandum dated August 14, 2020		n/a