



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
 OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 14.2

INITIAL PLANT TEST PROGRAMS - FSAR

REVIEW RESPONSIBILITIES

Primary - Quality Assurance Branch (QAB)

Secondary - Core Performance Branch (CPB)
 Reactor Systems Branch (RSB)
 Electrical, Instrumentation and Control Systems Branch (EICSB)
 Containment Systems Branch (CSB)
 Effluent Treatment Systems Branch (ETSB)
 Auxiliary and Power Conversion Systems Branch (APCSB)
 Mechanical Engineering Branch (MEB)
 Materials Engineering Branch (MTEB)
 Structural Engineering Branch (SEB)

I. AREAS OF REVIEW

The QAB reviews the following areas, relating to initial plant test programs, described in Chapter 14 of the final safety analysis report (FSAR) submitted by the applicant as part of his operating license (OL) application:

1. Summary of Test Program and Objectives

The summary descriptions for each major phase of the test program and the specific objectives for each major phase are reviewed.

2. Organization and Staffing

The information provided on the applicant's organizational units and any augmenting organizations or other personnel that will manage or execute any phase of the test program is reviewed. The information provided on the responsibilities, authorities, and qualifications of principal participants is reviewed. The information describing the extent and nature of the participation of the plant operating and technical staff in the test program is reviewed.

3. Test Procedures

The system the applicant will use to develop, review, and approve individual test procedures is reviewed. The responsibilities of the organizational units that will perform these activities, the designated functions of each organizational unit, and the general steps to be following in conducting these activities are reviewed. The type and source of design performance information that will be, or is being used in the

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to Revision 2 of the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20546.

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development of detailed test procedures is reviewed. The format for the test procedures is also reviewed.

4. Conduct of Test Program

The administrative controls that will govern the conduct of each major phase of the test program are reviewed. The specific methods to be used to assure that prerequisites are satisfied for individual tests are reviewed. The procedures to be followed in initiating plant modifications, or repairs that are determined to be required by the test program are reviewed. The controls that will be in effect to require adherence to approved test procedures and the controls for changing test procedures are reviewed. The general prerequisites to be completed before beginning each major test phase are reviewed.
5. Review, Evaluation, and Approval of Test Results

The controls that will govern the review, evaluation, and initial approval of test results for each phase of the test program are reviewed, including the specific controls to be used to assure notification of affected and responsible organizations when test acceptance criteria are not met and the specific controls established to resolve such problems. The applicant's controls relating to the methods and schedules for approval of test data for each major phase are reviewed.
6. Test Records

The applicant's plans pertaining to the disposition of test documents and data obtained during the test program are reviewed.
7. Test Programs' Conformance with Regulatory Guides

The applicant's plans pertaining to conformance with all regulatory guides applicable to initial test programs are reviewed to establish the extent of conformance. Exceptions from applicable regulatory guides are reviewed, along with the justification provided for each guide that is appropriate at the time the FSAR was tendered for review.
8. Utilization of Reactor Operating and Testing Experiences in the Development of the Test Program

The status of the applicant's program for review of operating experiences at other reactor facilities is reviewed. The degree of conformance to commitments in the preliminary safety analysis report (PSAR) is reviewed. The organizations involved in the study, the summary of qualifications of these organizations, the time span the applicant included in the study, the reactor types (BWRs, PWRs, etc.) or specific reactor facilities included in the study and the sources of information utilized in the study are reviewed. The conclusions or findings of the study and the effect on the test programs are reviewed.
9. Trial Use of Plant Operating and Emergency Procedures

The information pertaining to how, and to what extent, the plant operating and emergency procedures will be use-tested during the test programs is reviewed.
10. Initial Fuel Loading and Initial Criticality

The procedures that will guide initial fuel loading and initial criticality, including the prerequisites and precautionary measures to be used to assure safety, are reviewed.

11. Test Program Schedule

The schedule for conducting each phase of the testing program, relative to the fuel loading date, is reviewed. Information pertaining to anticipated schedule overlap of the test program with test program schedules for other reactor facilities at the site is reviewed. The sequential test schedule for testing individual plant structures, systems, and components for each test phase is reviewed. Also reviewed is the schedule for final approval of testing procedures.

12. Individual Test Descriptions

The listing of individual tests for each test phase is reviewed to establish the degree of conformance with tests identified in Regulatory Guide 1.68, other applicable regulatory guides, and other special testing requirements for the facility, including those identified in Section 14.1.2 of the PSAR. The prerequisites for each test, summary of the test method and objectives, and the acceptance criteria for each test are reviewed to establish that the functional adequacy of those structures, systems or components involved will be verified.

II. ACCEPTANCE CRITERIA

The acceptance criteria for the areas of review described above are as follows:

1. Summary of Test Program and Objectives

The applicant's description should establish that the major phases of the program and the objectives for each phase are consistent with the general guidelines and regulatory positions contained in Regulatory Guide 1.68 or the justification provided for any exceptions should be found to be acceptable by the reviewer.

2. Organization and Staffing

The information provided should conform to the general guidelines and regulatory positions contained in Regulatory Guide 1.68 and ANSI N18.7-1972. The experience and qualification of each principal participant in the test program is found to be acceptable based on the reviewer's judgment. Factors to consider in this judgment are the assigned responsibilities of augmenting personnel and the size and qualifications of the applicant's staff. The applicant's commitments, pertaining to how and to what extent the plant operating and technical staff will be utilized, should provide assurance that such personnel will be used to the maximum extent practicable.

3. Test Procedures

The applicant's system that will be used to develop, review, and approve individual test procedures should provide for appropriate levels of review prior to final approval. The different organizational units or personnel involved in these reviews should possess, by virtue of prior training and experience, the necessary qualifications to provide for a meaningful review. The format for the test procedures should be similar to the format contained in Regulatory Guide 1.68 or the justification for exceptions should be found to be acceptable by the reviewer. The applicant should utilize system designers to provide the functional requirements and performance objectives to be used in developing detailed test procedures. The system designers should include the nuclear steam system (NSS) supplier, architect-engineer, and other major contractors, subcontractors, and vendors, as appropriate.

4. Conduct of Test Program

- a. The test program should be conducted using detailed procedures approved by designated management positions within the applicant's organization.
- b. The controls used by the applicant to assure that test prerequisites are met should include requirements for inspections, checks, etc., and require sign-off by designated personnel.
- c. The controls provided for plant modifications and repairs are found to be acceptable if: (1) the controls are sufficient to assure the required repairs or modifications will be made; (2) the controls will assure retesting is conducted following such modifications or repairs; and (3) the controls will assure a review of any proposed facility modifications by the original design organization or other designated design organizations. The applicant's requirements for documentation associated with such controls should permit audits to be made to assure proper implementation of controls.
- d. The controls pertaining to adherence to test procedures and the methods for changing test procedures are found to be acceptable based on the reviewer's judgment.
- e. The prerequisites to be completed before each major test phase is begun should be similar to those contained in the general guidelines and regulatory positions stated in Regulatory Guide 1.68 or the justification provided for exceptions should be found to be acceptable by the reviewer.

5. Review, Evaluation, and Approval of Test Results

- a. The controls that will govern the review, evaluation, and approval of test results should provide for a technical evaluation of test results by qualified personnel and approval of test results by designated management positions in the applicant's organization.
- b. Design organizations should be notified and should participate in the resolution of problems involving design problems that result in a failure to meet test acceptance criteria.
- c. The applicant should establish requirements for review and approval of the test data for each major test phase, prior to beginning the next phase.
- d. The applicant should establish requirements for review and approval of the test data at each major power test plateau before raising power to the next test plateau during the power ascension test phase.

6. Test Records

The applicant should establish requirements for retention of test procedures and test data throughout the life of the facility.

7. Test Programs' Conformance with Regulatory Guides

The applicant should establish initial test program requirements consistent with regulatory positions established in all applicable regulatory guides or the justification provided for exceptions should be found to be acceptable by the reviewer.

8. Utilization of Reactor Operating and Testing Experiences
in the Development of the Test Program

- a. The study conducted by the applicant of operating experiences should be completed in sufficient time to permit the findings to be incorporated in the detailed test procedures and conduct of the test program.
- b. Organizations conducting the study for the applicant should be technically qualified by virtue of previous experience or training.
- c. The reactor facilities included in the study should include plants similar in design to the applicant's plant.
- d. The time frame included in the applicant's study should be sufficient to achieve a recent survey of plant operating problems. In general, this would involve the previous two-year period.
- e. The conclusions reached, and the effect on the test program should recognize and account for categories of repeated abnormal occurrences of the same type being experienced and current operating experiences of safety concern.

9. Trial Use of Plant Operating and Emergency Procedures

The applicant should incorporate the plant operating and emergency procedures into the test procedures or otherwise use-test these procedures to the extent practicable during the test program.

10. Initial Fuel Loading and Initial Criticality

The procedures that will guide initial fuel loading and initial criticality should include precautions, prerequisites, and measures consistent with the general guidelines and regulatory positions contained in Regulatory Guide 1.68 or exceptions should be found to be acceptable by the reviewer.

11. Test Program Schedule

- a. At least nine months should be allowed for conducting preoperational testing.
- b. At least three months should be allowed for conducting startup testing including fuel loading, low power tests and power ascension tests.
- c. Overlapping test program schedules should not result in significant divisions of responsibilities or dilutions in the staff provided to implement the test program.
- d. The sequential schedule for individual tests should establish test requirements for all plant structures, systems, and components that are relied upon to prevent or to limit or mitigate the consequences of postulated accidents prior to exceeding 25% power level. The schedule should also establish that, insofar as practicable, testing will be accomplished as early in the test program as feasible and that the safety of the plant will not be dependent on the performance of an untested system or feature.
- e. Test procedures should be available for review by regulatory inspectors no later than 30 days prior to their intended use.

12. Individual Test Descriptions

The applicant's commitments pertaining to the structures, systems, and components to be covered by the test program should assure the testing of those that: (1) are relied on for the safe shutdown of the facility under normal and faulted conditions; (2) are relied on for establishing conformance with limits or limiting conditions for operation that will be established by the technical specifications; (3) are relied on to prevent or to limit or mitigate the consequences of anticipated transients and postulated accidents. The prerequisites, the test method and objectives, and the acceptance criteria for each test should establish that the functional adequacy of the structures, systems and components involved will be demonstrated.

III. REVIEW PROCEDURES

Preparations for the review of Chapter 14 of the FSAR should include familiarization with the applicant's commitments in Chapter 13 of the PSAR and FSAR pertaining to organization, staffing, plant procedures, and training and commitments in Chapter 17 of the PSAR and FSAR pertaining to the transfer of plant structures, systems, and components to the applicant when construction or installation is completed. The reviewer should also be familiar with the contents of Regulatory Guide 1.68, ANSI N18.7-1972, and other regulatory guides that have applicability to initial test programs. Although the specific tests contained in Regulatory Guide 1.68 are applicable to water-cooled power reactors, the general administrative test program requirements contained therein are also applicable to initial test programs for gas-cooled power reactors and can be used as a basis for evaluation of test programs for these facilities.

The review consists of an analysis of the information submitted in Chapter 14, and of other chapters, as applicable, of the FSAR. A detailed comparison is made with each of the acceptance criteria contained in II above. Coordination of the review with the assigned reviewers for Chapter 13 of the FSAR may be necessary for items 2 and 9 and with the assigned licensing project manager and other branches for item 12, as deemed necessary by the reviewer. In general, the secondary review branches will be requested by the QAB to review the applicant's proposed testing requirements for special, unique, or first-of-a-kind design features to establish the adequacy and validity of test requirements.

The reviewer should be familiar with abnormal occurrences currently being experienced at operating reactors and other problems of safety concern at operating reactors to evaluate item 8 above. Computerized information on abnormal occurrences can be obtained through the Office of Operations Evaluation.

The reviewer selects and emphasizes material from the review procedures described below as may be appropriate for a particular case.

1. Summary of Test Program and Objectives

A comparison of the information provided is made with the general guidelines and Regulatory positions in Regulatory Guide 1.68. A comparison should also be made with the information on the initial test program provided in the PSAR and significant differences in commitments evaluated, as applicable.

2. Organization and Staffing

The information provided should be compared with the general guidelines and regulatory positions contained in Regulatory Guide 1.68. The information should also be compared to the applicable guidelines contained in ANSI N18.7-1972. An evaluation of the experience and qualifications of the principal participants in the test program and the organizational structure is made utilizing the general guidance provided in the above referenced documents.

3. Test Procedures

The information pertaining to the development, review, and approval of individual test procedures is examined to determine if adequate controls and organizational arrangements have been established and that key individuals in these activities possess the necessary qualifications and experience. The methods used to develop detailed test procedures are examined to establish that appropriate input from design organizations will be made. The information pertaining to the format of the test procedures is compared with the general guidelines and regulatory positions contained in Regulatory Guide 1.68.

4. Conduct of Test Program

Administrative controls that will govern the initial test program are examined including those relating to plant modifications and repairs, those that require adherence to approved test procedures, and those that specify the methods for changing test procedures. The information provided on prerequisites to be completed before each phase of the test program is begun is compared with the general guidelines and positions contained in Regulatory Guide 1.68 and the applicable guidelines contained in ANSI N18.7-1972.

5. Review, Evaluation, and Approval of Test Results

The controls that will govern the review, evaluation, and initial approval of test results for each phase of the test programs are reviewed. Organizations and individuals participating in these activities are evaluated based on the information provided on qualifications and experience normally contained in Chapters 13 or 14 of the FSAR and on the information on interfaces and organizational arrangements provided in Chapter 14 of the FSAR. The applicant's plans for review and approval of test data for each test phase and at each major power test plateau (or test condition) during the power ascension test phase are compared with the guidelines and regulatory positions contained in Regulatory Guide 1.68.

6. Test Records

Information provided on the applicant's plans for the disposition of initial test program procedures and data from such tests is reviewed to establish that they will be available throughout the anticipated 40-year life of the plant. The administrative controls established for the retention of test documents are reviewed to assure that adequate requirements have been established by the applicant.

7. Test Programs' Conformance with Regulatory Guides

The administrative and technical aspects of the initial test program are compared with all regulatory positions and guidelines contained in regulatory guides applicable at the time the FSAR was tendered for review.

8. Utilization of Reactor Operating and Testing Experiences in the Development of the Test Program

The information provided on the applicant's program for review of operating and testing experiences at other reactor facilities is examined. The adequacy of the applicant's program is evaluated based on the qualifications of the key personnel involved in the program, the relevancy to the applicant's facility of the specific reactors or reactor types included in the review, and the sources and timeliness of information utilized by the applicant. The applicant's conclusions and their effects on the test programs are examined to establish that any abnormal occurrences that have occurred several times and other current safety concerns have been adequately factored into the applicant's test program.

9. Trial Use of Plant Operating and Emergency Procedures

The applicant's plans for trial use of operating and emergency procedures are reviewed to assure that a trial use of procedures will be accomplished during the initial test program to the maximum extent practicable.

10. Initial Fuel Loading and Initial Criticality

The information provided is compared with the general guidelines and regulatory positions contained in Regulatory Guide 1.68. Particular emphasis is placed on the prerequisites, precautions, and sequence of steps to be followed. Justifications for exceptions to regulatory positions contained in Regulatory Guide 1.68 are examined on a case-by-case basis.

11. Test Program Schedule

The information provided is checked against the list in Section II.11 of this plan. The reviewer assures himself, by review of previously licensed applications and by review of applicable chapters of the FSAR and Section 14.1.2 of the PSAR, that the scheduled time periods for each test phase and the sequential method of testing of plant structures, systems, and components are adequate.

12. Individual Test Descriptions

The reviewer examines individual test abstracts to assure that the prerequisites, the test method and objectives, and the acceptance criteria provide reasonable assurance that performance characteristics of systems, structures, and design features will be demonstrated by adequate testing.

IV. EVALUATION FINDINGS

When the review of the information in the FSAR is complete and the reviewer has determined that is satisfactory and in accordance with the acceptance criteria in II above, a statement of the following type should be provided for the staff's safety evaluation report:

"The staff has reviewed the information provided in the final safety analysis report on the applicant's initial test program. This review included an evaluation of: (1) the applicant's organization and staffing for the development, conduct, and evaluation of the test program; (2) the qualifications and experience of the principal participants managing and supervising the test program; (3) the administrative controls that will govern the development, conduct, and evaluation of the test program; (4) the participation of the plant operating and technical staff in the test program; (5) the applicant's requirements pertaining to the trial-use of plant operating and emergency procedures during the test program; (6) the schedule for conducting the test program; (7) the sequence of testing to be followed; and (8) the methods for conducting individual tests and the acceptance criteria to be used in evaluating the test results for plant structures, systems, and components. The review also included an evaluation of the applicant's study of reactor plant operating experiences, conducted to determine where improvement or emphasis was warranted in his initial test program and the applicant's conclusions and actions resulting from this study. The staff has concluded that the information provided in the application describes an acceptable initial test program that will demonstrate the functional adequacy of plant structures, systems, and components."

V. REFERENCES

1. Regulatory Guide 1.68, "Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors."
2. ANSI N18.7-1972, "Administrative Controls for Nuclear Power Plants," American National Standards Institute.

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