

NRC INSPECTION MANUAL

INSPECTION PROCEDURE 72570

INITIAL CRITICALITY PROCEDURE REVIEW (PWR)

PROGRAM APPLICABILITY:

72570-01 INSPECTION OBJECTIVES

Ascertain whether the procedures to be used for the initial approach to criticality are consistent with FSAR commitments, regulatory requirements, regulatory guidance and applicable codes and standards.

72570-02 INSPECTION REQUIREMENTS

02.01 Review the FSAR, technical specifications, and other license provisions and identify specific requirements applicable to the initial approach to criticality.

02.02 Review the format of the procedure to confirm that it contains the following:

- Test Objectives
- Special Precautions and Limiting Conditions
- System Initial Conditions
- Environmental Conditions
- Acceptance Criteria
- Data Collection Provisions
- Step-by-Step Instructions
- Provision for Step Signoff
- Provision for Selective Quality Control
- Verification

02.03 Assure that the procedure has been properly reviewed and approved for use in accordance with technical specifications.

- a. Verify review by the independent review group.
- b. Verify authorized management approval.

02.04 Review the procedure to be used by the licensee to assure that it contains:

- a. Procedural steps to satisfy all items identified in 02.01 above.

- b. Specific prerequisites to assure that:
 - 1. Nuclear instrumentation calibration meets surveillance requirements.
 - 2. A manual scram test is conducted not more than 24 hours prior to initiation of Boron dilution.
 - 3. Acceptable signal-to-noise ratios and the minimum acceptable count rate are specified for special startup and source range channels
 - 4. A list of systems which are required to be operable is included.
 - 5. Special test instrumentation is identified.
 - 6. Temporary jumpers, lifted leads, etc., will be reviewed for impact.
 - 7. Reactor coolant system temperature and pressure are within technical specification limits for reactor startup.
 - 8. A listing of RPS trips required to be in service, including reduced trip points if applicable.
- c. Personnel and equipment precautions.
- d. Identification of control rod pattern prior to and during Boron dilution.
- e. Adequate acceptance criteria including a prediction of the Boron concentration at criticality with the defined control rod pattern.
- f. References to applicable facility blueprints, FSAR sections, technical specifications, etc.
- g. Requirements for maintaining Inverse Multiplication plots during dilution until criticality is achieved.
- h. Limiting rates of nuclear power increase following attainment of criticality.
- i. Frequency of Boron concentration determination and limits on Boron dilution rates.
- j. Verification of overlap of source (startup) range and intermediate range nuclear instrumentation.

72570-03 INSPECTION GUIDANCE

03.01 During this review confirm that the test procedure to be used is in agreement with the FSAR test description.

03.02 Provisions of ANSI N 18.7 and Regulatory Guide 1.68 should be used as guidance during format review. The licensee's procedure must consist of a detailed step-by-step procedure. The minimum requirements can be met by having the procedural details either stated in this procedure which is under review or by a specific reference to an existing topical or to an operating procedure provided the title and the paragraph references are explicit, and the referenced procedures have received the same review and approval required of this procedure.

03.03 The proposed technical specifications and FSAR normally define the review and approval requirements for testing performed after issuance of an operating license. This review is normally performed by a test review group consisting of representatives of the NSSS, the A/E, the Constructor, and the plant operations group. In addition, technical specifications may also require on-site or off-site safety committee review. Normally, the Plant Superintendent (or equivalent) will be identified as the authorized management approval.

The inspector should verify that the procedure reflects the above review and approvals, and that revisions receive equivalent review and approval. He should also review the appropriate committee minutes to assure that meaningful reviews were conducted.

03.04 The approved issue of the procedure to be used should be available for review 90 days prior to performance of the test if the licensee has committed to Regulatory Guide 1.68 (cf. Appendix B).

- a. All license requirements are considered applicable during the initial approach to critical, and should either be specifically identified in the procedure, or specifically referenced, e.g. by reference to technical specifications.
- b. Prerequisites should be identified in the test procedure, and require individual signoff for control.

The procedure should specifically require verification that all nuclear instrumentation has been properly calibrated and adjusted in accordance with procedural and frequency requirements of the technical specifications. Reduced trip points may be prescribed, and should be verified by instrument trip checks. If more than 3 months has elapsed since fuel loading, the SRMs should be checked prior to initial criticality.

- d. Rod positions should be specified for all rods, including part length rods if applicable. The procedure should include controls applicable during control rod withdrawal, and prescribe the withdrawal sequence.
- e. Prediction of the Boron concentration at the cold-critical condition will require parametric treatment to account for variations in temperature from the point of calculation.
- g. Inverse multiplication plots are required if the licensee has committed to performance of the test in accordance with Regulatory Guide 1.68.

- h. Normally startup rate limits are defined as a 60 second period; however, rates of one decade per minute have been acceptable to NRC.
- i. Initial sampling frequency should be high until trending of concentration data justify a reduced frequency. Samples should be analyzed at least once/hour during dilution and samples should be drawn at about 15 minute intervals as criticality is approached to assure accuracy at criticality. Use of continuous monitors would justify reduced sampling frequency after their response and accuracy has been confirmed.
- j. Normally, at least one decade of overlap will be adequate to prove operability of the intermediate range instrumentation. For CE reactors, at least two decades of overlap are necessary between the wide range logarithmic flux monitor channels, and the power range neutron flux monitoring channels.

END