

# NRC INSPECTION MANUAL

DQASIP

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## INSPECTION PROCEDURE 70308

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### PREOPERATIONAL HOT FUNCTIONAL TESTING - PWR PROCEDURE REVIEW

PROGRAM APPLICABILITY: 2513

#### 70308-01 INSPECTION OBJECTIVES

01.01 Review the procedure for the hot functional test (HFT) for consistency with regulatory requirements.

01.02 Ensure that the described test is technically adequate.

#### 70308-02 INSPECTION REQUIREMENTS

02.01 Obtain and review a copy of the approved test about three months before the scheduled date for the testing. Determine that the following items are included:

- a. All related procedures (operating, administrative, etc.) have been approved.
- b. Variations made to conduct the cold functional testing have been reset or returned to normal as required to perform HFT.
- c. The integrated hot functional testing procedure is the controlling document for testing to be performed.
- d. The procedure should have provisions to document satisfactory completion of the various steps and sequence that must be accomplished if required sequence is needed.
- e. Initial conditions are listed.
- f. Water quality is stated.
- g. Test criteria:
  - (1) Test procedures should define the criteria for each test.
  - (2) In each section of the procedure, ensure that each test criterion defined above is satisfied.

- h. The heatup and systems to be operated and the indicated modes of operation and checks to be performed are listed.
- i. An inspection of piping hangers and for leakage should be specified, and hanger settings should be verified hot.
- j. The RHR system should be tested to demonstrate the performance and capability for cooldown and for low temperature overpressure control while solid.
- k. Procedure includes the temperature/pressure plateaus at which testing will be performed.
- l. Provisions are included to correct operating procedures if errors are found.
- m. Ensure procedures include provisions for system inspections to ensure that electrical cables, paper boards, flammable material, etc., are not in contact with pipes which are expected to be hot. Similarly, provisions should be taken to protect personnel and sensitive equipment.
- n. Since steam may be intentionally or accidentally admitted to secondary systems, all turbines (main feed pump, main generator) should be verified on the turning gears as appropriate.
- o. If pressurizer and steam generator PCRVs and safeties are lifted per IHF test, the test should contain actions necessary to control the plant in the event these valves do not reset.

02.02 Review the FSAR, docketed licensee letters, and the Safety Evaluation Report and verify that testing commitments relating to the subject being tested are met.

02.03 Review Regulatory Guide 1.20. It contains guidance regarding vibration of reactor internals. For Westinghouse plants, portions of these requirements are translated into a minimum hours of reactor coolant pump running time for pre-conditioning.

02.04 Review Regulatory Guide 1.68, Appendix A, Sections 1, 1a(1), 1a(d), 1a(i), 1b(2), 1d, and 1e(1)-(12), for guidance regarding demonstration of component and system operability in all modes and throughout full design operating range, regarding expansion and restraint testing, "water hammer," and other areas which can be best tested during this time.

02.05 Review Regulatory Guide 1.79 C.1.a.(2), C.1.c.(3), and C.2.b.(1) for a description of hot functional testing of ECCS.

02.06 Review appropriate vendor startup manuals and the precautions, limitations, and setpoints documents. Ensure that the appropriate documents are incorporated into the test.

### 70308-03 INSPECTION GUIDANCE (GENERAL)

03.01 All related procedures for testing, administrative control, and other items of safety significance should be completed, evaluated, and approved by the licensee. The inspector should have completed review requirements listed in the applicable portions of Regulatory Guides and instructions.

03.02 The cold functional testing should be evaluated, and appropriate action taken to ensure that altered systems or identified deficiencies are corrected or returned to normal (to the extent necessary to support operations at temperature and pressure).

03.03 This will be the first time many plant systems are exposed to operating conditions. The performance of the systems and the adequacy of the operating procedures should be verified as soon as possible. This is one of the principal objectives of the HFT program.

03.04 Water quality must be maintained. Determine that sampling, systems, and water analyses maintain water quality within specified limits. Specific analyses should be highlighted: for example, there may be no reactor water oxygen requirements at low reactor water temperatures, but the requirements apply as reactor water temperatures increase.

03.05 Test procedures should contain clearly defined criteria in each procedure.

Functional test procedures generally demonstrate, by successful completion and adequate operation, that the criteria are met. Since a judgment factor is the major method of acceptance, assure that the equipment, etc., operated within acceptable limits and that good judgment was used in accepting the test as satisfactory.

03.06 The completion of Inspection Procedure 70370 satisfies the requirement for 02.01g, above.

03.07 Determine that maximum allowable heatup rate was not exceeded.

03.08 Determine that adequate checking and comparisons were made at each established temperature and pressure plateau (examples: ambient, 100°F, 250°F, etc.). Licensee evaluation should determine that each system and all systems performance were adequate. Concurrence should be obtained from supervisor before raising the temperature/pressure to the next test plateau (good operation practice).

03.09 The maximum amount of operator training should be conducted during the HFT Program. (Examples: Each shift should have several opportunities to control pressure and temperature operating safety-related equipment, starting and placing the turbine in service, etc.)

03.10 It is required for PWR HFT to include a planned cooldown in the test program. During the first cooldown of the reactor and primary system, the performance and capacity of the RHR system operating in the shutdown mode should be verified.

03.11 Evaluate operator familiarity with conditions such as operating in cold, solid, and pressurized conditions, as well as in hot, and with a pressurizer bubble. Since many of these conditions are infrequent operations, the inspector should ensure that adequate briefing, turnovers, log keeping, and test records provide for appropriate discussion of precautions in test plant status, as well as what to do if the plant does not perform as expected (example: relief valve does not seat).

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