



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NRC INSPECTION MANUAL

SRXB

INSPECTION PROCEDURE 60705

PREPARATION FOR REFUELING

PROGRAM APPLICABILITY: 2515

SALP FUNCTIONAL AREA: PLANT OPERATIONS (OPS)

60705-01 INSPECTION OBJECTIVES

01.01 Ascertain the adequacy of licensee procedures for the conduct of refueling operations.

01.02 Ascertain the adequacy of the licensee's administrative requirements for control of:

- a. Refueling operations.
- b. Plant conditions during refueling.

01.03 Ascertain the adequacy of the licensee's implementation of controls for items 01.02a. and b., above.

60705-02 INSPECTION REQUIREMENTS

02.01 Procedure. Prior to unit shutdown for refueling, verify the technical adequacy of approved procedures for three of the following areas:

- a. Receipt, inspection, and storage of new fuel.
- b. Fuel handling, transfer, and core verification.
- c. Inspection of fuel to be reused; fuel assembly inspection using underwater video system.
- d. Periodic monitoring of spent fuel pool cooling parameters and consideration of contingency cooling methods.
- e. Fuel sipping operations (if applicable).
- f. Core and fuel bundle reconstitution (if applicable).
- g. Handling and inspection of any other core internals.

02.02 Administrative Controls for Refueling Operations. Prior to unit shutdown for refueling, verify the adequacy of the licensee's administrative requirements for control of refueling operations. This should be accomplished by ensuring that the licensee has established the following:

- a. Clear definition of lines of supervision.
- b. Shift manning requirements.
- c. Requirements for training and qualification of key personnel.
- d. QA/QC requirements.
- e. Communications requirements.
- f. Radiation monitoring and radiological control requirements.
- g. Requirements for equipment checkout, dry runs of critical operations, and fuel handling.
- h. Casualty procedures.
- i. Requirements for work stoppage, delays, and holds.
- j. Requirements for the supervision of short-term contract personnel.

02.03 Administrative Controls for Plant Conditions During Refueling. Prior to unit shutdown, verify the adequacy of the licensee's administrative requirements for establishing and monitoring control of plant conditions during refueling. This should be accomplished by ensuring that the licensee has established requirements for the following:

- a. Shutdown margin and reactivity monitoring.
- b. Radiation monitoring.
- c. Water level control, including provisions reducing the probability of water level loss and provisions to recover level.
- d. Decay heat removal, for fuel in the reactor vessel and irradiated fuel in the spent fuel pool or intermediate pool (if applicable).
- e. Containment integrity.

02.04 Implementation of Controls. During preparation for refueling, assess through observation, interviews, and record reviews the adequacy of the licensee's implementation of controls. This should include:

- a. Interviews of key licensee and contractor personnel on their responsibilities, understanding of administrative requirements, and response to casualties.
- b. Review of technical specification (TS) surveillance for proper performance.
- c. Observation of equipment checkout.
- d. Observation of fuel receipt and inspection.

- e. Assessment of the adequacy of site management involvement in refueling preparations.

60705-03 INSPECTION GUIDANCE

General Guidance

- a. Refuelings are relatively infrequently performed evolutions which involve unusual plant conditions, significant radiation exposure risks, the opportunity to introduce foreign material into vital reactor plant systems, and the need for well-defined and coordinated responsibilities among several organizations. Most of the problems involving significant safety issues during refueling do not involve improperly written technical procedures. Rather, they are the result of inadequate or improperly implemented procedures and training, inadequate supervisory attention to first-of-a-kind or critical transitional evolutions, and failure of site management to be aggressively involved throughout the refueling effort. Because of this, emphasis has been placed in this inspection procedure on assessing the licensee's understanding and implementation of fundamental requirements and controls that will prevent or mitigate the occurrence of significant safety issues.
- b. This inspection procedure should be accomplished:
 1. Prior to a facility's first refueling to assess its readiness for controlling and performing refueling operations.
 2. Prior to a subsequent refueling if either the licensee received a category 3 rating from the most recently completed SALP, or if degradation in the conduct of or control of refueling activities is evident.

Specific Guidance

03.01 Procedure. ANSI N18.7-1976 provides guidance for the content of refueling and fuel handling procedures. Once a procedure has been reviewed by the inspector, subsequent reviews should only consider changes to the original procedure. The inspector should review technical documents related to fuel receipt and refueling to verify that:

1. Changes made to the approved procedures are accurate.
2. Revised vendor technical information pertinent to the procedures has been incorporated in the latest approved procedures.

Procedures should contain:

1. Prerequisites for commencement of refueling activities, including pre-refueling surveillance testing required by TS. Inspection procedure 60710 provides guidance.
2. Surveillance required by TS during the conduct of refueling activities.
3. Provisions for inspection of cladding conditions and sampling for fuel bowing, distortion, swelling, or crud buildup.

4. Provisions for maintaining proper decay heat removal.
5. Provisions for detailed inspections, pin exposure, and enrichment criteria.
6. Provisions for maintaining good housekeeping in the refueling and new fuel storage areas and for control of loose objects.
7. Provisions for training and qualification of personnel involved in refueling activities, including reference to TS requirements and licensed operator requirements.

03.02 Administrative Controls for Refueling Operations

- a. In particular, the inspector should verify that the licensee has specified in writing:
 1. Specific responsibilities of key personnel.
 2. Interface and coordination among different organizations.
 3. Integration of contractors into licensee organization.
 4. Clear statement of who is in charge.
- b. The inspector should verify that the licensee has:
 1. Work schedules for personnel supervising and conducting fuel movements that are appropriate for routine and repetitive activities.
 2. An adequate number of personnel qualified for fuel movement to support the work schedule.
- c. The inspector should verify that the licensee has ensured that personnel qualifications and training are adequate, including:
 1. Training and qualifications of short-term contract personnel are appropriate for assigned responsibilities.
 2. Personnel training has addressed modifications to fuel handling procedures and equipment that have been implemented since last refueling outage.
- d. QA/QC requirements include foreign material exclusion, small items control, personnel access controls, and general housekeeping to maintain the required levels of cleanliness.
- e. For instances where the licensee uses oral communication to direct fuel movements, the inspector should ensure that the licensee:
 1. Establishes standardized communication protocols between all personnel responsible for fuel movement.
 2. Uses communication methods that are adequate for reliable communications under anticipated noise level conditions.
- f. No inspection guidance provided.

g. In particular, requirements for the checkout and dry run of the following equipment should be specified:

1. Main (polar) crane.
2. Refueling machine.
3. Upender/trolley/fuel transfer tube.
4. Spent fuel bridge.
5. Safety interlocks.

h-j. No inspection guidance provided.

03.03 Administrative Controls for Plant Conditions During Refueling. Limits for the parameters cited are normally specified in facility TS. The inspector should ensure that the licensee's procedure complies with the monitoring requirements and limits specified in the TS, and that the procedure identifies the appropriate action to be taken if a limiting condition for operation is violated.

In reviewing the procedures for controlling the cited parameters, the inspector should also emphasize the clear assignment of specific responsibilities, the adequacy of control room instrumentation for monitoring key parameters, the adequacy of local and control room alarms for key parameters, and the proper logging of these parameters.

03.04 Implementation of Controls

a-c. No inspection guidance provided.

d. The inspector should ensure that the licensee establishes:

1. Proper manning and supervision.
2. Procedural compliance.
3. Proper control of material exclusion and small items.
4. Cleanliness level commensurate with the activity being conducted.

e. No inspection guidance provided.

60705-04 RESOURCES ESTIMATES

For planning purposes, the direct inspection effort to accomplish this procedure is estimated to be 25 hours.

60705-05 REFERENCES

ANSI N18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants."

Inspection Procedure 60710, "Refueling Activities."

Facility Technical Specifications.

END