



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

NRC INSPECTION MANUAL

SRXB

INSPECTION PROCEDURE 60710

REFUELING ACTIVITIES

PROGRAM APPLICABILITY: 2515

SALP FUNCTIONAL AREA: Plant Operations (OPS)

60710-01 INSPECTION OBJECTIVE

Ascertain whether pre-refueling activities specified in the technical specifications (TS) have been completed and whether refueling activities are being controlled and conducted as required by TS and approved procedures.

60710-02 INSPECTION REQUIREMENTS

02.01 Pre-refueling Activities. Prior to the removal of the reactor vessel head, verify that:

- a. The licensee has implemented controls for the conduct of refueling operations and for establishing and maintaining control of plant conditions in accordance with TS and approved procedures. This should be accomplished by:
 1. Interviewing key licensee and contractor personnel on their responsibilities, understanding of administrative requirements and the outage organization, and response to casualties.
 2. Reviewing the results of TS surveillance testing to ensure proper completion of those tests required to be performed as prerequisites for refueling.
 3. Observing or confirming that equipment checkout has been satisfactorily completed.
 4. Observing or confirming the satisfactory completion of fuel receipt and inspection.
 5. Assessing the adequacy of site management involvement in refueling preparations.
 6. Verifying that personnel have been trained and qualified commensurate with their responsibilities for refueling activities. The training should include procedure and equipment modifications that have been implemented since the last refueling outage.

- b. The licensee has conducted a 10 CFR 50.59 safety evaluation to ascertain whether the reload core requires prior NRC review and approval for an unreviewed safety question or change to TS.
- c. Personnel involved in special, critical evolutions, or first-of-a-kind operations that require extensive coordination have been properly briefed prior to commencement of the activities. Evolutions warranting such consideration include, but are not limited to, the following:
 1. Refueling seal installation and testing.
 2. Establishment of proper refueling pool water level.
 3. Reactor vessel head removal and initial implementation of foreign material and small items control.
 4. Initial setting of containment integrity and coordination of control room and refueling pool activities prior to starting core alterations.
 5. Reactor vessel internals removal and replacement.

02.02 Refueling Activities. During the refueling, verify that:

- a. Periodic testing and verification of the operability of refueling-related equipment and systems are being performed as required by TS and licensee administrative procedures.
- b. Fuel handling operations (removal, inspection, sipping, reconstitution, and insertion) and other ongoing activities are being performed in accordance with TS and approved procedures.
- c. Plant conditions are being maintained as required by TS and approved procedures.
- d. Good housekeeping and loose object control are being maintained in the refueling and spent fuel areas.
- e. The licensee's staffing is in accordance with TS and approved procedures.
- f. Site management maintains adequate oversight of site staff and contractor personnel to ensure that fuel movement activities are being conducted in accordance with applicable requirements and management expectations.

60710-03 INSPECTION GUIDANCE

General Guidance

This inspection procedure should be accomplished:

- a. During a facility's first refueling.
- b. During 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.

- c. During every other refueling after the initial refueling if neither of the conditions specified in items 1. and 2., above are met.

If this inspection procedure is performed as a followup to inspection procedure 60705, "Preparation for Refueling," complete all 60710 inspection requirements except section 02.01a (this requirement would have been fulfilled as part of inspection procedure 60705).

Specific Guidance

03.01 Pre-refueling Activities

a.1 No inspection guidance provided.

a.2 In examining the master refueling outage plan, the inspector should confirm that TS requirements and other pre-refueling program-related activities have been scheduled. Check sheets which cover the activities should be reviewed to confirm that all checks were completed within the time constraints stipulated in the TS. Examples of pre-refueling activities that should be scheduled are:

1. Refueling machine operation and indexing.
2. Fuel storage area containment ventilation system testing.
3. Refueling interlocks testing.
4. Crane testing.
5. Refueling floor and spent fuel pool radiation monitors testing.
6. Communication system testing.
7. Cooling system testing for stored and in-core fuel.
8. Containment building penetration status.
9. Installation of refueling cavity seal ring.

a.4 No inspection guidance provided.
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b. If an unreviewed safety question or a need for a TS change exists, the inspector should verify that the licensee has obtained NRR approval prior to startup.

c. Inspectors should pay particular attention to first-of-a-kind operations. Discussions should be held with key personnel, questioning them on their specific responsibilities. Inspectors should observe refresher training and shift briefings prior to the start of significant, new operations to ensure that new requirements and potential problem areas are properly addressed. The inspector should note whether the briefings adequately discuss any potential radiation or containment hazards that personnel should be aware of during the evolution. Site management involvement in these critical transitional evolutions should be addressed.

03.02 Refueling Activities

a. These should include:

1. Core monitoring during refueling operations is in accordance with TS.
2. Fuel accountability methods are in accordance with established procedures.
3. Vessel and spent fuel storage pool water levels are as required by TS.
4. Boron concentrations (PWR) are as required by TS, and appropriate dilution path valve checks are performed.
5. Reactor mode switch position is as required by TS (BWR).
6. Control blade checks (BWR) are being conducted in accordance with applicable procedures.
7. Checks of containment penetration positions are being conducted as required by TS.
8. Operability of spent fuel storage area crane interlocks is being demonstrated as required by TS.
9. Checks of decay heat removal system for reactor vessel, intermediate pool (if applicable), and spent fuel pool are being conducted as required by TS and approved procedures.
10. Operability of the containment purge and exhaust isolation systems is being demonstrated as required by TS.

b. The inspector should witness two shifts of fuel handling operations per week throughout the refueling period. At least four hours of direct observations should be made during either the 4-12 or 12-8 shifts. The inspector should verify that:

1. personnel are not exhibiting indications of fatigue.
2. the correct revisions of applicable procedures are in use.
3. personnel operating the manipulator crane, upender, and spent fuel bridge are qualified to do so.
4. personnel performing fuel movement activities are not relying upon uncontrolled operator aids.
5. effective teamwork, supervision, and standardized communication protocols are being used to conduct fuel movement activities.

Additionally, the inspector should observe refueling activities from the control room, fuel building, and containment, and verify the data and I/M plots in the specified locations.

The inspector should obtain an outage schedule or contact the licensee to learn those activities being carried out at the time of the inspection. Such activities as torus work, fuel sipping, penetration leak testing, and isolation valve maintenance are the types of activities that should be considered for direct observation to ensure that:

1. Radiation controls are proper.
 2. Equipment lockout and tagging is in accordance with established procedures.
 3. Work to be conducted under the ASME Code is in compliance with Code requirements. The inspector should make a judgment as to whether a regional specialist should be called in to inspect the work.
 4. Refueling support systems are not rendered inoperable as a result of modification, surveillance, or maintenance activities.
- c. Plant conditions for refueling that are specified in TS normally concern maintaining certain parameters within allowable limits, as well as maintaining containment integrity, when required. The parameters normally cited are shutdown margin, reactivity, radiation levels, refueling pool and spent fuel pool water levels, and decay heat removal. The inspector should ensure that the licensee is checking these parameters at the required periodicity, and that appropriate action is taken if a limiting condition for operation is entered as a result of a parameter being outside the allowable TS limits.
- d. The inspector should make a judgment regarding the licensee's implementation of provisions to protect against the falling of foreign objects into the open reactor vessel.
- e. Sections 50.54 (i) through (m) of 10 CFR establish specific regulatory requirements for licensed personnel at operating facilities. Section 6 of Standard TS further defines supervision responsibilities and qualifications during core alteration activities. The senior reactor operator in charge of fuel handling need not be continuously present at the refueling platform during core alterations. He may be at other fuel handling stations observing equipment status, provided his duties are limited to supervision of activities directly related to fuel handling movement.

60710-04 RESOURCE ESTIMATE

For planning purposes the direct inspection effort to accomplish this procedure is estimated to be 46 hours.

60710-05 REFERENCES

10 CFR 50.59

10 CFR 50.54(i) through (m)

Standard and facility technical specifications

Inspection Procedure 60705, "Preparation for Refueling"

"Part 9800 Guidance on 10 CFR, "Changes to Facilities, Procedures, and Tests (or Experiments)"

END