

NRC INSPECTION MANUAL

PDND

INSPECTION PROCEDURE 37801

SAFETY REVIEWS, DESIGN CHANGES, AND MODIFICATIONS AT PERMANENTLY SHUTDOWN REACTORS

PROGRAM APPLICABILITY: 2561

SALP FUNCTIONAL AREA: N/A

37801-01 INSPECTION OBJECTIVES

01.01 To verify whether the licensee's safety review program at decommissioning power reactors is effective at contributing to public health and safety and the environment. This review also assesses the effectiveness of training applicable to the safety review process.

01.02 To ascertain whether facility design changes, tests, experiments, and modifications (CTEMs) are effectively conducted, managed, and controlled during plant decommissioning.

01.03 To verify that major and minor decommissioning activities do not involve an unreviewed safety question (USQ) or change to technical specification (TS).

37801-02 INSPECTION REQUIREMENTS

02.01 Decommissioning Safety Review Program

- a. Review the licensee's safety review process and procedures and assess whether they are adequate to identify an USQ and/or change to TS resulting from CTEMs. Determine whether the program conforms to 10 CFR 50.59.
- b. Evaluate the conduct of the licensee's offsite and/or onsite safety review committees and assess their contribution towards plant safety. Determine whether these committees are appropriately staffed and trained and are fulfilling their charter, as defined in the licensee's TSs, licensee quality assurance (QA) plan, or other licensing documentation.
- c. Ascertain whether the licensee's training program provides effective periodic training for personnel preparing, reviewing, and approving safety evaluations. Verify that the

training and qualification of the personnel conducting the 50.59 training is consistent with license requirements. Determine whether the licensee has established a process to assess training effectiveness.

02.02 Design Changes, Test, Experiments, and Modifications

- a. Review the procedures that control and implement design CTEMs and assess whether the procedures provide adequate instructions to assure proper implementation, review, and approval.
- b. Select a sample of design changes and/or modifications that will result or have resulted in changes to the facility. Determine whether the activities were properly implemented, controlled, and contributed to plant safety. This review should also include any tests or experiments conducted for the purpose of decommissioning. Assess the details of the safety evaluations, evaluate whether the licensee's safety judgements were appropriate, and determine whether key considerations were effectively evaluated.
- c. Based on the sample above, verify that the selected CTEMs have been reviewed and approved in accordance with licensee procedures and regulatory requirements, such as the TSs and QA Plan. Confirm that effected procedures, drawings, maintenance records, and operator training were updated to reflect the CTEM. Assess whether alarm setpoints, and calibration and operating requirements were revised, if required. Confirm that the licensee adequately evaluated any inter-relationships between the modification and other systems affected by the activity.

Review a sample of safety evaluations written for the conduct of decommissioning. Verify that the licensee updated their Final Safety Analysis Report (FSAR), or equivalent, as required by 50.71, and Post-Shutdown Decommissioning Report (PSDAR) or license termination plan (LTP), if required, and has adequate controls to maintain the licensed configuration of the facility.

- d. Select a sample of procedures that have been revised or implemented to reflect the power reactor state of decommissioning. Ascertain whether an USQ and/or change to the TS resulted. This review should also focus on emergency preparedness, fire protection, and other procedures and plans referenced in the TSs or license.

02.03 Major and Minor Decommissioning Activities

- a. Select a sample of maintenance, repair, and/or work activities to ascertain whether the licensee made changes to their facility without invoking their safety review process.
- b. Select a sample of structure, system, or component configuration changes made to place the facility in a post-shutdown configuration. Review these configuration changes to ascertain whether they involved a defacto modification to the facility as described in the FSAR (or equivalent).

General Guidance

This inspection procedure resulted, in part, from long-term actions taken by the NRC staff in response to NRC Bulletin 94-01, "Potential Fuel Pool Draindown Caused by Inadequate Maintenance Practices at Dresden Unit 1," power reactor decommissioning rulemaking (61 FR 39278, July 29, 1996), and a determination that NRC inspection of decommissioning power reactors provides additional assurance that licensed activities will not be adverse to public health and safety and the environment. The primary intent of this inspection procedure is to assure that each licensee possesses and implements a safety review program that effectively maintains decommissioning safety and the facility configuration as described in their licensing basis. Further, this IP provides assurance that licensees will effectively perform safety evaluations to ensure that NRC reviews are conducted prior to changes, test, or experiments involving USQs or changes to TSs.

Plants holding a Part 50 license can use 50.59 to conduct CTEMs (without prior NRC review) not described in the FSAR (or equivalent) provided that the CTEM's do not involve a change in TSs or an USQ. For plants undergoing decommissioning, additional requirements are set forth to provide assurance that decommissioning CTEMs are properly evaluated by licensees. These additional requirements are described in the NRC Staff Requirements Memorandum, dated January 14, 1994, and codified by the power reactor decommissioning rulemaking (61 FR 39278, July 29, 1996). In particular, decommissioning CTEMs can be made without NRC staff review, if they do not: (1) foreclose the unrestricted release of the site; (2) significantly increase decommissioning costs; (3) cause any significant environmental impact not previously reviewed; or, (4) violate the terms of the existing license.

The inspector should coordinate with the PM to identify the safety or regulatory significant CTEMs that are to be reviewed. Depending on the vintage of the plant and decommissioning schedule, significant CTEMs may include large-scale system, component, soil, or structural removal activities.

The PM will normally perform or participate in this inspection procedure. It is expected that this inspection procedure will be periodically performed; however, this inspection could be scheduled prior to major decommissioning activities and after the CTEMs have been approved by the licensee. For significant activities, such as reactor vessel and steam generator removal or segmentation of large radioactive components, a small multi-disciplined inspection effort may be required to assess the licensee's safety evaluations. For other activities, such as tank and small-bore piping removal, the 50.59 review could be performed by an individual inspector or PM. If possible, prior to permanent shutdown, the PM and regional representatives should determine which licensee activities and potential CTEMs should be reviewed to provided assurance that decommissioning activities can proceed safely.

Although this procedure applies to all phases of decommissioning, a different set of concerns will dominate the safety envelope depending on the activities on site. The inspector is not required

to complete all inspection requirements listed in this IP, nor is the inspector limited to these inspection requirements listed if safety issues are involved. However, the objectives of this IP shall be met. Based on an assessment of licensee performance, the inspector may choose to inspect any aspect of the licensee's safety review process that could adversely affect public health and safety or the environment.

Specific Guidance

The inspector should review and incorporate as necessary the information described in IP 37001, "10 CFR 50.59 Safety Evaluation Program," as further guidance and clarification of the inspection requirements in this IP.

Few inspectors are expert in every nuclear-related discipline. Therefore the inspector should recognize when technical or interpretive assistance is needed to effectively review a safety evaluation or identify a safety concern. This assistance can be obtained through the Project Manager for headquarters technical disciplines or the region manager responsible for site inspection. The inspector should make every effort to reach a conclusion about a safety issue or concern in time to discuss it with the licensee prior to the exit meeting.

Recognizing failures of the licensee to comply with administrative requirements of its 50.59 program is important; however, recognizing failures of the licensee to adequately assess how a CTEM will effect plant safety is more important. Therefore, the inspector should focus on safety. The failure to prepare, document, or adequately address or evaluate all questions pertinent to a particular CTEM, in itself, may indicate inadequate engineering or training more so than a safety concern. However, if the errors were a frequent occurrence, caused by a programmatic inadequacy, or demonstrative of a failure to address obvious and reasonable safety considerations (such as identifying all relevant accident scenarios or failing to recognize a change to TS), then the finding would be of significance.

03.01 Decommissioning Safety Review Program

- a. The safety review process used by a licensee during decommissioning should be comparable to the program utilized by the licensee during power reactor operation, even with possible changes to the licensee's TS because of decommissioning. If a licensee pursues immediate component removal or decommissioning following plant shutdown, the NRC staff expects that the licensee's 50.59 program will be of high quality. The same may not be the case if a licensee enters into long-term storage and then implements a 50.59 program that has not been exercised for a long period of time. In this latter case, the licensee may experience a loss of expertise in the conduct of technical or safety reviews due to staff changes. In either case, the inspector should assess whether the program: (1) reflects the licensee's current decommissioned organization and staffing

configuration; (2) incorporates the most recent regulatory requirements and guidance; (3) applies appropriate management and technical reviews; and, (4) includes appropriate quality considerations to assure that safety questions, evaluations, and justifications are performed and documented.

If performed by the licensee, the inspector should review the highest tiered licensee safety evaluation written that evaluates whether decommissioning involves an USQ and/or change to the TS. Review of this document is important because it would probably evaluate the current plant configuration (a permanent shutdown condition) to a decommissioned state assessing design basis accident(s), normal and off-normal events, site characteristics, etc. The inspector should also review any sub-tiered SEs (written, for example, for steam generator, reactor, and large component removal) that refer to a general decommissioning safety evaluation to assess whether an USQ and/or change to TS exists for the particular activity to be conducted. The inspector should review SEs to: (1) assess the rigor of engineering and management reviews; (2) determine whether the proposed activities are bounded by the general decommissioning safety evaluation; and, (3) identify whether the changes, tests, or experiments involve an USQ or changes to TS. NRC inspector/staff review of licensee safety evaluations shall always be conducted after licensee management approval of their documents and should be inspected prior to the activity occurring, if possible.

- b. The inspector should assure that the safety committees are properly staffed and members appropriately trained. A performance-based assessment should be performed to assure that significant decommissioning activities are independently and effectively reviewed, as required by the TSs, other requirements, and docketed commitments. The inspector and/or PM should observe the conduct of a safety review committee and assess the effectiveness of this review body at: (1) questioning risks and benefits and the technical adequacy of the particular activity; (2) providing an independent safety perspective; and, (3) contributing to plant safety through, in part, the incorporation of lessons learned and experience. The offsite safety review committee should also be assessed.

The administrative section of the TS will normally contain audit and safety review committee requirements. Herein, licensee staff training and qualifications will typically reference an ANSI standard. The inspector should also assess whether the safety review committee is made up of persons of appropriate technical expertise necessary to accomplish their safety function during power reactor decommissioning. The QA Plan or other licensing basis documents may also describe the licensee's plans for assuring effective safety reviews.

- c. The inspector should review the licensee's training and qualification program for the individuals performing safety evaluations and reviews to assure that the training is consistent with licensee commitments as described in

licensing basis documentation. The training program should be timely updated to assure that an accurate facility configuration is presented to personnel who prepare and review packages that results in a change, test, or experiment. Information provided to the control staff in the form of plant procedures and drawings should also correctly represent the facility configuration and operation of modified systems and components.

03.02 Design Changes, Test, Experiments, and Modifications

- a. The NRC staff expects that the procedures that govern the control and implementation of decommissioning design changes and modifications will be comparable in quality to the procedures that were in use when the plant was in operation. However, based on the safety significance of the structures, systems, and components (SSCs), the level of quality assurance applied by the licensee in the procedures may be different between systems that assure safe storage of spent fuel or monitor for radioactive effluents and those SSCs that don't. The inspector should review the licensee's QA Plan or other licensee document (such as a safety qualification manual, Q-list, or other listing of equipment safety classification) to ascertain the level of quality that will be provided to SSCs of importance and evaluate whether the QA controls and verifications applied by the licensee on these systems are appropriate. The licensee's 10 CFR 50.65 maintenance rule implementation program may also provide insights into equipment classification.

For SSCs (still described in the FSAR) determined by the licensee as being of lesser importance than SSCs associated with spent fuel storage, the procedures and associated controls could have less rigorous quality elements applied to provide a comparable level of assurance that the design changes and/or modifications of these SSCs would be appropriately implemented and completed. These SSCs may include large component removal; building and ventilation changes and dismantlement; and, contaminated/irradiated system removal. The inspector should also verify that appropriate administrative requirements exist to maintain the licensed configuration of the plant.

- b. Attention should be focused on the structures, systems, and components necessary to safely store or transport spent fuel or highly irradiated materials or monitor for radioactive effluents. The inspector should verify that safety evaluations are performed as required; that drawings and procedures are updated in a timely fashion; and, that appropriate training is performed to assure that personnel properly operate and maintain the effected structure, system, or component.

If this review includes an Independent Spent Fuel Storage Facility, NMSS inspection procedures 60854, "Preoperational Testing of an ISFSI," and IP 60855, "Operation of an ISFSI," may be used as inspection guides.

In regard to the transportation or storage of spent fuel, NMSS inspection procedures 60854 and 60855 predominately focus on activities associated with the ISFSI, not with licensee activities and controls in or about the spent fuel pool. Therefore, for the implementation of this IP, the NRC staff should focus on the areas not reviewed by the NMSS SFPO procedures. This would include reviews and evaluations for safe load pathways and heavy load drop scenarios and the review of the engineered features designed to mitigate impact failure of structures, systems, and components (SSC) should a transfer cask free fall or impact an SSC or adversely effect the operation of the shutdown power reactor. Similarly, inspector review of 50.59 safety evaluations written for the transfer of irradiated fuel should include an assessment of human performance for the certified fuel handlers. This may include: operator command and control; supervisory oversight; man-machine interface changes; and, training. During these assessments the inspector should refer to IP 60705, "Preparation for Reactor Fuel Handling," and IP 60710, "Reactor Fuel Handling Activities," for additional inspector guidance regarding the training and conduct of irradiated fuel handling.

The inspector should verify that the licensed configuration of the facility does not change without appropriate licensee and/or NRC staff reviews, if required. The inspector should use the descriptions provided in the FSAR, PSDAR, LTP, or any other docketed commitment that provides details as to plant configuration. Other examples important for inspector review include spent fuel pool heat-up or evaporation tests; load testing of polar, refueling, or other cranes; and, special dismantlement activities involving highly irradiated or contaminated materials and components. The inspector should be aware of licensee plans or actions that modify, remove, or redistribute soils and potentially affect ground water transport. Changes in radiological effluent pathways could jeopardize licensee radiological assessments, environmental impact evaluations, and NRC safety judgements used to assess decommissioning.

Other changes and modifications observed by the NRC staff include the deactivation of systems and components, the replacement of cooling systems with lower capacity systems, and modifications to containment to facilitate decommissioning. Licensees could also pursue the removal or modification of electrical distribution, fire protection systems, and ventilation systems. For example, modifications to a plant heating system led to freezing and bursting of piping systems located within containment at one decommissioning power reactor. These conditions within containment also had the potential for freezing and bursting of the fuel transfer tube which could have resulted in a partial draindown of the spent fuel pool.

- c. The inspector should assess whether the licensee is timely in updating and maintaining accurate design and configuration information in the control room or other decommissioning

control location. NRC staff has identified that during the conduct of time-aggressive decommissioning, some licensees have been challenged in maintaining their documents up-to-date detailing the status of a particular system at a particular moment in decommissioning. For SSCs for which work is well defined within physical boundaries, this does not typically represent a problem. However, during some decommissioning work, interfaces and interferences between SSCs could be subtle and harder to identify. Such situations could involve SSCs shared between units, structural modifications, heavy lifts, etc.

The inspector should verify that the licensee's processes capture the safety evaluations necessary for the periodic 10 CFR 50.71(e) or PSDAR/LTP updates, as required.

- d. The inspector should focus on the procedures that control design changes, modifications, system operation, spent fuel management, and other activities of regulatory concern. These other activities could include radiation sampling and survey, transportation, fire protection, and emergency preparedness. The inspector should assess whether reductions in procedural reviews, details, or requirements adversely impacted quality of activities governed by those procedures or the level of safety assurance required by regulatory requirements.

Throughout decommissioning, the risks associated with long-term storage or dismantlement and decontamination will generally reduce due to reductions in the radiological source term; general area radiation dose; external threat to safe fuel storage; etc. Therefore, the NRC staff expects that licensee's will review and implement, as required, changes to their programs, plans, and procedures to reflect the current decommissioning safety risk. For example, adequate measures should be taken by the licensee (such as revising their fire protection plan or procedure) to account for additional fire loading in containment or other plant area caused by decontamination, torch cutting, or dismantlement activities. Similarly, if conditions present less risk, the licensee could possibly implement fewer response actions to gain an equivalent level of assurance that public health and safety would not be impacted. No matter the situation, the inspector should assess whether the licensee's plans reflect the status of the decommissioning power reactor and decommissioning activities being conducted.

03.03 Major and Minor Decommissioning Activities

- a. Although maintenance and repair generally do not involve USQs or changes to TSs, the inspector should select a number of maintenance and repair activities to assess whether these activities involved CTEMs without a 10 CFR 50.59 evaluation. The inspector should review control room or maintenance planning information to select activities that may have a high possibility of resulting in a change to the facility. Examples of such changes could include TS systems including,

but not limited to, the spent fuel pool cooling pump rebuilds, radiological effluent or criticality monitoring instrumentation replacement, spent fuel rack repairs, or spent fuel pool heat exchanger tube plugging. Other examples could include the removal or modification of a building, contouring or excavation of soil and foundations, and diversion of rain water and sewage system effluent. Licensee work procedures should have a mechanism to determine whether a safety evaluation is needed.

- b. The inspector should select a sample of SSC configuration changes made by the licensee to place the power reactor in a post-shutdown condition or other particular state of decommissioning. Typically, a licensee could use their work control, maintenance, design change, or modifications processes to conduct these changes. For example, after final plant shutdown, the licensee may isolate particular portions of systems no longer necessary for safe decommissioning operations. These systems could include portions of service water, component cooling water, electrical, fire water, or radiation effluent monitoring. A licensee may perform these isolations using originally installed valves, blind flanges, or they may use freeze seals. However, the use of freeze seals and the long-term isolation of portions of an operating system (as described in the FSAR) may constitute a modification, whether or not the licensee used originally installed valves. Also, any change in the design of an SSC, whether in existence prior to or after final shutdown as a result of an error or cognitive decision during modification or maintenance, is considered a defacto modification or change to the facility. Plant decommissioning with a defacto modification or change must be evaluated pursuant to 10 CFR 50.59, as necessary, to determine whether it involves an unreviewed safety question or change in TSs.

Of similar importance, is the verification that SSCs credited in the licensing basis as preventing or mitigating design basis occurrences are available to fulfill their function. If the power reactor safety analysis as described in the licensing basis depends on or credits the availability of such SSCs (whether or not described in the TSs), then removing these SSCs from service during decommissioning should be evaluated in accordance with 50.59. These types of systems could include spent fuel pool condensate water transfer and system for refill capability, fire water and detection systems, instrumentation systems for effluents and radiation levels, etc,. For definitions and examples of major and other decommissioning activities refer to Manual Chapter 2561, "Decommissioning Power Reactor Inspection Program."

37801-04 RESOURCE ESTIMATE

Inspection resources for this inspection procedure will vary from site to site based on NRC management's assessment of licensee performance. In addition, inspection resources will be dependent

on the phase of decommissioning being implemented. It is estimated that during most active periods of decommissioning approximately 32 onsite inspection hours will be needed to adequately assess and document licensee performance semi-annually.

37801-05 REFERENCES

1. Inspection Manual Chapter 9900, 10 CFR 50.59, "CFR Discussions, Changes To Facilities, Procedures, and Tests (Or Experiments)"
2. NUREG 0612, Control of Heavy Loads at Nuclear Power Plants.

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