



BACKGROUND

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Decommissioning Nuclear Power Plants

Background

When a power company decides to close a nuclear power plant permanently, the facility must be decommissioned by safely removing it from service and reducing residual radioactivity to a level that permits release of the property and termination of the operating license. The Nuclear Regulatory Commission has strict rules governing nuclear power plant decommissioning, involving cleanup of radioactively contaminated plant systems and structures, and removal of the radioactive fuel. These requirements protect workers and the public during the entire decommissioning process and the public after the license is terminated.

Discussion

Licensees may choose from two decommissioning strategies: DECON and SAFSTOR.

Under DECON (immediate dismantling), soon after the nuclear facility closes, equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits release of the property and termination of the NRC license.

Under SAFSTOR, often considered “deferred dismantling,” a nuclear facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, the plant is dismantled and the property decontaminated.

A licensee may also combine the two strategies by dismantling and decontaminating some portions of the facility while leaving other parts in SAFSTOR. The decision may be based on factors besides radioactive decay, such as availability of waste disposal sites. There is no formal declaration of a strategy: A facility is said to be in DECON when active decommissioning work is underway.

Decommissioning must be completed within 60 years of the plant ceasing operations. A time beyond that would be considered only when necessary to protect public health and safety in accordance with NRC regulations.



Demolition of a Reactor Containment Building

Regulations

The requirements for decommissioning a nuclear power plant are set out in several NRC regulations.¹ In August 1996, a revised rule went into effect that redefined the decommissioning process and required owners to provide the NRC with early notification of planned decommissioning activities. The rule allows no major decommissioning activities to be undertaken until after certain information has been provided to the NRC and the public.

Several nuclear power plants completed decommissioning in the 1990s without a viable option for disposing of their spent nuclear fuel because the federal government did not construct a geologic repository as planned. Accordingly, the NRC implemented regulations allowing licensees to sell off part of their land once it meets NRC release criteria, while maintaining a small parcel under license for storing the spent fuel. These stand-alone facilities, called “independent spent fuel storage installations,” remain under license and NRC regulation. Licensees are responsible for security and for maintaining insurance and funding for eventual decommissioning.

The NRC is currently developing new regulations that will implement lessons learned from transitioning several plants from operation to decommissioning since 2011. These regulations will enhance the efficiency and transparency of the transition and the early stages of decommissioning.

Decommissioning Funds

Before a nuclear power plant begins operations, the licensee must establish or obtain a financial mechanism – such as a trust fund or a guarantee from its parent company – to ensure there will be sufficient money to pay for the eventual decommissioning of the facility.

Each nuclear power plant licensee must report to the NRC every two years the status of its decommissioning funding for each reactor or share of a reactor that it owns. The report must estimate the minimum amount needed for decommissioning by using the formulas found in [10 CFR 50.75\(c\)](#). Licensees may alternatively determine a site-specific funding estimate, provided that amount is greater than the generic decommissioning estimate. Although there are many factors that affect reactor decommissioning costs, generally costs range from \$300 million to \$400 million. Approximately 70 percent of licensees are authorized to accumulate decommissioning funds over the operating life of their plants. These owners – generally traditional, rate-regulated electric utilities or indirectly regulated generation companies – are not required today to have all the funds needed for decommissioning. The remaining licensees must provide financial assurance through other methods such as prepaid decommissioning funds and/or a surety method or guarantee. The staff performs an independent analysis of each of these reports to determine whether licensees are providing reasonable “decommissioning funding assurance” for radiological decommissioning of the reactor at the permanent termination of operation.

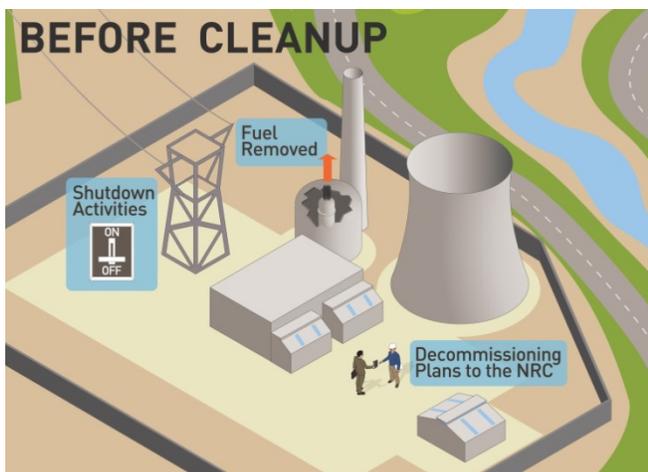
¹ Title 10 of the Code of Federal Regulations, Part 20 Subpart E, and Parts 50.75, 50.82, 51.53, and 51.95

Public Involvement

The public has several opportunities to participate in the decommissioning process. A public meeting is held in the vicinity of the facility after submittal of a post-shutdown decommissioning activities report to the NRC. Another public meeting is held when NRC receives the license termination plan. An opportunity for a public hearing is provided prior to issuance of a license amendment approving the plan or any other license amendment request. In addition, when NRC holds a meeting with the licensee, members of the public may observe the meeting (except when the discussion involves proprietary, sensitive, safeguards, or classified information).



Phases of Decommissioning



The requirements for power reactor decommissioning activities may be divided into three phases: (1) transition; (2) major decommissioning and storage; and (3) license termination activities.

1) Transition from Operation to Decommissioning

When a nuclear power plant licensee shuts down the plant permanently, it must submit a written certification of permanent cessation of operations to the NRC within 30 days. When radioactive nuclear fuel is permanently removed from the reactor vessel, the owner must submit another written certification to the NRC, surrendering its authority to operate the reactor or load fuel into the reactor vessel. This eliminates the obligation to adhere to certain requirements needed only during reactor operation. Other requirements are currently eased through exemptions and license amendments; several of these transitional changes will be included in the new regulations under development.

Within two years after submitting the certification of permanent closure, the licensee must submit a post-shutdown decommissioning activities report to the NRC. This report provides a description of the planned decommissioning activities, a schedule for accomplishing them, and an estimate of the expected costs. The report must discuss the reasons for concluding that environmental impacts associated with the site-specific decommissioning activities have already been addressed in previous environmental analyses. Otherwise, the licensee must request a license amendment for approval of the activities and submit to the NRC details on the additional impacts of decommissioning on the environment.

After receiving the report, the NRC publishes a notice of receipt in the Federal Register, makes the report available for public review and comment, and holds a public meeting in the vicinity of the plant to discuss the licensee's intentions.

2) Major Decommissioning Activities

Ninety days after the NRC receives the planning report, the owner may begin major decommissioning activities without specific NRC approval. These include permanent removal of such major components as the reactor vessel, steam generators, large piping systems, pumps, and valves.

However, decommissioning activities conducted without specific prior NRC approval must not prevent release of the site for possible unrestricted use, result in there being no reasonable assurance that adequate funds will be available for decommissioning, or cause any significant environmental impact not previously reviewed. If any decommissioning activity does not meet these terms, the licensee is required to submit a license amendment request, which would provide an opportunity for a public hearing.

Initially, the owner can use up to 3 percent of its set-aside funds for decommissioning planning. The remainder becomes available 90 days after submittal of the planning report unless the NRC staff has raised objections.



3) License Termination Activities

The owner is required to submit a license termination plan within two years of the expected license termination. The plan addresses each of the following: site characterization, remaining site dismantlement activities, plans for site remediation, detailed plans for final radiation surveys for release of the site, updated estimates of remaining decommissioning costs, and a supplement to the environmental report describing any new information or significant environmental changes associated with the final cleanup. Most plans envision releasing the site to the public for *unrestricted use*, meaning any residual radiation would be below NRC's limits of 25 millirem annual exposure and there would be no further regulatory controls by the NRC. Any plan proposing release of a site for *restricted use* must describe the site's end use, public consultation, institutional controls, and financial assurance needed to comply with the requirements for license termination for restricted release.

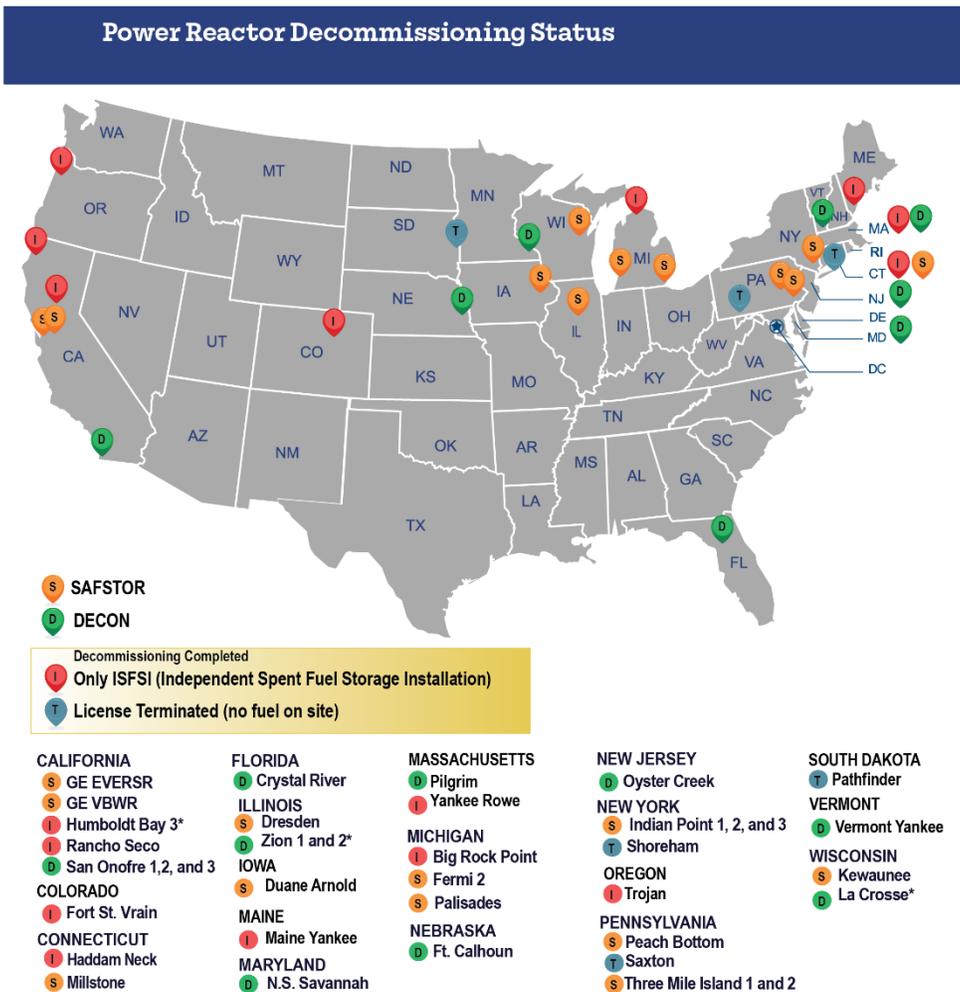
The license termination report requires NRC approval of a license amendment. Before approval can be given, an opportunity for hearing is published and a public meeting is held near the plant site.

The NRC uses a [standard review plan](#) (NUREG-1700, “Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans”) to ensure high quality and uniformity of the license termination plan reviews.

If the remaining dismantlement has been performed in accordance with the approved licence termination plan and the NRC’s final survey demonstrates that the facility and site are suitable for release, the NRC issues a letter terminating the operating license.

Current updates of all power reactor sites undergoing decommissioning are available on the [NRC website](#).

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* The NRC is in the final stages of the license termination process with the reviews of the final status survey reports at Zion 1 and 2, and La Crosse.

Notes: Fort St. Vrain ISFSI NRC SNM-2504 license was transferred to the DOE on June 4, 1999. ISFSIs are also located at all sites undergoing decommissioning or in SAFSTOR. GE Bonus, Hallam, and Piqua decommissioned reactor sites are part of the DOE nuclear legacy. For more information, visit DOE’s Office of Legacy Management Sites Web page at <https://www.energy.gov/lm/sites/>. CVTR, Elk River, and Shippingport decommissioned reactor sites were either decommissioned before the formation of the NRC or were not licensed by the NRC. Licensees have announced their intention to permanently cease operations for Byron (2021), Dresden (2021), Palisades (2022), and Diablo Canyon (2024 and 2025). NRC-abbreviated reactor names are listed. Alaska and Hawaii are not pictured and have no sites. For the most recent information, go to the NRC facility locator page at <https://www.nrc.gov/info-finder/reactors/index.html>. Data are current as of September 2022.