

# Plymouth First White Paper Decommissioning Pilgrim Nuclear Power Station (PNPS)

The Nuclear Regulatory Commission (NRC) is responsible for regulating the decommissioning of nuclear power systems in the U.S. as such it offers three options to the owners / licensees of those facilities., DECOM, SAFSTOR and ENTOMB.

Note: The following fact sheet has been taken from the NRC's web site:

<https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/decommissioning.html> , with occasional editing for convenience. Although some of it may seem a bit too technical, it is, nonetheless, important to understand the various steps required by the NRC in the decommissioning of a nuclear power system like Pilgrim. There is also a great deal of other related information on this site that may be of interest to some.

DECON is considered the immediate dismantling of the facility shortly after it closes. The reactor, reactor building and other support building on the site, as well as their equipment are removed or decontaminated to a level that meets NRC standards and permits the release of the property for other use and termination of the NRC license. Although this option has been used, it is not the most common option chosen by licensees.

SAFSTOR is considered deferred dismantling. Under this option 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 according to NRC standards after which the property is permitted to be released for other use.

ENTOMB, is the option whereby radioactive contaminants are permanently encased on site in structurally sound material such as concrete. The facility is maintained and monitored until the radioactivity decays to a level permitting restricted release of the property. To date, no NRC-licensed facilities have requested this option.

Entergy, the licensee of the PNPS, has stated that it will likely chose the SAFSTOR decommissioning option.

## **Regulations**

The requirements for decommissioning a nuclear power plant are set out in several NRC regulations. 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. The NRC is currently in the process of revising some of those regulatory requirements.

## **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 ultimate 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 their regulations. 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 they 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 of 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.

Note: As of 3/31/2017 Entergy has stated that the balance of the Pilgrim Decommissioning Trust balance was about \$1 Billion. The adequacy of the amount in this fund will be better known after the filing of the Post Shutdown Decommissioning Activities Report (PSDAR), by Entergy for the PNPS, to the NRC. Although the NRC allows up to two years for this Report to be submitted after the shutdown of the reactor, Entergy has indicated that it will submit their PSDAR just prior to, or shortly thereafter, their shut down of the Pilgrim reactor.

## **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).

## **Improving the Decommissioning Program**

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.

As more facilities complete decommissioning, the NRC is implementing "lessons learned" in order to improve the program and focus on the prevention of future legacy sites that are difficult to clean up. New regulations published in 2010 require plant operators to be more vigilant in preventing contamination during operations, and to clean up and monitor any contamination that does occur.

## **Phases of Decommissioning**

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

### **1) Initial Activities**

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.

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 can 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 (LTP) 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.

Note: If a state has more stringent radiation standards than the NRC standards, those standards must be used. As of 1/2018, Massachusetts has no such standards that may apply to the PNPS.

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 LTP 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.

Note: Entergy's own web site is an informative source of information on the Pilgrim site: <http://www.pilgrimpower.com/#> . In addition, the NRC's web site is an informative source of information on the nuclear power industry and the NRC's regulatory oversight and jurisdiction over it in general, as well as the decommissioning of nuclear facilities, in specific: <https://www.nrc.gov/waste/decommissioning.html>

(The above was written independent of any of the following affiliations.)

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