

WRITTEN STATEMENT
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UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
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Chairman Boxer, Ranking Member Vitter, and Members of the Committee, I appreciate the opportunity to appear before you today on behalf of the U.S. Nuclear Regulatory Commission (NRC).

In my testimony today, I would like to highlight how the NRC accomplishes its safety and security mission by ensuring the safe decommissioning of nuclear power plants, including the management of spent nuclear fuel generated by the plants. I will discuss the regulatory process for nuclear power plant decommissioning, including our role and the engagement of stakeholders, such as individual citizens, state and local government officials, Tribal governments, industry, and non-government organizations.

What is Decommissioning?

Decommissioning is the process of safely removing from service a nuclear power plant or other facility where nuclear materials are handled. This process primarily involves decontaminating the facility to reduce residual radioactivity to levels that the NRC has determined to be protective of public health and safety for releasing the property for unrestricted or, under certain conditions, restricted use. This often includes dismantling the facility or dedicating it to other purposes.

Evolution of the Decommissioning Process

Under the Atomic Energy Act of 1954, as amended, the NRC has sole responsibility for regulating radiological health and safety at commercial nuclear power plants. The NRC's requirements and regulatory program for nuclear power plant decommissioning have evolved since the agency was established in 1975. In the early years, the NRC focused on ensuring the safe construction and operation of nuclear power plants; therefore, decommissioning was not a priority from a safety or regulatory perspective. As time progressed, several plants permanently shut down. The Commission drew upon lessons learned from our initial experiences in nuclear decommissioning here in the United States and from the experience of other countries around the world to establish a regulatory program, requirements, and oversight capabilities with the specific objective of ensuring safety and security throughout the decommissioning process. Over time, as we heard from members of the public, industry representatives, and others, the NRC also recognized that the ideal time to begin planning for decommissioning is long before nuclear facilities are constructed and operated. This recognition is reflected in our current regulations, which require applicants for new facilities to describe how the design will minimize contamination of the facility and the environment, facilitate decommissioning, and minimize the generation of radioactive waste. NRC's regulations now require operating licensees to conduct operations in a manner that minimizes introduction of residual radioactivity into the site.

An Overview of the Decommissioning Process

The decommissioning process for nuclear power plants begins with the formal, written notifications to the NRC by the licensee that nuclear operations have permanently ceased and that the fuel has been removed from the reactor. These notifications are publicly available, so any individual can remain informed as decommissioning proceeds.

Within two years of permanent shutdown, NRC requires licensees to submit a report called the Post Shutdown Decommissioning Activities Report, or PSDAR for short. The PSDAR is a publicly available document. No major decommissioning activities described in the PSDAR can begin until 90 days after the agency receives this report and confirms that the licensee has provided the following three elements:

1. A description and schedule for the planned decommissioning;
2. An estimate of the expected costs of decommissioning; and
3. An evaluation of the potential environmental impacts of decommissioning.

The NRC reviews the report and may request that the licensee provide supplemental information to ensure that the report meets our requirements. During our review, the NRC holds a public meeting in the vicinity of the shutdown nuclear power plant to receive public comments on this report.

There are three primary approaches that licensees can use to accomplish decommissioning in accordance with NRC regulations: immediate dismantlement, or DECON; deferred dismantlement, or SAFSTOR; and entombment, or ENTOMB. DECON consists of prompt dismantlement and removal of radioactively contaminated equipment, structures, and buildings. The low-level waste removed is sent to a facility licensed to receive this type of material for disposal. The objective of the dismantlement and disposal activities is to safely remove radioactive contamination to achieve levels of radioactivity that NRC has determined are suitable for releasing the site, or portions of the site, from regulatory control. After a sufficient cooling period, the spent nuclear fuel in the spent fuel pools is transferred safely to NRC-certified dry storage casks and placed in an onsite Independent Spent Fuel Storage Installation. Decommissioning under the DECON option is typically accomplished in seven to 10 years, although NRC regulations allow up to 60 years for decommissioning to be completed.

Under SAFSTOR, licensees may promptly remove some radioactively contaminated equipment and structures. However, most of the radioactively contaminated material is placed

in a safe, stable condition until it is subsequently decontaminated to levels that no longer require regulatory control. During SAFSTOR, the spent nuclear fuel in the spent fuel pools either remains safely and securely stored in the pools or is transferred to NRC-certified storage dry casks at an onsite Independent Spent Fuel Storage Installation. This decommissioning approach must be completed within 60 years of permanent shutdown and allows substantial time for radioactive decay to reduce residual contamination levels. NRC estimates that after 50 years, the radiation dose rates in the plants have generally decreased to about one percent of the original levels at shutdown. The volume of radioactive waste that requires removal and disposal at a licensed disposal facility after 50 years is projected to be about 10 percent of the volume that exists at shutdown. Consequently, the eventual dismantling and decontamination of the remaining radioactive materials can be accomplished with significantly reduced doses to workers and lower volumes of low-level waste requiring disposal.

Licensees make decisions on which of these two approaches to pursue by taking a variety of factors into consideration, including: ensuring plant safety, potential dose to workers, availability of decommissioning funds, access to low-level waste disposal facilities, potential future uses of the site, and stakeholder input. Both DECON and SAFSTOR are equally viable options under NRC regulations.

The ENTOMB approach is permissible under NRC decommissioning regulations but has not yet been pursued by any NRC-licensed nuclear power plant. In this approach, some radioactive equipment and other materials may be removed from the site. The spent fuel would be transferred to onsite dry cask storage or transferred to a licensed facility off site. The rest of the plant would then be encased in a stable and durable structure to provide adequate protection and allow sufficient radioactive decay to reduce residual radioactive materials to achieve a condition in which the site can eventually be released for other uses in accordance with NRC's restricted release regulations. This method has been applied at a few Department of Energy sites that are not regulated by the NRC.

Any time after decommissioning commences, but at least two years before making a request to terminate the license, the licensee must submit a License Termination Plan for the remainder of decommissioning activities. The NRC makes the License Termination Plan publicly available on its website. After an initial acceptance review by the NRC, the NRC begins its regulatory review of the plan and conducts one or more public meetings in the vicinity of the site to receive public comments. A License Termination Plan contains five elements:

1. A description of the characteristics of the site (e.g., distribution of radioactive contamination, environmental properties that affect the risks associated with the contamination);
2. A description of the remaining dismantlement and decontamination activities planned to remove radioactively contaminated equipment, structures, and materials;
3. Plans for remediating the site;
4. Plans for conducting the final radiation survey to demonstrate that contamination levels have been sufficiently reduced to allow release of the site from regulatory controls upon termination of the license; and
5. An updated site-specific estimate of remaining decommissioning costs.

After a detailed regulatory review of the License Termination Plan, the NRC will approve the plan and issue a license amendment to reflect the plan approval, provided that the plan demonstrates that decommissioning will be completed safely and in compliance with NRC regulations. Because the License Termination Plan is approved through a license amendment, there is an opportunity for the public, as well as state, local, and Tribal governments, to request a hearing on the plan. This is in addition to the opportunity to comment on the plan without requesting a hearing.

Throughout the decommissioning process, the NRC continues to oversee the safety, security, and compliance of activities conducted by the licensee. The principal method for oversight is onsite inspections. These inspections are supplemented by observations of site

characterization and, before license termination, a radiological survey to confirm that radiation levels have been suitably reduced. At least one NRC resident inspector remains onsite during the initial phases of the decommissioning process until the complexity and risk associated with site operations are reduced. Eventually, resident inspectors are no longer necessary onsite on a daily basis, and NRC's oversight shifts to specialist inspectors from the regional offices or headquarters. The NRC will continue to adjust the level of oversight to ensure the site remains safe and secure and in response to the licensee's performance as warranted.

Decommissioning Progress

As noted earlier, the NRC has refined its regulatory program and regulations based on experience with nuclear decommissioning in the United States and abroad. Since 1982, the NRC has overseen the successful completion of decommissioning at 11 nuclear power plants. Each of the completed sites was decommissioned in a safe and effective manner that supported termination of the license and release of the sites for other uses, with one exception applicable at most sites: the portions of the site devoted to the onsite storage of spent nuclear fuel. These fuel storage facilities remain safe, secure, and under NRC oversight.

Currently there are 17 reactors in some stage of decommissioning.

Questions that often arise early in the decommissioning process are:

- When will the site be available for other uses?
- What will the site look like when decommissioning has been completed?
- Will it be a "green field" or will it look more like a power plant site?

The answers to these questions depend on the decommissioning approach selected by the licensee and the extent of decommissioning, the licensee's intention for future use of the site, and any specific requirements from or agreements with state and local entities.

For example, at the Rancho Seco site near Sacramento, the plant shutdown in 1989 and selected the DECON approach. The licensee dismantled and removed radioactive components

and decontaminated all of the structures in 2009, but chose to leave the reactor containment and auxiliary building intact. The Independent Spent Fuel Storage Installation and a low-level waste storage facility also remain onsite. Two fossil-fueled power plants were built at the site and use the former nuclear power plant's transmission lines, and vineyards have been planted on nearby land. Contrast that approach to the one used in decommissioning Maine Yankee in Wiscasset, Maine, which shutdown in 1996, selected DECON, and achieved "green field" status by the time decommissioning was completed in 2005. All structures were removed with the exception of the spent fuel storage installation, and the site was restored to its original condition with respect to residual radioactive contamination.

A third example is Big Rock Point near Charlevoix, Michigan, which shutdown in 1997, selected DECON, and completed decommissioning and license termination in 2007. Similar to Maine Yankee, and again with the exception of the spent fuel, the site was restored to its pre-existing condition, with the complete dismantlement and removal of contaminated and uncontaminated structures and buildings.

A final example is the Humboldt Bay nuclear power plant in Eureka, California, which shut down in 1976, selected the SAFSTOR approach, and is still being dismantled close to 40 years later. In 2013, the NRC received the License Termination Plan from the licensee and conducted a public meeting near the site to hear comments and answer questions from the public about the licensee's proposed plan. The NRC staff is conducting a detailed technical review of the plan, which should be completed by the end of 2014.

Of note, within the last year, several plants have shut down in advance of their license expiration dates, including Kewaunee in Carlton, Wisconsin; Crystal River Unit 3 in Crystal River, Florida; and San Onofre Nuclear Generating Station Units 2 and 3 in San Clemente, California. The operators of the Vermont Yankee Nuclear Power Station have also announced that they intend to permanently shut down the plant at the end of 2014. Consequently, the NRC staff is reviewing a variety of amendment and exemption requests associated with these

facilities to continue to ensure safety and security during their transition from operating to decommissioning status.

Closing

While the NRC believes its regulatory program adequately protects public health and safety, we continually assess the lessons learned from our decommissioning processes to identify appropriate program improvements

I thank you for the opportunity to appear before you today and I would be pleased to respond to any questions.