

Relicensing and the Safety of Nuclear Energy Plants

The ongoing activities at Japan's Fukushima nuclear energy plant have coincided with the U.S. Nuclear Regulatory Commission's review of applications to extend the licenses of American nuclear energy plants. Some people have asked whether issues related to Fukushima – notably the potential effects of earthquakes and tsunamis – should be considered as part of the NRC's relicensing reviews.

Electric utilities and the NRC address safety issues at nuclear power plants on an ongoing basis. Companies that operate reactors inspect their plants continually to identify and correct potential safety issues. As an independent regulator of the industry, the NRC has the authority to order improvements, including up to ordering the shutdown of a reactor until safety improvements are made.

The relicensing process focuses primarily on issues related to the age of the plants and large components at the facility that may not be replaced as part of regular maintenance.

License Renewal

The 40-year term of a nuclear power plant license has nothing to do with aging plant components or a belief that safety needs to be reviewed on a 40-year cycle. Instead, the period was chosen to parallel the financing amortization period for a plant. Exceeding federal safety standards is an ongoing activity for companies that operate nuclear power plants.

The NRC says that the license renewal process rests on two overriding principles:

1. The regulatory process ensures that the licensing basis of all operating plants provides and maintains high levels of safety. All of the NRC's strict safety requirements must be met at all times, not just the period for license renewal.
2. Each plant's licensing basis is required to be maintained during the renewal term in the same manner and to the same extent as during the original licensing term. In short, all of the NRC's safety requirements will continue to be met.

For a license to be renewed, a plant owner must identify all safety-related plant systems, structures and components and any additional elements that support them; and demonstrate compliance with the NRC's regulations, including those for fire protection, environmental qualification, pressurized thermal shock (which affects the integrity of pressure vessels), the ability to maintain a safe condition of the plant even in a complete loss of electric power.

However, the primary consideration during the relicensing process remains age-related issues. For example, if a structure or component requires additional consideration due to age, the plant owner must install new monitoring equipment or schedule more frequent inspections.

Earthquakes and Tsunamis

Nuclear power plants are designed to withstand all potential natural forces, including earthquakes and tsunamis. Earthquakes can occur in every U.S. state, though at various levels of intensity. Tsunamis are very rare. Nonetheless, the nuclear energy industry prepares for the unexpected.

The NRC requires all of its licensees to take the most significant seismic activity recorded or expected into account when designing and operating nuclear power plants. All plants, including those in areas with low seismic activity, are designed to withstand the maximum ground motion expected for their particular locations. For example, nuclear power plants in California are designed and built to withstand a ground force higher than what occurred near Japan's nuclear power plants as a result of the 9.0 earthquake in Japan on March 11.

More generally, the NRC requires that safety-significant structures, systems and components take into account:

- The most severe natural phenomena historically reported for the site and surrounding area;
- Combinations of the potential effects a phenomenon can have on facilities; and
- The importance of the safety functions to limit those effects or to contain any damage that occurs.

Large tsunamis, like the one in Japan, are associated with subduction faults. The only subduction fault in the United States is located near the Northwest, where nuclear power plants are not near the ocean.

The NRC does not wait for relicensing to examine issues and, if appropriate, take necessary action to ensure adequate levels of safety. When new seismic hazard information becomes available, the NRC evaluates the new data and determines if changes are needed at plants. For example, in the 1990s, industry and the NRC evaluated the plants' abilities to withstand ground motions even larger than assumed in the plants' designs. Industry and the NRC are currently reviewing the effects of the latest seismic hazards estimates for the Central and Eastern United States, as described in the [Generic Issue 199 Safety/Risk Assessment Report](#).

Continuing Safety

The U.S. nuclear energy industry launched a self-assessment within a week of the Fukushima Daiichi accident to ensure that U.S. reactors could respond to events that may challenge safe operation of the facilities.

These actions include verifying each plant's capability to manage such major challenges as aircraft impacts and losses of large areas of the plant due to natural events, fires or explosions; to manage a total loss of off-site power; and to mitigate flooding and the impact of floods on systems inside and outside the plant. Each plant is also inspecting important equipment needed to respond successfully to extreme events like fires and floods.

The NRC also started a [review](#) of U.S. nuclear power plant safety. The agency established a task force to conduct short- and long-term analyses of lessons that can be learned from the Japanese experience, the results of which will be made public. Permanent NRC inspectors at U.S. nuclear power plants will support the inspections that will be part of the task force recommendations, supplemented by experts from the agency's regional and headquarters offices.

Whatever the issue, the NRC has guidelines and regulations to cover it. The agency's framework for reactor oversight covers reactor safety, radiation safety, and safeguards. Within each of those areas are cornerstones that reflect the essential safety aspects of facility operation: initiating events, mitigating systems, barrier integrity, emergency preparedness, public radiation safety, occupational radiation safety, and physical protection. Satisfactory licensee performance in the cornerstones ensures safe facility operation.