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License Renewal in the United States: Policy and Experience

Good morning. It is a pleasure to be here to discuss our experience in the United States with nuclear plant license renewal. We have had a very positive experience, and I hope I can pass on some information of use to others as they consider the issue.

One of my favorite poems is the 19th century account of the long life of a very sturdy horse-drawn carriage. The title is “The Wonderful One-Hoss Shay.” It was “built in such a logical way,” the poem begins, “that it ran 100 years to the day.”

The builder used the very best of materials for every component, so that each part was exactly as strong as every other part. No part would break or wear out before any other part, and that was the secret of the Shay’s long life.

The issue of license renewal – as we call it in the United States – never fails to remind me of that poem. Our plants are initially licensed for 40 years. In order to keep their licenses, they have to be in essentially the same operating condition on the last day of their licenses as on the first.

Unlike the carriage in the poem, this is not because all the parts are perfect. In the case of U.S. nuclear power plants, it is because of very thorough maintenance work.

The original 40-year license period was chosen arbitrarily by the U.S. Congress in the law that established the regulatory basis for the commercial nuclear power industry in the United States. Since the license period was based on financial, rather than material considerations, the law also made provision for license renewal.

In the late 1980s, a few years before the first U.S. plants reached the halfway point, the industry started talking seriously with the Nuclear Regulatory Commission, or NRC, about license renewal. The NRC already had rules in place, but they would have required re-examination of nearly every plant system and operating procedure, as if the operator were applying for a new license. Because the plants are always kept in full compliance with their existing license and current regulations, the approach did not seem focused or logical. No applications were submitted under those rules.

The relationship between the industry and the NRC is maturing to a more collegial and cooperative one. The industry through the Institute of Nuclear Power Operations has set high standards for operating excellence. The Nuclear Energy Institute, or NEI, works on behalf of the industry with the NRC on generic solutions to regulatory issues.

Our regulators have increasing confidence in the ability of the industry to operate safely without the highly prescriptive oversight it had previously exercised. The industry has rewarded that confidence with consistently increasing levels of safety and efficiency. The relationship continues to evolve and improve. The industry and the NRC have a common paramount objective in safety of operations.

A major breakthrough in the NRC's less prescriptive approach to regulation was the adoption of a regulatory program commonly known as the maintenance rule. Quite simply, it assures the NRC that plant systems, structures and components important to safety will be maintained thoughtfully and well.

Confidently assured of proper maintenance, the NRC was free to consider revised regulations for re-licensing that focused on managing the aging process. In 1995, the NRC issued a more efficient, tightly focused rule that made license renewal a much more viable option for the industry.

The license review requirements are based on two key principles. First, plants must maintain the same levels of safety during their renewed licenses as they did under the original licenses. Second, they must maintain their licensing basis. The licensing basis is the given set of requirements and commitments under which the plant must operate in order to maintain its license. The basis evolves and changes over the operating lives of plants, as technology advances and operating experience provides new information. But a plant that seeks license renewal must operate in the same way and to the same standards under its

renewed license as it did for the existing license. License renewal cannot, and does not, permit any degradation of safety.

Following the very first applications, the industry began subjecting pending applications to a peer review process. This ensures that applications submitted have incorporated all lessons learned about the process to date. It is consistent with the industry's effort to provide high quality applications and make the NRC's job of regulatory review as easy as possible.

Once an application is submitted, it proceeds along two parallel tracks – a safety review and an environmental review.

The safety review validates operations consistent with the licensing basis and any programmatic aspects of the application through on-site inspection. The technical content of the application is also reviewed for completeness and accuracy. A safety evaluation report is produced. It focuses on long-lived, passive structures and components, such as the reactor vessel itself, the reactor coolant system, steam generators, pressurizer, pump casings and concrete. The NRC considers that the active systems such as motors, cooling fans, batteries, relays, switches, and so on will be covered by surveillance and maintenance, as dictated by the maintenance rule.

Opportunities exist for formal public participation either through the review process conducted by the Advisory Committee on Reactor Safeguards or by petition for a formal hearing.

The environmental review is conducted concurrently. This portion of the review process has been greatly streamlined by the NRC's issuance of a Generic Environmental Impact Statement. The applicant is only required to draft and obtain review of a supplement to the generic statement that is site specific. This is of major importance in maintaining a sharp focus. It excludes any issues that are not site specific from contention.

The public hearings included in the process were very difficult in the initial licensing of the plants. Nuclear opponents used them as public forums and were able to delay licensing with many groundless or speculative challenges. Frequently, the same or similar challenges were made at hearings for each site. In the case of license renewal the hearing process is much more straightforward. The NRC has acted consistently to forestall the digressions and irrelevancies that have been the tactics of opponents on every front since the beginnings of the commercial nuclear industry. The NRC has limited admissible contentions to relevant technical or licensing concerns associated with the specific license under consideration. There have been no challenges admitted on applications approved to date.

After these two parallel review paths have been completed the NRC is able to make its decision on the application.

Despite the streamlining, the license renewal process is still complicated, and exacting. Since 1995, the industry has worked continuously with the NRC to refine it, and to help guide license applicants along. The industry and the NRC have developed three key documents to aid applicants.

Two, the Standard Review Plan and the Generic Aging Lessons Learned report are NRC documents. The Standard Review Plan literally gives the applicants the NRC's plan of work in reviewing an application. The Generic Aging Lessons Learned report details the NRC's experience with plant systems and programs that warrant particular attention during the license review. Each was developed with extensive industry input.

The third document is an NEI guide (NEI 95-10) that walks an applicant through the process, advising on how to develop an application, when and how to submit it, and how to work with the NRC in advancing it. Similar to the industry involvement in the two documents prepared by the NRC, the NRC had extensive influence on the NEI guide.

All three of these documents are being kept current as the process continues. Focused applications that address the issues of concern make this process much easier for both the applicants and the regulators.

NEI has a standing License Renewal Working Group that meets regularly with the NRC to raise policy and technical issues as they emerge and work toward solutions. And since plants vary widely in design, construction and operating parameters, the operators of plants designed and built by each major nuclear manufacturer – Westinghouse, GE, Babcock & Wilcox, and so on – maintain an owner's group to advise on issues particular to their design.

This positive working relationship has produced a smooth, steady program that is already yielding results. The first application was filed for the Calvert Cliffs

units in April 1998. The licenses were approved in March 2000 – 23 months after submission. The three-unit Oconee plant applied in July 1998 and received its licenses in 21 months.

Since then, five more reactors have received licenses, in periods between 18 and 21 months. Owners of 16 more plants have applied, and owners of 23 more have notified the NRC of their intention to seek license renewal by 2005. That is nearly half of existing nuclear plants in the U.S. More are expected to follow.

For all of the cooperation and progress the industry and the NRC have made, though, some problems remain. The NRC has raised several issues – most notably in the area of station blackouts and concrete aging – that the industry believes expand the scope of license renewal consideration unnecessarily. NEI on behalf of the industry has indicated that it disagrees with the NRC position. It is indicative of the positive relationship we have with the NRC, however, that we acknowledge NRC's position on the issues, and will follow the regulatory guidance while we try to get the agency to change its mind.

Another concern is the speed with which NRC can address applications. Retirements are thinning the ranks of NRC personnel qualified to conduct license renewal inspections and reviews, and they are having a hard time finding replacements. Lack of manpower could stretch out review times, and increase the cost of the renewal process to some degree.

Existing nuclear plants are much more valuable as assets than they were a dozen years ago years ago because their performance is so much better. In 1990,

the average capacity factor for U.S. nuclear plants was about 70 percent. By the end of 2001, it was more than 90 percent. This increased capacity translates into about 24,000 megawatts of additional electric power, or the virtual equivalent of building 24 new plants. In addition, we have uprates approved by NRC or in planning that account for nearly 4,000 additional megawatts. Nuclear energy is a vital component of the U.S. electricity supply.

Clearly, extending the life of these plants will have an important impact on the sufficiency, security and reliability of the U.S. power supply. Operating safety also benefits. License renewal makes it easier for plant owners to continue investments in modernized equipment that enhance safety and efficiency.

Extending the license of a fully amortized plant is an easy decision when the license renewal process costs \$10 to \$15 million. As this graphic shows, using very conservative estimates of two cents per kilowatt-hour to produce power – our current costs are less than that – and a market price of 3.5 cents per kilowatt-hour, license renewal has a substantial economic benefit. .

And the environmental benefit is another argument for license renewal. Operation of our nuclear fleet for another 20 years will result in the complete avoidance of significant amounts of NO_x, SO_x, particulates and other combustion by-products including over 2 billion metric tons of carbon equivalent. This is about twice the total carbon equivalent emitted in all of Western Europe during the year 2000. This complete avoidance of harmful emissions by extending the lives of our nuclear plants is a valuable benefit for all of us, all around the world.

In closing, let me observe that like the Wonderful One-Hoss Shay of legend, the U.S. nuclear industry is well constructed, well maintained and suited to providing reliable service. Our existing plants may not have the century-long life of that remarkable horse-drawn vehicle, but I can state with confidence that most – if not all – of the plants will see 60 years of service.

And after that? Well, we are already starting to plan the next generation – but that's a story for another day. Thank you.