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Mr. Chairman:

I appreciate the opportunity to appear before this Subcommittee to discuss the proposed Nuclear Siting and Licensing Act of 1978. In response to a request from the House Interior Committee, the Congressional Budget Office has prepared an analysis of the delays in light water reactor licensing and construction times, and, using that analysis, has evaluated this proposed legislation. In my testimony I will address three questions:

- How much has the time needed to license and construct a light water reactor increased over the last decade and what are the costs associated with these delays?
- What are the primary reasons for the increased time period?
- How much would the Nuclear Siting and Licensing Act reduce these delays?

Longer Leadtimes, Greater Costs

Over the last decade, it has taken progressively longer to license and construct reactors. The anticipated average time for a construction permit review is now 30 months, contrasted with a review period of only one year in the mid-1960s and slightly over two years in 1975 and 1976.

Construction times have also become longer during the last several years. For example, the construction of a commercial size (900-1,100

megawatts electric) reactor that took six years in the mid-1970s is now anticipated to take seven to eight. In all, the total leadtime necessary to license and construct a reactor has gone from 6-7 to 10-11 years in the past decade.

This increasing gestation time for reactors presents two major problems. First, delays represent an added cost that the consumer must inevitably bear. Our estimates of the added cost of a month's delay in acquiring a construction permit is $9 million for an average size reactor. A month's delay during construction can cost close to $11 million, although the after-tax costs of these delays may vary somewhat because of different tax treatment. These estimates include the incremental costs of the energy used instead of nuclear, the interest costs of capital incurred while the plant was delayed, and the additional inflationary costs of the subsequent construction. The second major problem is that, if licensing is unduly long because of bureaucratic inefficiency or a poorly conceived licensing process, then nuclear power may suffer from an unwarranted disadvantage when compared to alternative energy sources.

Delays in the Licensing Process

Reactors proceed along what is described by the Nuclear Regulatory Commission (NRC) as the "critical path," a series of actions that culminate

in commercial operation. A utility first hires a firm to design a reactor and then applies to the NRC for a construction permit for the design. The permit may be delayed because of the lengthy resolution of issues in the environmental, safety, or anti trust reviews, either because the NRC staff demands it, or because the utility is slow to provide relevant data or reach an accomodation with the staff. After permit issuance, construction is started, but may be held up by financing problems, revised estimates of need for power, or more rarely, NRC mandated changes in design. The plant's conformity to design is certified by the granting of an operating license, which is usually timed to coincide with the end of construction, unless unanticipated problems are discovered concerning the plant's operation. Delays can take place along this critical path because of either licensing problems or factors outside the regulatory process, such as a reduction in the projected demand for power or construction mismanagement.

In order to specify the causes of delays that have been recently experienced in the licensing process, CBO has utilized information provided by the Nuclear Regulatory Commission in public documents and from utility executives in informal interviews. While these sources represent the best data available they are, nevertheless, of limited usefulness when the origins of delays are interrelated. For example, it is sometimes contended that reactors are overdesigned in an attempt to preempt challenges by NRC staff

or public participants. If an overdesigned component should subsequently pose technical problems, CBO's analysis would, on the basis of available information, attribute the resulting delay to mismanagement by the utility when, in fact, its origins might more properly be attributed to the potential actions of public participants or NRC staff. Given this restriction, our findings can be summarized as follows:

First, the longest delays occur because of economic factors that directly affect the decisions of individual utilities, such as unanticipated declines in the demand for power or difficulty in financing a project. These financial delays appear to be more related to problems of electric utilities in general, especially the "capital shortage" of several years ago, than to uncertainties created by the regulatory process. Declines in the expected demand for electricity are primarily caused by the current adjustment in the economy because of higher energy prices. Most of these delays occur after the issuance of construction permits, and are largely related to events outside the jurisdiction of the Nuclear Regulatory Commission.

The second most important source of delay is the resolution of the substantive-technical radiological, safety, and environmental issues of regulation during the construction review procedures. The median value of delays caused by these issues is about six months, but can range from zero to two years. Most of these fall into one of two categories: either "site

specific" issues that deal with the unique features of the particular site under review, such as seismic considerations, nearby population density, or meteorlogical phenomena; or "new issues" that are only currently coming to the fore, such as the reliability of newly designed core cooling systems or designs for new components. Most of these issues are within the jurisdiction of the NRC.

The third most important source of delay, which generally averages about six months, is public participation in the NRC licensing process. While some public participants have been characterized as "obstructionist," many interventions have been instrumental in publicizing important safety and environmental issues. Moreover, existing rules and regulations give hearing officers of the NRC's Atomic Safety and Licensing Board great leeway in limiting interventions that are without merit. It should also be noted that many interventions are resolved before hearings are held, which may cause the effects of public participation to be understated both in terms of delay costs and safety benefits.

The final, and least important, category of delays encompasses state/federal redundancy in license review, management problems in construction, and labor disputes. Although together these typically account for only a few months, any one could potentially cause extreme delays in individual cases.

The conclusion of this analysis of delays is that legislation redirecting the NRC's licensing effort will have a moderate effect in expediting reactor licensing and construction. Many types of delay, such as financing difficulties, reconsideration of demand for electric power, management problems during construction, delivery of poor quality materials and components, etc., will be relatively insensitive to reforms of the regulatory process. On the other hand, delays attributable to substantive regulatory issues, bureaucratic redundancy, or public participation can be addressed through legislation. These delays, conservatively estimated, account for approximately 30-40 percent of all delays experienced. Thus, although two-thirds of the historical delays most likely cannot be ameliorated by the proposed legislation, the remaining one-third, which represents up to 15 month delays per reactor, can be addressed by legislation to modify the present nuclear regulatory process. If these maximum 15-month delays could be eliminated, the potential savings would be $140 million per reactor, which is approximately 12 percent of the total cost of a new commercial-size nuclear power plant.

The Proposed Legislation

I would now like to turn to the major provisions in the proposed legislation that are directed toward reducing these delays. There are six

major areas of licensing reforms included in the bill:

- o standardization of reactor design;
- o early site review;
- o elimination of mandatory hearings by the Advisory Committee on Reactor Safeguards of the NRC;
- o coordination of state and federal reviews;
- o changes in operating license procedures; and
- o changes in rules affecting hearings and interventions.

The two most potentially viable avenues of licensing reform are standardization of design and early site review. These reforms address those delays resulting from the substantive issues of regulation by the NRC staff. Our analysis indicates that a strict program of standardization, if adhered to, could shorten safety review by a year to 18 months. These savings, like any others, would, however, be translated into an equivalent shortening of the total time period only if other components of the licensing review process were shortened correspondingly.

It is difficult, however, to standardize the design of an entire plant because some part of the design must accomodate the conditions of the site, such as the ability to withstand seismic activity or the nature of the cooling system used. But individual components can be standardized and generically

approved for use in future plants. This in itself would be helpful, and, if designs achieve sufficient permanence, the added advantage of stockpiling crucial parts could be realized. This would expedite the construction process by several months. The drawback associated with such a proposal is that there is always a body of unresolved generic issues relating to safety, whose resolutions may change the acceptability of designs that are already approved. This adds an element of uncertainty that undermines the efficacy of standardization. Thus, it is our estimate that time savings from standardization would amount to 6 months per reactor over the next several years.

Early site review involves approval of a reactor site that meets certain limitations as to size, radiological effluent, etc., for ten years into the future. This "site banking" does not reduce the time needed to conduct the review, but rather completes the site portion of review early in the review process, when the costs of delay are far lower, and allows the utility and the NRC to concentrate on the actual reactor design. When coupled with standardization, the licensing procedure would then consist of matching a preapproved design to the parameters of a preapproved site. This could be done thoroughly within 12-18 months, thereby reducing delays by up to a year. The benefits of the standardization and early site review will not, however, be realized until the mid to late 1980s, because of the long leadtime for nuclear reactors.

Two potential drawbacks are, however, associated with early site review. First, some parameters of the site may change over the ten-year planning period, particularly the population and land-use patterns in the adjacent areas. Present NRC policy is to use "remote siting" of nuclear plants. Should population densities shift over the planning period, a site's acceptability may be compromised. A second problem is "grandfathering." Grandfathering occurs when a utility spends a large sum of money on site preparation and advance construction before a construction permit is issued, and then argues that economic hardship will occur if its license is denied. Although consideration of sunk costs is not allowed in licensing procedures, it is apparently given informal consideration. Such a practice may undermine the integrity of the licensing process.

Three other proposals in the bill would save shorter amounts of time. Elimination of the mandatory review by the NRC's Advisory Committee on Reactor Safeguards would save two to three months that are now expended for that purpose, and would not compromise safety levels. The bill's provision allowing the NRC to approve and utilize state reviews of environmental safety would expedite licensing somewhat in states with rigorous approval procedures. The alternative to such a system would be federal preemption of states' rights to approve sites for nuclear plants, which is not an attractive proposition.

Finally, two changes are proposed in the granting of an operating license, the document that certifies that the reactor has been completed as designed and is safe to begin operation. First, the bill proposes that operating licenses be granted along with construction permits. Since construction permits are now granted with only 30-35 percent of the final design completed, far more engineering work would have to be done in advance of the construction permit application. Traditionally, utilities have been hesitant to provide this much information to the NRC at such an early date, for fear that the NRC will use the extra time to require additional changes in design. The time needed to design the 60-65 percent of the reactor that would be necessary to award an operating license at an earlier date may be greater than the time saved by avoiding a separate operating license review at the end of construction. Secondly, the bill proposes that "interim" operating licenses be granted. CBO sees the savings resulting from such a practice as minor, and it is our conclusion that the NRC rarely obstructs at this point in the construction process. Moreover, issuing operating permits before the final condition of the reactor is checked may compromise the public's safety.

A final and controversial area of licensing reform is the role of the public. The bill takes the following steps with regard to this matter:

- Interventions are limited to issues on which there has been "no prior opportunity" for resolution.

- o Hearings can be of an adjudicatory form (which includes the rights to discovery and cross examination) if a factual difference is discovered between parties. Otherwise, they will take the form of legislative hearings, whereby only the hearing examiner has the right to question technical issues.

- o The bill encourages the NRC to give priority to applications that allowed the public to participate in reactor design planning.

- o The bill provdies limited funding to intervenors at the discretion of the hearing officer.

The first two of these proposals, the use of the "no prior opportunity" rule and the use of adjudicatory hearings only when a "factual difference" is uncovered, would expedite hearings to some extent, although these savings could fail to materialize if the way in which these rules are applied is challenged and overturned in courts. Public participation in reactor design planning, which would resolve contested issues at an early stage, is a worthwhile innovation, and consideration should be given to making it mandatory with results binding. Such a program would eliminate time-consuming interventions at subsequent stages of the licensing process. Finally, while some anticipate that the availability of funding for intervenors will open the door to frivolous challenges of reactor designs and licensing decisions, the provision for funding gives the hearing officer a quid pro quo to exchange for the cooperation and improved specificity and competence of intervenors in the licensing process.

It should be noted that there are reforms contained in the Nuclear Siting and Licensing Act that would be enacted by the NRC under existing statutes. This is particularly true for standardization, which is now

underway and would not be charged by this legislation. Similarly, the NRC can presently issue limited work authorizations, a procedure also included in the bill. It is also empowered under current authority to great early site approval, yet can only do so if the site review is coupled with a docketed construction permit application to a reactor design. Thus, the NSLA is to some extent redundant with current legislation regarding the two most important aspects of the bill. CBO estimates, therefore, that 50% of the savings that may be realized under NSLA procedures could be achieved under existing authority.

A final point may be important. Proponents of nuclear power claim that many of the delays reactors now experience are more the product of bureaucratic intervention than of scientific application of reactor standards. While CBO cannot definitively evaluate each NRC standard and regulation as to technical merit, we see the entirety of nuclear reactor regulation as conforming to a risk averse strategy that can be termed "as safe as practicable." It is difficult to determine the maturity and acceptability of light water reactor technology, and CBO does not purport to have reached a judgement on this issue, which ultimately must be decided by Congress. Yet in order to yield the time savings we have estimated, the proposed Nuclear Siting and Licensing Act would modify the existing standard and move towards a view that sees light water reactor technology as more stable and acceptable than previously perceived, when compared to alternatives.

In summary, we have found that delays in licensing and construction of light water reactors have increased the total leadtime from 7 to 11 years over the last decade. Although from 6 to 12 months of this increase is attributable to changing environmental regulations and the increasing size of reactors, the remaining 36-42 months is caused by various types of delays. Two-thirds of the 36-42 months are outside the jursidiction of the regulatory process. The remaining third, which can primarily be attributed to substantive regulatory issues, bureaucratic redundancy, or public participation, does, however, represent a meaningful target for regulatory reform. The proposed Nuclear Siting and Lcensing Act addresses these issues and could expedite by about a year to 15 months the planning and construction of reactors in the mid- to late-1980s, when its provisions should be fully operational.

Mr. Chairman, I would be happy to answer any questions.