

POLICY ISSUE NOTATION VOTE

October 7, 2002

SECY-02-0180

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations

SUBJECT: LEGAL AND FINANCIAL POLICY ISSUES ASSOCIATED WITH LICENSING NEW
NUCLEAR POWER PLANTS

PURPOSE:

To obtain Commission approval of staff positions on issues related to modular plant licensing, merchant plant licensing and high-temperature gas-cooled reactor (HTGR) licensing.

BACKGROUND:

By letter dated December 5, 2000, Exelon Generation Company (Exelon) expressed an interest in pre-application activities for the pebble bed modular reactor (PBMR). The staff began its pre-application review at a meeting with Exelon on April 30, 2001. During the meeting, Exelon discussed legal and financial issues, among others, that Exelon believed merited special consideration due to the unique features of the modular facility, the gas-cooled reactor design, and Exelon's intention to operate the PBMR as a merchant plant.

By letter dated May 10, 2001 (ADAMS Accession No. ML011420393), Exelon submitted white papers on these legal and financial issues and requested a response from the Nuclear Regulatory Commission (NRC). The Exelon white papers addressed requirements associated with:

- ! fuel cycle impacts: Tables S-3 and S-4 in 10 CFR 51.51 and 51.52
- ! financial qualifications
- ! decommissioning funding
- ! operator staffing requirements
- ! fuel cycle impacts: Waste Confidence Rule (10 CFR 51.23)
- ! minimum decommissioning costs

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- ! antitrust review
- ! modular reactor licensing
- ! annual fees
- ! financial protection

In addition to the issues discussed in the white papers, the staff identified the following related issue:

- ! testing of new design features for a COL

SECY-01-0207, "Legal and Financial Issues Related to Exelon's Pebble Bed Modular Reactor (PBMR)," dated November 20, 2001 (ADAMS Accession No. ML012850139), presented preliminary staff positions related to the staff's assessment of Exelon's proposals on legal and financial issues and additional staff-identified licensing-related issues. In that paper, the staff informed the Commission that it would engage stakeholders on these preliminary staff positions, amend the positions as necessary, and make recommendations on policy issues related to the legal and financial issues for Commission approval. On March 27, 2002, the staff conducted a public workshop to apprise Exelon and other stakeholders of the positions presented in the paper and obtain their feedback. The workshop transcript and a summary of stakeholder comments were provided in a meeting summary dated June 4, 2002 (ADAMS Accession No. ML021500200).

The staff also solicited written comments on the preliminary staff positions in SECY-01-0207. In response, General Atomics submitted comments by letter dated April 10, 2002 (ADAMS Accession No. ML021070343). In its letter, General Atomics also provided a justification of the applicability of the issues discussed in SECY-01-0207 to the gas turbine- modular helium reactor (GT-MHR) design it is currently developing.

On April 16, 2002, Exelon announced that it would not proceed with the PBMR project after the completion of the current feasibility study. After this announcement regarding the PBMR project, the Nuclear Energy Institute (NEI) requested a meeting with the NRC to discuss modular plant and merchant plant licensing issues that NEI believes have generic applicability. On May 22, 2002, the staff held a public meeting with NEI, Exelon, and other interested stakeholders to discuss NEI's proposed integrated approach to modular plant licensing, including the assessment of annual fees. By letter dated June 17, 2002 (ADAMS Accession No. ML021970596), NEI submitted a white paper providing the details of this proposed approach. In the June 17, 2002, letter, NEI also provided comments on the preliminary staff positions discussed in SECY-01-0207 related to decommissioning funding assurance, timing of the approval of new and spent fuel storage casks, testing requirements for COL applicants, and NRC antitrust review requirements.

Following receipt of stakeholder comments at the workshop and through written correspondence, the staff reviewed the positions presented in SECY-01-0207 and prepared final recommendations as discussed below in the summary.

Finally, it should be noted that technical policy issues related to licensing non-light water designs are not included in this paper. They will be addressed in a separate paper to the

Commission as discussed in SECY-02-0139, "Plan for Resolving Policy Issues Related to Licensing Non-Light Water Reactor [non-LWR] Designs."

DISCUSSION:

Based on the staff's review of stakeholder comments on the preliminary staff positions discussed in SECY-01-0207 and the staff's assessment of NEI's proposals, the staff has developed final positions on modular plant, merchant plant, and HTGR licensing issues (the issues are discussed in detail in the attachment). The staff is providing Commission recommendations for issues 1 through 3. For remaining issues, the staff is providing information to the Commission regarding the status or resolution of the issue.

1. Fuel cycle and transportation impacts: Tables S-3 and S-4 in 10 CFR 51.51 and 51.52

Should the NRC initiate rulemaking specifying the environmental impacts of the production, transportation, and storage of reactor fuel and radioactive waste for HTGRs on a generic basis?

The staff recommends that the environmental effects of the production, transportation, and storage of reactor fuel and radioactive waste be reviewed on an application-by-application basis for other-than-LWR applicants.

2. Financial qualifications in 10 CFR 50.33(f)

Are there regulatory and policy bases for establishing by rulemaking a class of non-utility licensees who need not submit the financial qualifications information otherwise required by 10 CFR 50.33(f)?

The Commission has the authority to determine by regulation that a given class of non-electric-utility applicants for nuclear power plant licenses shall not be required to submit financial qualifications information. However, the staff has not identified a reasonable basis for establishing such a class of applicants. The staff recommends that non-electric-utility applicants continue to be required to submit financial qualifications information in accordance with 10 CFR 50.33(f).

3. Decommissioning funding requirements in 10 CFR 50.75

Can a non-utility utilize an alternative method for decommissioning funding, such as partial prepayment?

According to current NRC regulations, an applicant has several options for funding decommissioning. Non-electric-utility applicants are not allowed to use the sinking fund option exclusively (uniform series of payments). The staff recommends that the NRC require non-electric-utility applicants to use the other options provided in 10 CFR 50.75 to fund decommissioning costs. The staff does not recommend that the regulations be modified to allow additional alternatives for decommissioning funding.

4. Operator staffing in 10 CFR 50.54(m)

Should a modular facility be allowed to control more than two reactors from one control room and operate with a control room staffing complement that is less than would be required for individual reactors?

Current regulations do not address the possibility of more than two reactors being controlled from one control room. Applicants will need to address the safety implications to demonstrate that more than two reactors can be adequately controlled from one control room. Regarding operator staffing requirements, applicants could request an exemption to current requirements to allow an alternate level of operator staffing for modular reactors, provided they address the safety implications.

5. Fuel cycle impacts: the Waste Confidence Rule (10 CFR 51.23)

Would PBMR and GT-MHR spent fuel fall within the scope of the NRC's Waste Confidence Rule?

The staff concluded that PBMR and GT-MHR facilities appear to be within the scope of the generic determination in Section 51.23(a). With respect to the Department of Energy's (DOE's) acceptance of PBMR or GT-MHR spent nuclear fuel (SNF), applicants should discuss DOE's acceptance of non-LWR SNF with DOE, as appropriate.

6. Minimum decommissioning cost estimates in 10 CFR 50.75(c)

Can a non-LWR applicant submit design-specific decommissioning cost estimates?

The staff will accept a minimum decommissioning cost estimate specifically for the PBMR or for the GT-MHR if the applicant can technically justify this estimate.

7. Antitrust review requirements in 10 CFR 50.33a

Can the NRC except applicants for nuclear plants that will be operated as merchant plants from the preclicensing antitrust review?

The authority of the NRC to except certain applicants for new nuclear generating facilities from the NRC's antitrust review requirements is being addressed separately by the Office of the General Counsel.

8. Licensing multiple modular reactors and the duration of a combined license (COL)

Can the NRC conduct a single set of licensing reviews and a single public hearing for multiple, nearly identical COL applications? What is the effective duration of a COL?

The Commission has the authority to conduct a single set of licensing reviews and a single public hearing for multiple COL applications for nuclear power plants of essentially the same design. Under current regulations, the term of operation for each COL would be limited to 40 years from the date of issuance of the COL. However, legislation submitted by the

Commission addressing 40-year terms, if enacted, would permit the 40-year term of operation to begin when the Commission authorizes operation (i.e, makes the initial 10 CFR 52.103(g) finding). This pending legislation would not specify the duration of the construction period of the COL and the design approval.

The NRC did not envision the delayed use of COLs that is possible under pending legislation, which is inconsistent with the Commission's policy on duration of design approvals. The staff will provide the Commission with a recommended course of action on this issue six months after Congress acts with respect to the pending legislation.

9. Annual fee requirements in 10 CFR Part 171

How should annual fees be assessed for a set of modular reactors that constitute a facility?

Based on the provisions of 10 CFR Part 171 that a separate annual fee be assessed for each license, if a separate COL is issued for each module of a modular facility, a separate annual fee would be assessed for each module. The annual fees for the COLs would be determined based on the requirements of Omnibus Budget Reconciliation Act of 1990 (OBRA-90), as amended, that the charges be assessed in a fair and equitable manner and, to the maximum extent practicable, reflect a reasonable relationship to the costs of providing services to the licensees or classes of licensees. Therefore, the staff has concluded that no further change to the fee rule is necessary at this time to address the assessment of annual fees for modular facilities.

10. Financial protection requirements in 10 CFR Part 140

Should Price-Anderson financial protection requirements be applied to each reactor module or to the entire modular "facility"?

The House of Representatives and the Senate passed legislation to amend Section 170b. of the Atomic Energy Act (AEA) to allow a combination of two or more reactor modules (each rated 100–300 MWe) with a combined rated capacity of not more than 1300 MWe to be considered one facility for the purposes of application of Price-Anderson financial protection requirements. This legislation is currently being considered in the Energy Bill conference.

11. Testing of new design features for a COL

Should a COL be issued before completion of all testing that is necessary to demonstrate the performance of safety systems and components?

This issue will be resolved as part of the 10 CFR Part 52 rulemaking after review of public comments provided in response to the proposed rule change which was provided in SECY-02-0077, "Proposed Rule To Update 10 CFR Part 52, 'Early Site Permits, Standard Design Certifications, and Combined Licenses For Nuclear Power Plants'," dated May 8, 2002 (ADAMS Accession No. ML021040009).

RECOMMENDATION:

That the Commission approve the following recommendations:

1. The staff recommends that the environmental effects of the production, transportation, and storage of reactor fuel and radioactive waste be reviewed on an application-by-application basis for other-than-LWR applicants;
2. The staff recommends that non-electric-utility applicants continue to be required to submit financial qualifications information in accordance with 10 CFR 50.33(f); and
3. The staff recommends that the NRC require non-electric-utility applicants to use the options provided in 10 CFR 50.75 to fund decommissioning costs. The staff does not recommend that the regulations be modified to allow additional alternatives for decommissioning funding.

COORDINATION:

The Office of the General Counsel has no legal objections to this paper. The Office of the Chief Financial Officer has concurred in this paper.

/RA by William F. Kane Acting For/

William D. Travers
Executive Director
for Operations

Attachments: Policy Issues, Analysis and Recommendations

Policy Issues, Analysis, and Recommendations

As part of the pebble bed modular reactor (PBMR) pre-application review, Exelon Generation (Exelon) submitted nine white papers on selected legal and financial issues for Commission response. Exelon identified several regulations that could be an undue and unintended burden when applied to gas-cooled reactors, modular facilities, or merchant plants. In addition, the staff has identified related issues, including the duration of design approval for combined licenses (COLs) and requirements for testing new design features for COLs.

SECY-01-0207, "Legal and Financial Issues Related to Exelon's Pebble Bed Modular Reactor (PBMR)," dated November 20, 2001 (ADAMS Accession No. ML012850139), presented preliminary staff positions related to the staff's assessment of Exelon's proposals on legal and financial issues and additional staff-identified licensing-related issues. On March 27, 2002, the staff conducted a public workshop to apprise Exelon and other stakeholders of the positions presented in the paper and obtain their feedback. The workshop transcript and a summary of the stakeholder comments were provided in a meeting summary dated June 4, 2002 (ADAMS Accession No. ML021500200). In addition, by letter dated April 10, 2002 (ADAMS Accession No. ML021070343), General Atomics provided a justification of the applicability of the issues discussed in SECY-01-0207 to their gas turbine-modular helium reactor (GT-MHR) design currently under development.

On April 16, 2002, Exelon announced that it would not proceed with the PBMR project beyond the completion of the current feasibility study phase. Following Exelon's announcement regarding the PBMR project, the Nuclear Energy Institute (NEI) submitted a white paper dated June 17, 2002 (ADAMS Accession No. ML021970596), providing a proposed integrated approach to modular plant licensing. In the June 17, 2002, letter, NEI also provided comments on the preliminary staff positions discussed in SECY-01-0207 related to decommissioning funding assurance, timing of approval of new and spent fuel storage casks, testing requirements for COL applicants, and NRC antitrust review requirements.

The staff has considered stakeholder feedback on the preliminary positions presented in SECY-01-0207 and has evaluated NEI's proposed integrated approach to modular plant licensing. Based on this review, the staff has developed positions related to the following issues and regulations:

- A. Fuel cycle impacts: Tables S-3 and S-4 in 10 CFR 51.51 and 51.52
- B. Financial qualifications in 10 CFR 50.33(f)
- C. Decommissioning funding requirements in 10 CFR 50.75
- D. Operator staffing in 10 CFR 50.54(m)
- E. Fuel cycle impacts: the Waste Confidence Rule (10 CFR 51.23)
- F. Minimum decommissioning cost estimates in 10 CFR 50.75(c)
- G. Antitrust review requirements in 10 CFR 50.33a
- H. Licensing issues:
 - 1. Licensing multiple modular reactors
 - 2. Duration of a combined license (COL)
- I. Annual fee issues:
 - 1. Annual fee requirements in 10 CFR Part 171
 - 2. Commencement of annual fees for COL

- J. Financial protection requirements in 10 CFR Part 140
- K. Testing of new design features for a COL

The detailed discussions of these issues on the following pages summarize the issues, the current regulations, stakeholder positions, the staff's considerations, and the staff's positions.

- A. Environmental Impacts of the Fuel Cycle and Transportation: 10 CFR Part 51, Tables S-3 and S-4

Issue

Should the NRC initiate rulemaking specifying the environmental impacts of the production, transportation, and storage of reactor fuel and radioactive waste for high-temperature gas-cooled reactors (HTGRs) on a generic basis?

Current Regulations

In accordance with 10 CFR 51.41, 51.45, 51.50, 52.17(a)(2), and 52.79(a)(2), an environmental report prepared by the applicant for a construction permit, early site permit (ESP), or COL that does not reference an ESP must provide sufficient information regarding any applicable environmental impacts associated with all stages of the project, including production, transportation, and storage of reactor fuel and radioactive waste. Light-water power reactor (LWR) applicants must use the generic values in Tables S-3 and S-4 in their environmental report to describe fuel cycle and transportation effects. For other-than-LWR applicants, fuel cycle and transportation effects must be described on a docket-specific basis. That information serves as a starting point for the NRC's environmental impact statement (EIS).

Discussion

The NRC staff has initiated work that will lead to rulemaking to revise Tables S-3 and S-4 in 10 CFR 51.51 and 51.52. However, the scope of this rulemaking is limited to the environmental impacts of LWRs. The fuel cycle and fuel transportation impacts for non-LWRs could be different from those addressed in 10 CFR Part 51; absent rulemaking to specify the values on a generic basis for non-LWRs, these impacts would have to be addressed in each COL or ESP application. The NRC staff must review these design-specific environmental impacts. The impacts should be discussed in a manner similar to that presented in 10 CFR 51.51 and 51.52; the discussion would serve as a starting point for the NRC independent assessment and should provide sufficiently detailed information on the cumulative, environmental, socioeconomic, and human health impacts of the production, transportation, and storage of reactor fuel and radioactive waste.

The NRC has only limited experience in licensing other-than-LWRs; at this time all operating power reactors are LWRs. Inasmuch as the PBMR and GT-MHR are prospective designs, the staff believes that any effort to undertake a generic rulemaking on these issues would be premature. When the staff has gained more experience in the issues associated with the PBMR, GT-MHR or other non-LWR designs, through a design certification or safety evaluation and/or environmental review of a COL application, the staff will be able to determine whether it has sufficient information to proceed with a generic regulatory solution.

Recommendation

The staff recommends that the environmental effects of the production, transportation, and storage of reactor fuel and radioactive waste be reviewed on an application-by-application basis for other-than-LWR applicants.

B. Financial Qualifications

Issue

Are there regulatory and policy bases for establishing by rulemaking a class of non-utility licensees who need not submit the financial qualifications information otherwise required by 10 CFR 50.33(f)?

Current Regulations

Section 182(a) of the Atomic Energy Act (AEA) requires license applications to include such information on the financial qualifications of the applicant as the Commission may specify by regulation. Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.33(f) specifies the information sufficient to demonstrate to the Commission the financial qualifications of the applicant. Electric utility applicants are not required to provide this information because the financial qualifications have been established for electric utilities on a generic basis by rulemaking. An electric utility is defined in 10 CFR 50.2 as “any entity that generates or distributes electricity and which recovers the cost of this electricity, either directly or indirectly, through rates established by the entity itself or by a separate regulatory authority.” An application for a new facility may be submitted under either 10 CFR Part 50 or 10 CFR Part 52 of the regulations. In either case, a non-utility applicant is required to submit financial qualifications information as stated in 10 CFR 50.33(f).

Discussion

The NRC issued NUREG-1577, Rev. 1, “Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance” to describe the process it uses to review the applicant’s financial qualifications and proposed methods of providing decommissioning funding assurance to evaluate compliance with the financial qualifications requirements of 10 CFR 50.33(f). Under these requirements, the NRC staff is obligated to conduct a financial qualifications review for each license application.

If an applicant does not satisfy the definition of an electric utility, it is deemed to be a non-utility. Utilities use rate base rate of return, which provides a more stable and regular income. Non-utilities face more competition in the marketplace than utilities and are not guaranteed a return by a State public service commission.

The financial information required to fulfill 10 CFR 50.33(f) is information that the applicant will have at its disposal. The NRC seeks to review financial information in order to have reasonable assurance that the facility will have the resources to operate safely. The staff believes it is premature to categorize any applicant as having reasonable assurance before examining such assets or parental guarantees.

Non-electric-utility applicants must submit estimates for the total construction costs and annual operating costs for each of the first 5 years of operation of the facility and identify the source of funds to cover such operating costs, as required by Appendix C of Part 50. This submittal will be reviewed by the staff using the process provided in NUREG-1577, Rev. 1.

At the March 27, 2002, public workshop, Greenpeace provided comments on this issue. They stated that "the public would be well served if the NRC would require the financial requirements be met and not exempt any merchant plant from that requirement."

Recommendation

The Commission has the authority to determine by regulation that a given class of non-electric-utility applicants for nuclear power plant licenses shall not be required to submit financial qualifications information. However, the staff has not identified a reasonable basis for establishing such a class of applicants. The staff recommends that non-electric-utility applicants continue to be required to submit financial qualifications information in accordance with 10 CFR 50.33(f).

C. Decommissioning Funding

Issue

Can a non-utility utilize an alternative method for decommissioning funding, such as partial prepayment?

Current Regulations

The regulations of 10 CFR 50.75 contain the requirements for providing decommissioning funding assurance. The regulations describe six methods of providing decommissioning funding assurance: (1) prepayment, (2) an external sinking fund, (3) surety bonds, (4) a corporate parent guarantee, (5) contracts, and (6) any other mechanism or combination of mechanisms that is determined by the NRC to provide assurance of decommissioning funding. Utilities are licensees that are rate-regulated; they may use any of the six methods. Non-rate-regulated licensees, such as merchant plant operators, may not use the sinking fund method, but are allowed to use any of the other methods. A non-utility may also use an external sinking fund in combination with a guarantee mechanism, provided that the total amount of funds estimated to be necessary for decommissioning is assured. The only notable exception to the above is a power reactor licensee that has the full faith and credit backing of the United States Government. This option entails a statement of intent containing a cost estimate for decommissioning and indicating that funds for the decommissioning will be obtained when necessary.

Discussion

The intent of this regulation is to provide assurance that decommissioning funding is available, particularly in the event of a permanent shutdown of the plant prior to the expiration of the license. According to the regulations, all funding options are available to a non-utility or a non-rate-regulated entity except the sinking fund option. A sinking fund is a fund that is accumulated by making periodic deposits and is reserved for a specific purpose, such as

retirement of debt or decommissioning of a commercial nuclear reactor. In a sinking fund, uniform periodic payments accumulate at compound interest to a given sum at a given future time. Exelon considered proposing an alternative decommissioning funding method for the PBMR that involved a partial payment of the total decommissioning cost estimate and annual contributions over the next 20 years. This proposed method of decommissioning funding is deemed a form of a sinking fund. The staff does not believe that a sinking fund alone would provide the same level of assurance as other funding options available to non-rate-regulated entities and is not consistent with current requirements. Further, an exemption to use a sinking fund is likely to be difficult to justify technically since non-utilities do not have a rate base rate of return (i.e., a guaranteed rate base).

However, as noted in the staff's position in item F, "Minimum Decommissioning Cost Estimates," a non-LWR applicant would be able to use an adequately justified site-specific estimate for decommissioning costs. Since the decommissioning cost estimate would be based on a site-specific study, the staff interprets 10 CFR 50.75(e)(1)(i) (the prepayment option) to allow an applicant to take the 2-percent real earnings credit for the whole period if necessary if the final decontamination schedule and the schedule of cash flows necessary to complete decommissioning is specifically outlined in a site-specific estimate. The present value of even a relatively large decommissioning cost, when discounted back at 2-percent real rate of return, should not be very large and should thus not require an onerous initial deposit.

Staff Position

According to current NRC regulations, an applicant has several options for funding decommissioning. Non-electric-utility applicants are not allowed to use the sinking fund option exclusively (uniform series of payments). The staff recommends that the NRC require non-electric-utility applicants to use the other options provided in 10 CFR 50.75 to fund decommissioning costs. The staff does not recommend that the regulations be modified to allow additional alternatives for decommissioning funding.

D. Operator Staffing

Issue

Should a modular facility be allowed to control more than two reactors from one control room and operate with a control room staffing complement that is less than would be required for individual reactors?

Current Regulations

The NRC has established the requirements for control room staffing in 10 CFR 50.54(k) and (m). Section 50.54(k), states "An operator or senior operator licensed pursuant to Part 55 of this chapter shall be present at the controls at all times during the operation of the facility."

Three sections of 10 CFR 50.54(m) relate to this operator staffing issue. The first is 10 CFR 50.54(m)(2)(i), which states: "Each licensee shall meet the minimum licensed operator staffing requirements in the following table." The table includes one, two and three nuclear units and one, two, and three control rooms and gives the minimum number of operators and senior

operators for each applicable combination, but does not address more than two units per control room.

The second related section is 10 CFR 50.54(m)(2)(iii), which states: "When a nuclear power unit is in an operational mode other than cold shutdown or refueling, as defined by the unit's technical specifications, each licensee shall have a person holding a senior operator license for the nuclear power unit in the control room at all times. In addition to this senior operator, for each fueled nuclear power unit, a licensed operator or senior operator shall be present at the controls at all times."

The third related section is 10 CFR 50.54(m)(2)(iv), which states: "Each licensee shall have present, during alteration of the core of a nuclear power unit (including fuel loading and transfer), a person holding a senior operator license or a senior operator license limited to fuel handling to directly supervise the activity and, during this time, the licensee shall not assign other duties to this person."

In addition, NUREG-0800, Standard Review Plan (SRP) 13.1.2, Section II.B.3, states that staffing should follow the staff positions of items I.A.1.1 and I.A.1.3 of NUREG-0737, "Clarification of TMI Action Plan Requirements:"

- a. A shift supervisor with a senior reactor operator's license, who is also a member of the station supervisory staff, shall be on site at all times when at least one unit is loaded with fuel.
- b. In addition to the licensed personnel specified in 10 CFR 50.54(m), as a minimum, an auxiliary operator (non-licensed) shall be assigned to each reactor and an additional auxiliary operator shall be assigned for each control room for an operating reactor.

TMI Action Plan item I.A.1.1 also discusses the need for engineering expertise on shift in the position of a shift technical advisor.

Discussion

To allow an alternate level of operator staffing, an exemption from the regulation would need to be justified. The staff has identified a number of issues that would need to be addressed to justify an alternate operator staffing level in an application. The key to justification of alternate staffing is a detailed function and task analysis, followed by performance demonstrations on a control room simulator or control room prototype of all activities expected of the operators in normal, abnormal, emergency, and accident conditions. To accomplish this, an applicant would first have to develop its concept of operations, considering the following, at a minimum:

- ! Role of the operator—Is the operator to be an active participant in reactor operation or merely a passive monitor or troubleshooter?
- ! Level of automation—Is the system to be fully automatic, fully manual, or some combination thereof? What degree of automation is desired?
- ! Modes of operation—What modes of operation will be required of the system (e.g., cold shutdown, hot standby, normal operation, refueling)?

- ! Multiple module control—What is the goal? How many modules should be controlled per operator or how many operators should there be per module?
- ! Control room design—What is the control room design concept? How many workstations? For what purpose? What is the individual workstation design concept?
- ! Refueling during operation—How accomplished? How controlled? By whom?
- ! Personnel categories and qualifications—Should operators be licensed as they are today or will they need different qualifications (e.g., knowledge of refueling operations, computer expertise)?
- ! Procedures—Symptom based? Interactive? Computerized or hard copy?

Once the concept of operations is determined, the applicant could follow the Human Factors Engineering Program Review Model described in NUREG-0711, "Human Factors Program Review Model." This NUREG was developed during the review of the three certified advanced reactor designs. It was specifically intended to anticipate advances in instrumentation technology that might occur prior to actual construction of a plant. This guidance will be used by the staff to review the applicant's human factors engineering program. This guidance includes an element on operator staffing.

The staff has an issue regarding the interpretation of the phrase "at the controls" in 10 CFR 50.54(k) as it might relate to one operator controlling multiple reactors in a modular facility. For example, if the operator of a multimodule facility is manipulating reactivity in one reactor via digital keyboard and CRT (cathode ray tube [display]), is that operator "at the controls" of other reactors using the same or a spatially different keyboard and CRT? The issue is the precise definition of "at the controls." The staff expects applicants to address the safety implications of this issue as it affects modular reactor designs.

The issue related to 10 CFR 50.54(m)(2)(i) is twofold. First, for a multimodule facility having only one control room (as opposed to two or three), the Minimum Requirements table considers only up to two nuclear power units controlled from that one control room. The regulation is silent on the consideration of three or more reactors controlled from one control room, and the staff concludes that a safety justification is necessary. The second issue associated with the table is the number of operators required per unit per control room. An applicant would have to provide a justification of any proposed reduced level of operator staffing. The issue with 10 CFR 50.54(m)(2)(iii) is similar to the issue with 10 CFR 50.54(k) (requiring the operator to be "at the controls") but contains an additional requirement in that the provision is "for each fueled nuclear power unit."

The final staffing issue associated with 10 CFR 50.54 relates to 10 CFR 50.54(m)(2)(iv). The issue stems from the last phrase in the requirement: "the licensee shall not assign other duties to this person." If the reactor design includes online refueling, the core is being altered continuously. Based on 10 CFR 50.54(m)(2)(iv), the staff would expect a senior licensed operator to be in the control room to supervise the fuel handling activity, with no other assigned duties. The staff, therefore, expects applicants to define the duties of the senior licensed operator as they relate to the refueling process and to justify these duties with regard to safety.

Lastly, the staff believes the staffing-related issues in the SRP are applicable to modular designs and expects these issues to be addressed by applicants.

Staff Position

Current regulations do not address the possibility of more than two reactors being controlled from one control room. Applicants will need to address the safety implications to demonstrate that more than two reactors can be adequately controlled from one control room. Regarding operator staffing requirements, applicants could request an exemption to current requirements to allow an alternate level of operator staffing for modular reactors, provided they address the safety implications.

E. Environmental Impacts of the Fuel Cycle and Transportation: Waste Confidence Rule

Issue

Would PBMR and GT-MHR spent fuel fall within the scope of the NRC's Waste Confidence Rule?

Current Regulations

The Commission codified its Waste Confidence findings at 10 CFR 51.23. Section 51.23(a) states:

The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least thirty years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within thirty years beyond the licensed life for operation of any reactor to dispose of commercial high-level waste and spent fuel originating in such reactor and generated up to that time.

Because of the generic determination in Section 51.23(a), there is no need to consider the environmental impacts of the onsite storage of spent fuel (in environmental reports, EISs, environmental assessments, or other analyses), for the period following the expected expiration of the license, in reactor and independent spent fuel storage facility licensing proceedings. However, Section 51.23(c) requires consideration of environmental impacts during the term of the reactor operating license or a license for an independent spent fuel storage installation (ISFSI) in a licensing proceeding.

Discussion

The Commission based its Waste Confidence Rule, as codified at 10 CFR 51.23, on the findings of its Waste Confidence Decision (WCD). The Commission issued its first WCD on August 31, 1984 (49 FR 34658). This decision assessed the degree of assurance then available that radioactive waste can be disposed of safely, when such disposal or offsite storage would be available, and whether radioactive waste can be stored safely on site after expiration of existing facility licenses until offsite disposal or storage is available. The

Commission reevaluated its initial WCD in 1990 and affirmed, with some changes, the findings of the original decision (55 FR 38474; September 18, 1990). The Commission also changed Section 51.23 to conform to the revised findings (55 FR 38472; September 18, 1990). On December 6, 1999, the Commission issued a status report on the WCD. The Commission noted that "experience and developments since 1990 confirm the Commission's 1990 Waste Confidence findings" (64 FR 68005).

The WCD found there is reasonable assurance that (1) safe disposal of radioactive waste and spent fuel in a mined geologic repository is technically feasible; (2) one or more geologic repositories will be available within the first quarter of the twenty-first century, and sufficient repository capacity will be available within 30 years beyond expiration of any reactor license to dispose of high level waste (HLW) and SNF; (3) HLW and SNF will be managed safely until sufficient repository capacity is available to assure the safe disposal of all high-level waste and spent fuel; (4) if necessary, the SNF can be stored safely and without significant environmental impacts for at least 30 years beyond the reactor license expiration at either an onsite or offsite storage facility; and (5) safe independent onsite or offsite storage capacity will be available if needed.

Findings 2 and 5 address availability of repository and storage capacity, respectively. These findings do not depend on the type of spent fuel involved. Finding 1 on the technical feasibility of the safe disposal of spent fuel in a mined geologic repository recognized that different types of spent fuel might need to be accommodated in the repository. Also, Findings 3 and 4 specifically considered the storage of different types of spent fuel, including fuel from gas-cooled reactors and spent fuel similar to the graphite-encased PBMR and GT-MHR fuel. In reaching Finding 3, the Commission considered the technical feasibility of using both wet and dry storage. The form of PBMR and GT-MHR SNF will necessitate the use of dry storage. Although the basis for Finding 4 is considered primarily LWR spent fuel, the basis references several reports that considered dry cask storage of spent fuel from gas-cooled reactors. These reports include "Dry Storage of Spent Nuclear Fuel: A Preliminary Survey of Existing Technology and Experience" (NUREG/CR-1223, 1980) and "Behavior of Spent Nuclear Fuel and Storage System Components in Dry Interim Storage" by A.B. Johnson et al. (PNL-4189, Rev. 1, August 1982).

The first report (NUREG/CR-1223) is a survey of the then-existing technology and experience with the dry storage of spent fuel. The report describes the experience with the dry storage of irradiated graphite fuel at the Irradiated Fuel Storage Facility at the Idaho National Engineering Laboratory (INEL). The graphite fuel included fuel from the HTGRs at Peach Bottom 1 (Core 2) and Fort St. Vrain and irradiated fuel from the Rover Nuclear Rocket Program. The report also discusses the experience with the storage of Peach Bottom 1 (Core 1) graphite fuel and Fermi 1 blanket fuel in dry storage at the Idaho Chemical Processing Plant at INEL. For both of these storage alternatives, the report notes that there were no unusual or significant unexpected occurrences during the period of operation.

The second report (PNL-4189, Rev. 1) discusses the dry storage experience with gas-cooled reactor spent fuel, including graphite fuel, and concludes that "at all the operating facilities..., dry storage operations have been successful, with low radiation doses and no serious operational problems" (p. xii). One of these facilities was a vault to store pebble bed gas-cooled test reactor fuel at the Julich Research Center. The report also concludes that all types of irradiated reactor fuel have been shipped and handled under dry conditions.

In addition to these two reports, the Commission, in discussing the safety of dry storage in the original WCD, referenced DOE comments on successful storage of reactor fuel from a sodium-cooled, graphite research reactor and from the Fort St. Vrain HTGR prototype facility. In response to these comments, the Commission stated that it was "confident that dry storage in installations can provide continued safe storage of spent fuel at reactor sites for at least 30 years after expiration of the operating license" (49 FR 34658, 34663; August 31, 1984).

Although cask designs and information on potential accidents associated with PBMR or GT-MHR fuel storage have not been submitted, there does not appear to be any technically insurmountable issues. Since the original WCD, there has been a significant increase in knowledge of and experience with the design and performance of dry casks. Designs of independent spent fuel storage installations (ISFSIs) consider accident scenarios such as natural disasters and incorporate security and safeguard features. In addition, any potential long-term environmental impacts will be addressed in the cask design process and through demonstration of compliance with the Commission's regulations. The Commission would then evaluate potential environmental impacts as part of future licensing actions.

In the Commission's 1990 re-evaluation of its WCD, the Commission modified Finding 4 to state that spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation, including the term of revised or renewed licenses. On dry storage, the Commission found that (1) the material degradation processes of spent fuel in dry storage are well understood; (2) dry storage systems are simple, passive, and easily maintained; (3) both the NRC and dry storage operators have gained experience with dry storage that confirms the Commission's 1984 conclusions; and (4) the Commission maintains regulatory authority over any spent fuel installation (55 FR 38474, 38509; September 18, 1990).

The NRC staff evaluation that formed the basis for the 1990 reevaluation of the WCD cited the environmental assessment for 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Fuel and High-Level Radioactive Waste" (NUREG-1092), as support for reaffirmation of Finding 4 (NRC Staff Waste Confidence Review Group's Final Waste Confidence Decision Review, 1990). The environmental assessment found that almost 40 years of experience attests to the safety of passive dry storage technologies, beginning with the extended vault and drywell tests conducted by INEL in 1964 on liquid metal fast breeder reactor fuel, and 12 years of research into passive dry storage technology in the United States and abroad. U.S. research conducted by INEL includes operations that began in 1971 with dry well storage of gas-cooled reactor fuel and vault storage of gas-cooled reactor fuel in 1975. The environmental assessment also includes a statement made by the Commission in response to the authorization proceedings on the Nuclear Waste Policy Act (NWPA): "the Commission believes the information is sufficient to reach a conclusion on the environmental effects of dry storage. All areas of safety and environmental concern (e.g., maintenance of systems and components, prevention of material degradation, protection against accidents and sabotage) have been addressed and shown to present no more potential for adverse impact on the environment and the public health than the storage of spent fuel in water pools" (at II-7).

Regarding DOE's responsibility to accept irradiated PBMR fuel under the NWPA, the volume of spent fuel produced by a PBMR or GT-MHR facility is expected to be greater than that produced by a typical LWR. More detail on the design of the proposed facilities is necessary to predict with accuracy the volume of spent fuel that would be produced and what impact that volume would

have on the repository. About the WCD's general consideration of the need for a second repository, the 1990 reevaluation noted that "since Congress specifically provided in the NWPA for a first repository, and required DOE to return for legislative authorization for a second repository, the Commission believes that Congress will continue to provide institutional support for adequate repository capacity" (55 FR 38474, 38508). This statement appears to encompass any capacity concerns associated with a PBMR, GT-MHR, or other nuclear reactor facility in terms of the Commission's WCD. However, applicants should discuss DOE's acceptance of non-LWR SNF with DOE, as appropriate.

As part of the license application, it would be prudent for applicants to have NRC-approved fresh fuel and spent fuel casks. The staff notes that essentially all the technical criteria used in the evaluation of a cask design's ability to contain spent fuel are based on experimental and performance data obtained using light-water fuel. As a result, non-LWR applicants would need to provide additional information on interim storage and transportation scenarios to address the safety implications of the cask designs. This information would include data on fuel geometry, confinement and containment, and fuel stability over time, under both normal and accident conditions.

In reaching the various WCD findings that formed the basis for its Waste Confidence Rule in 10 CFR 51.23, the Commission specifically considered spent fuel similar to that which would be generated at a PBMR or GT-MHR facility. Therefore, it appears that a PBMR or GT-MHR facility is within the scope of the generic determination in Section 51.23(a).

Since the original WCD, there has been a significant increase in knowledge and experience regarding the design and performance of dry casks. Designs of ISFSIs consider accident scenarios such as natural disasters and incorporate security and safeguard features. In addition, any potential long-term environmental impacts will be addressed in the cask design process and through demonstration of compliance with the Commission's regulations. The Commission would then evaluate potential environmental impacts as part of future licensing actions.

The staff notes that although cask designs and information on potential accidents associated with PBMR or GT-MHR fuel storage have not been submitted, there does not appear to be any technically insurmountable issues. The staff stated in SECY-01-0207, that "as part of the license application, Exelon will need to have approved fresh fuel and spent fuel casks." In response to stakeholder comments, the staff reevaluated this position and concluded that, although it would be prudent, there is no requirement that fresh fuel and spent fuel casks be approved prior to submittal of an application for a COL.

Conclusion

The staff concluded that PBMR and GT-MHR facilities appear to be within the scope of the generic determination in Section 51.23(a). With respect to the Department of Energy's (DOE's) acceptance of PBMR or GT-MHR SNF, applicants should discuss DOE's acceptance of non-LWR SNF with DOE, as appropriate.

F. Minimum Decommissioning Cost Estimates

Issue

Can a non-LWR applicant submit design-specific decommissioning cost estimates?

Current Regulations

The minimum amount of decommissioning funds required of BWRs and PWRs is regulated through the minimum decommissioning funds equation in 10 CFR 50.75(c). There are no formulas specifically for gas-cooled reactors or other non-LWR designs. However, the regulations allow the use of a site-specific estimate instead of the amount calculated through the generic formula.

Discussion

There are currently no regulations that specifically deal with minimum decommissioning cost estimates for gas-cooled reactors or other non-LWR designs. The staff further recognizes that, since the regulations do not specifically address non-LWR decommissioning cost estimates, a site-specific decommissioning cost estimate submitted with the first application could set the standard for subsequent reactors of the same design. The initial decommissioning cost estimate will need to be reviewed for adequacy from both the technical and the financial perspectives.

The staff is willing to accept a design-specific minimum decommissioning cost estimate for non-LWR designs if the staff finds the technical justification to be acceptable. For a modular facility, the staff is willing to review a standard decommissioning cost estimate based on the decommissioning of one module, which can then be applied multiple times for the facility in question, or (alternatively), a cost estimate based on the decommissioning of multiple modules at a single location. Regardless of the method used, the resulting estimate must include the cost of decommissioning common elements and structures associated with the facility, in addition to the costs of decommissioning each individual module.

Conclusion

The staff will accept a minimum decommissioning cost estimate specifically for the PBMR or for the GT-MHR if the applicant can technically justify this estimate.

G. Antitrust Review Authority

Issue

Can the NRC except applicants for nuclear plants that will be operated as merchant plants from the precicensing antitrust review?

Current Statutory Provisions and Regulations

The NRC's antitrust responsibilities are set forth in Section 105 of the AEA. Section 105c, as amended in 1970, requires the NRC to conduct an antitrust review of applications for construction permits or COLs, seek the advice of the Attorney General in conducting this review, and provide an opportunity for members of the public to request a hearing in connection with this review. Section 105c prescribes the process for conducting a prelicensing antitrust review and making findings as to whether activities under the license would create or maintain a situation inconsistent with antitrust laws. Pursuant to 10 CFR 50.33a, prospective applicants must submit the required antitrust review information to the NRC at least 9 months prior to the application for a construction permit or COL. This information, which is set forth in Appendix L to 10 CFR Part 50, includes detailed transmission, distribution, and business planning information. Under Section 105c.(7) of the AEA, the NRC has the authority, subject to the approval of the Attorney General, to determine that the issuance of certain classes or types of licenses "would not significantly affect the applicant's activities under the antitrust laws" and, therefore, to except such applicants from the NRC's antitrust review requirements. The NRC also has the authority, under Section 105c.(6) of the AEA, to issue a license with appropriate antitrust conditions on the basis of the findings of the antitrust review.

Discussion

During the March 27, 2002, workshop, NEI stated their position that there appears to be a sound basis for eliminating the NRC antitrust review given the oversight that exists among the NRC, the Department of Justice (DOJ) and the Federal Trade Commission (FTC). They also stated that they hoped a resolution could be put in place in time to support the first application for a COL. In their June 17, 2002, white paper, NEI asserted this position and recommended that the NRC use its existing authority under Section 105c.(7) of the AEA to seek approval from the Attorney General to except certain license applicants (e.g., merchant generating companies) from pre-licensing antitrust review. NEI further stated that the industry is separately pursuing a legislative change to eliminate the Section 105c. requirement for NRC to perform pre-licensing antitrust reviews.

Conclusion

The authority of the NRC to except certain applicants for new nuclear generating facilities from the NRC's antitrust review requirements is being addressed separately by the Office of the General Counsel.

H. License Issues

H.1 Licensing Multiple Modular Reactors

H.2 Duration of a Combined License (COL)

Issues

Can the NRC conduct a single set of licensing reviews and a single public hearing for multiple, nearly identical COL applications? What is the effective duration of a COL?

Current Statutory Provisions and Regulations

Section 103 of the AEA states:

- a. The Commission is authorized to issue licenses to persons applying therefor to transfer or receive in interstate commerce, manufacture, produce, transfer, acquire, possess, use, import, or export under the terms of an agreement for cooperation arranged pursuant to Section 123, utilization or production facilities for industrial or commercial purposes. Such licenses shall be issued in accordance with the provisions of Chapter 16 and subject to such conditions as the Commission may by rule or regulation establish to effectuate the purposes and provisions of this Act.
- b. Commission shall issue such licenses on a nonexclusive basis to persons applying therefor (1) whose proposed activities will serve a useful purpose proportionate to the quantities of special nuclear material or source material to be utilized; (2) who are equipped to observe and who agree to observe such safety standards to protect health and to minimize danger to life or property as the Commission may by rule establish; and (3) who agree to make available to the Commission such technical information and data concerning activities under such licenses as the Commission may determine necessary to promote the common defense and security and to protect the health and safety of the public. All such information may be used by the Commission only for the purposes of the common defense and security and to protect the health and safety of the public.
- c. Each such license shall be issued for a specified period, as determined by the Commission, depending on the type of activity to be licensed, but not exceeding forty years, and may be renewed upon the expiration of such period.

10 CFR 50.51(a) states:

Each license will be issued for a fixed period of time to be specified in the license but in no case to exceed 40 years from date of issuance. Where the operation of a facility is involved, the Commission will issue the license for the term requested by the applicant or for the estimated useful life of the facility if the Commission determines that the estimated useful life is less than the term requested. Where construction of a facility is involved, the Commission may specify in the construction permit the period for which the license will be issued if approved pursuant to §50.56. Licenses may be renewed by the Commission upon the expiration of the period. Renewal of operating licenses for nuclear power plants is governed by 10 CFR Part 54. Application for termination of license is to be made pursuant to §50.82.

10 CFR 52.103(g) states:

Prior to operation of the facility, the Commission shall find that the acceptance criteria in the combined license are met. If the combined license is for a modular design, each reactor module may require a separate finding as construction proceeds.

10 CFR Part 52 Appendix N(3) states:

Applications for operating licenses submitted pursuant to this appendix N shall include the information required by §§50.33, 50.34 (b) and (c), and 50.34a(c) of this chapter. The applicant shall also submit the information required by §51.53 of this chapter. For the technical information required by §§50.34(b) (2) through (5) and 50.34a(c), reference may be made to a single final safety analysis of the design.

Background

By letter dated June 17, 2002, (ADAMS Accession No. ML021970596), NEI submitted a white paper providing the details of a proposed integrated approach to modular plant licensing. In their paper, NEI describes an approach to licensing that is based on issuance of a COL under 10 CFR Part 52 for each module of a modular facility. This approach is different from the approach for licensing modular reactors proposed by Exelon in their May 10, 2001, submittal, and assessed by the staff in SECY-01-0207. NEI proposes that (1) the facility would be subject to a single set of licensing reviews and a single public hearing by the NRC; (2) each reactor module of a modular facility would be permitted to operate for the maximum period permitted by the AEA; and (3) a modular facility would be subject to a single NRC annual fee and be subject to a single Price-Anderson retrospective premium.

Under NEI's proposal, NRC would issue multiple COLs that would authorize construction of each module of the modular plant, and each COL application would identify the latest anticipated date that each reactor module will be completed based on the applicant's projections of the demand for electricity. If market conditions or other factors delay the planned construction of one or more modules, NEI proposes that a license amendment would be required to extend the "completion by" date(s) specified in the COL(s), and that the NRC decision to extend the "completion by" date(s) in the COL(s) would be focused on the safety impact of the delay and would not involve reconsideration of the design and licensing bases of the reactor module(s). NEI further proposes that: (1) the COL will embody NRC design approval for all modules proposed in the COL application, common systems, interfaces between the modules, interfaces with the site, etc.; (2) the duration of the NRC design approval is coincident with the term of the COL; and (3) the modular plant licensee may begin construction and deploy individual modules at any time during the license term, in accordance with the module completion dates specified in the COL.

Discussion

In accordance with 10 CFR Part 52 Appendix N, COL applicants for multiple nuclear power plants of essentially the same design may reference a single final safety analysis of the design

to provide the technical information required by 10 CFR 50.34(a) (1) through (5) and (8), 50.34a (a) and (b), 50.34(b) (2) through (5), and 50.34a(c). It has been Commission practice, under Part 50, to consider applications for multiple units at a single site in one proceeding. On this basis, the Commission has the authority to conduct a single set of licensing reviews and hearings for multiple COL applications for multiple nuclear power plants of essentially the same design, at the same site.

The issuance of multiple COLs for the same design is equivalent to issuing a design approval that can be referenced multiple times. The NRC has issued a number of preliminary and final design approvals under Appendix O to 10 CFR Part 52 and, prior to 1989, under 10 CFR Part 50. Since 1978, these design approvals have been issued with a duration of five years, in accordance with the Commission's "Policy Statement on Standardization of Nuclear Power Plants," (43 FR 38954, August 31, 1978). In the same *Federal Register* notice, the concept of a manufacturing license is discussed.

Manufacturing licenses are issued under Appendix M to Part 52 (38 FR 30253, November 2, 1973) and would authorize a number of identical nuclear power plants to be manufactured at one location and moved to a different location for operation. The number of units specified in the license is that number whose start of manufacture could practically begin within a 10-year period commencing on the date of issuance of the manufacturing license. However, in no event will the number be more than 10. The manufacturing license requires the plant design to be updated no later than 5 years after its initial approval. The number of units specified in the license will be reduced if the plant design incorporates a reference system design whose term of approval ends sooner than the approval periods of the manufacturing license.

In 1989, the Commission decided to grant a duration of 15 years for a standard design certification issued under Subpart B of Part 52 (see 10 CFR 52.55(a), "Duration of Certification"). However, the Commission did not change its policy for issuance of design approvals under Appendix O. The licensing processes in Part 52 demonstrate that the Commission has always imposed a time limit on design approvals that can be referenced in an application to build a nuclear power plant.

Under Section 103 of the AEA, the term of operation for each COL would be limited to 40 years from the date of issuance of the COL. Legislation submitted by the Commission addressing 40-year terms, if enacted, would permit the 40-year term of operation to begin when the Commission makes the initial 10 CFR 52.103(g) finding. This pending legislation would not specify the duration of the construction period of the COL and the design approval. The NRC did not envision the delayed use of COLs that is possible under the approach proposed by NEI. It was expected that an applicant would use a COL to construct and operate nuclear power plant(s) in a timely manner, e.g., 10 years. However, NEI would have the NRC issue COLs for nuclear power plants that may not be built for a long period of time. The NEI proposal is inconsistent with the Commission's policy on duration of design approvals. Therefore, the question is whether the NRC should allow the same reactor design to be built over a long time period after issuance of the license without reconsidering the acceptability of the original design approval.

Conclusion

The Commission has the authority to conduct a single set of licensing reviews and a single public hearing for multiple COL applications for nuclear power plants of essentially the same design. Under current regulations, the term of operation for each COL would be limited to 40 years from the date of issuance of the COL. However, legislation submitted by the Commission addressing 40-year terms, if enacted, would permit the 40-year term of operation to begin when the Commission authorizes operation (i.e, makes the initial 10 CFR 52.103(g) finding). This pending legislation would not specify the duration of the construction period of the COL and the design approval.

The NRC did not envision the delayed use of COLs that is possible under pending legislation, which is inconsistent with the Commission's policy on duration of design approvals. The staff will provide the Commission with a recommended course of action on this issue six months after Congress acts with respect to the pending legislation.

I. Annual Fee Issues

I.1 Annual Fee Assessment

1.2 Commencement of Annual Fees

Issues

How should annual fees be assessed for a set of modular reactors that constitute a facility?
When should annual fees commence for a facility that has been issued a COL?

Current Statutory Provisions and Regulations

The Omnibus Budget Reconciliation Act of 1990 (OBRA-90), as amended, requires that the NRC assess annual fees and that the fees be established through rulemaking. The statute establishes two standards for the annual fees. The fees must be "fair and equitable" in allocating the "aggregate amount of charges" among licensees; and, "to the maximum extent practicable," the fees must have a "reasonable relationship to the costs of providing regulatory services and may be based on the allocation of the Commission's resources among licensees or classes of licensees."

In the FY 2002 final fee rule, 10 CFR Part 171 was amended to specifically authorize the assessment of annual fees for COLs issued under 10 CFR Part 52; to clarify that the annual fee is charged per license, not per unit; and to establish when NRC will begin to charge an annual fee to a holder of a 10 CFR Part 52 COL. The annual fee will be assessed for a 10 CFR Part 52 COL only after construction has been completed, all regulatory requirements have been met, and the Commission has authorized operation of the reactor(s).

Discussion

It is clear from the language of the OBRA-90, as amended, that the NRC has flexibility in determining policies and practices in recovering the statutorily directed amount of the NRC's budget through fees. The Commission is within its statutory bounds as long as the rule establishing the fees results in a fair and equitable allocation of costs to licensees and as long

as there is a reasonable relationship between the services rendered by the agency and the costs charged for those services.

In accordance with OBRA-90, as amended, annual fees for each class of licenses are based on NRC's budgeted costs allocated to the class for generic activities and other costs not recovered under 10 CFR Part 170. It is not clear whether the agency's generic and other efforts to regulate modular reactors will be significantly different from its regulation of other types of operating power reactors. Further, while a modular reactor might have less megawatt output capacity than any existing reactor, historically capacity has not been a consideration in determining the annual fee amount. This is because the NRC has not found a necessary relationship or predictive trend between the thermal megawatt rating of a power reactor and NRC regulatory costs. If the NRC's regulatory costs for a modular reactor were approximately the same as for existing power reactors, the annual fee would be of the same magnitude as for existing power reactors. However, if the NRC's regulatory costs were significantly lower or higher than those for other types of operating reactors, the Commission could establish a separate license fee class through a 10 CFR Part 171 rulemaking.

Under the current provisions of 10 CFR Part 171, an annual fee would be charged for each COL. In its June 17, 2002, white paper, NEI stated that "if individual COLs are issued for each module of a modular plant (facility), a further change to the NRC's annual fee structure will be necessary to provide for assessment of a single annual fee to a modular plant (facility)."

Conclusion

Based on the provisions of 10 CFR Part 171 that a separate annual fee be assessed for each license, if a separate COL is issued for each module of a modular facility, a separate annual fee would be assessed for each module. The annual fees for the COLs would be determined based on the requirements of OBRA-90, as amended, that the charges be assessed in a fair and equitable manner and, to the maximum extent practicable, reflect a reasonable relationship to the costs of providing services to the licensees or classes of licensees. Therefore, the staff has concluded that no further change to the fee rule is necessary at this time to address the assessment of annual fees for modular facilities.

J. Financial Protection

Issue

Should Price-Anderson financial protection requirements be applied to each reactor module or to the entire modular "facility"?

Current Statutory Provisions and Regulations

The Price-Anderson Act, which is contained in Section 170 of the AEA (42 U.S.C. § 2210), is implemented by the NRC via its 10 CFR Part 140 regulations. The Price-Anderson Act has three elements. First, it establishes a ceiling on the aggregate damage award for nuclear tort claims that can be imposed against an entity involved in the use or handling of radioactive material. Second, it indemnifies any entity exposed to potential liability for activity resulting in a nuclear incident, even if the entity did not directly participate in the activity. Third, it establishes an indemnification scheme through which the Federal government requires entities involved in nuclear activities to obtain private insurance to a certain level.

With respect to the third element, the Price-Anderson indemnification scheme, Section 170b. of the Act establishes that the amount of primary financial protection required for facilities designed to produce substantial amounts of electricity and having a rated capacity of 100,000 electric kilowatts (100 MWe) or more must be equal to the maximum amount of commercially and reasonably available nuclear liability insurance, which is currently \$200 million (42 U.S.C. § 2210b.(1)). Primary financial protection may include private insurance, private contractual indemnities, self-insurance, other proof of financial responsibility, or some combination thereof. In addition, Section 170b. requires licensees of such facilities to participate in an industry retrospective rating plan, or secondary layer of protection, which provides for the assessment of additional deferred premiums in the event that the public liability from a nuclear incident exceeds or appears likely to exceed the level of primary financial protection required of the licensee involved in the nuclear incident. The total amount of financial protection presently available under the Act from both the primary and secondary layers is approximately \$9.7 billion (the primary layer of \$200 million plus a secondary layer of approximately \$9.5 billion, based upon a maximum retrospective premium of \$88.095 million per nuclear incident per nuclear facility).

The NRC's implementing regulations impose these financial protection requirements on each nuclear reactor a licensee is authorized to operate (10 CFR 140.11). A "nuclear reactor" is defined as "any apparatus, other than an atomic weapon, designed or used to sustain nuclear fission in a self-supporting chain reaction" (10 CFR 140.3(f)). The maximum amount of the standard deferred premium that may be charged per nuclear incident is \$88.095 million (\$83.9 million plus a maximum 5-percent surcharge assessed under Subsection 170(1)(E) of the Act) for each facility (nuclear reactor) for which the licensee is required to maintain the maximum amount of primary financial protection (10 CFR 140.11(a)(4)), but no more than \$10 million per year.

The Commission has stated its position, in letters to Congress, on the application of Price-Anderson financial protection requirements to multiple modular reactor units co-located at a single site. The Commission stated, in part, that it "believes there are substantial doubts whether it has authority to treat multiple reactor units as only one facility for purposes of the retrospective assessment because the specific financial protection and retrospective assessment provisions in Section 170b. of the AEA are specified for a 'facility,' elsewhere defined as a single reactor or even an important component part of a reactor. In our view, Congress should amend the AEA if it seeks to assure that multiple modular units at a single site are treated as a single facility."

The staff notes that the Nuclear Control Institute provided comments on this issue at the March 27, 2002, public workshop. They stated that "there is simply no technical basis for concluding that it is appropriate to reduce the insurance requirement for modular reactors based on a reduction in the rated power."

Conclusion

The House of Representatives and the Senate passed legislation to amend Section 170b. of the AEA to allow a combination of two or more reactor modules (each rated 100–300 MWe) with a combined rated capacity of not more than 1300 MWe to be considered one facility for the purposes of application of Price-Anderson financial protection requirements. This legislation is currently being considered in the Energy Bill conference.

K. Testing of New Design Features for a Combined License

Issue

Should a COL be issued before completion of all testing that is necessary to demonstrate the performance of safety systems and components?

Discussion

The Commission reformed its licensing process for commercial nuclear power plants with the issuance of 10 CFR Part 52 in 1989. One of the principal issues in the development of 10 CFR Part 52 was the inclusion of requirements to demonstrate the performance of new or innovative safety features for advanced designs prior to licensing (54 FR 15372, April 18, 1989). These requirements may be met with either separate effects tests, prototype tests, or a combination of tests, analyses, and operating experience, as described in 10 CFR 52.47(b)(2). These requirements were included, as intended, in the original rulemaking for 10 CFR Part 52, Subpart B, "Standard Design Certifications." However, the NRC failed to include the same requirements in Part 52, Subpart C, "Combined Licenses," for custom plant designs. Because the NRC intended that the testing requirement apply to all new reactor designs in accordance with the Commission policy statement on advanced reactors, the proposed rule language for 10 CFR Part 52 corrects this oversight. The draft proposed rulemaking language was made available in SECY-02-0077, "Proposed Rule To Update 10 CFR Part 52, 'Early Site Permits, Standard Design Certifications, and Combined Licenses For Nuclear Power Plants'," dated May 8, 2002 (see section A.9) and is available on the NRC's rulemaking web site. Stakeholders will be able to provide comments on the proposed rule language after the Commission approves the notice of proposed rulemaking for publication in the *Federal Register*.

The NRC has initiated rulemaking to update 10 CFR Part 52. In the rulemaking language that was provided in SECY-02-0077, and made available on the NRC's rulemaking web site, the NRC staff proposed to revise the current language in Subpart C (proposed Subpart G) of 10 CFR Part 52 to make it consistent with current Subpart B (proposed Subpart D) of 10 CFR Part 52 and the original intent of 10 CFR Part 52. Thus, if approved, the revised 10 CFR Part 52 would require that all testing determined to be necessary to demonstrate that new design features will perform as predicted in the final safety analysis be completed before issuance of the COL.

Conclusion

This issue will be resolved as part of the 10 CFR Part 52 rulemaking after review of public comments provided in response to the proposed rule change which was provided in SECY-02-0077, "Proposed Rule To Update 10 CFR Part 52, 'Early Site Permits, Standard Design Certifications, and Combined Licenses For Nuclear Power Plants'," dated May 8, 2002 (ADAMS Accession No. ML021040009).