July 3, 2008

MEMORANDUM TO: Chairman Klein
Commissioner Jaczko
Commissioner Lyons
Commissioner Svinicki

FROM: R. W. Borchardt ***/RA/ Bruce S. Mallett for***
Executive Director for Operations

SUBJECT: CRITERIA FOR FUNDING THE REVIEW OF FUTURE SMALL, GRID-APPROPRIATE REACTORS

The purpose of this paper is to provide the Commission with (1) criteria for including small, grid-appropriate reactor licensing activities in future budgets and (2) the criteria that the staff will apply for accepting a design certification (DC) application for a small, grid-appropriate reactor.

Background

The Commission's Statement of Policy on the Regulation of Advanced Nuclear Power Plants (Volume 59 of the *Federal Register*, page 35461; July 12, 1994) encourages the earliest possible interaction between applicants, vendors, other government agencies, and the U.S. Nuclear Regulatory Commission (NRC) to allow for the early identification of regulatory requirements for advanced reactors and to provide a timely independent assessment of the safety characteristics of advanced reactor designs. The Commission's policy statement also indicates that the Commission intends to develop the capability for timely assessment and response to innovative and advanced designs that might be presented for NRC review.

In its May 10, 2005, staff requirements memorandum (SRM), "Staff Requirements—Briefing on Status of New Site and Reactor Licensing, 9:30 a.m., Wednesday, April 6, 2005, Commissioners' Conference Room, One White Flint North, Rockville, Maryland (Open to Public Attendance)," the Commission stated the following:

> In accordance with Commission policy to support design certification reviews before a construction permit or combined license (COL) [application] has been filed, the staff should plan on developing budget estimates to conduct all pre-application reviews, design certification reviews, early site permit reviews,

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> and COL reviews which are reasonably expected to be submitted in FY2007 or beyond (i.e., where the uncertainty associated with receiving the request for review is low to medium). However, when it comes time to execute the budget in FY2007 and beyond, the staff should give priority to applications that are aligned with a COL partner, and assign a lower priority to applications that are not clearly aligned with a COL partner, if funding is not approved to review all applications.

In its November 16, 2006, SRM, "Staff Requirements—SECY-06-0187—Semiannual Update of the Status of New Reactor Licensing Activities and Future Planning for New Reactors," the Commission directed the staff to continue to plan and budget for all low and medium uncertainty new plant licensing applications. Furthermore, the Commission provided the staff with a set of factors to use when making resource allocations and schedule decisions, if and when actual licensing work exceeds the new reactor budget. The factors apply only when allocating resources during budget execution and are not to be applied in preparing budget requests.

In SECY-08-0019, "Licensing and Regulatory Research Related to Advanced Nuclear Reactors," dated February 14, 2008, the staff provided (1) information regarding its current licensing, technical review, and regulatory research activities associated with advanced reactors, (2) an update on industry projections as to when advanced reactor designs will be submitted to the NRC for licensing reviews, and (3) the staff's plans to develop programmatic and organizational strategies that will position the NRC to effectively and efficiently support the licensing and technical reviews that are anticipated for advanced reactor designs. In its June 11, 2008, SRM, "Staff Requirements—SECY-08-0019—Licensing and Regulatory Research Related to Advanced Nuclear Reactors," the Commission approved the staff's proposed technical and programmatic approach to begin preparing the regulatory framework and supporting technical bases to license advanced reactor designs. Furthermore, the Commission directed that gas-cooled reactor technology should remain a focus of staff licensing preparations, but it stated that these efforts should be appropriately prioritized so that in the event of a continuing resolution or other limited or constrained budget scenario, they do not receive priority over mission-critical work.

In SRM M080317B, "Staff Requirements—Briefing on State of NRC Technical Programs, 1:00 P.M., Monday, March 17, 2008, Commissioners' Conference Room, One White Flint North, Rockville, Maryland (Open to Public Attendance)," dated April 3, 2008, the Commission directed the following:

> The staff should develop a recommendation and criteria for Commission consideration as to whether to put the small, grid-appropriate reactor license proposals into future budgets. In addition, the staff should include in its recommendation the criteria that will be applied to accepting a design of a small, grid-appropriate reactor for design certification.

Discussion

Although definitions vary, the U.S. Department of Energy (DOE) generally defines small, grid-appropriate nuclear reactors as small- and medium-sized commercial nuclear reactors with capacities ranging from 10 to 350 megawatts-electric. DOE envisions that these reactors will be designed to achieve high standards of safety, security, and proliferation resistance, with their size suited for those countries or locations that have smaller and less developed power grids. The NRC staff has generally included in this category any reactor proposed to supply electricity to remote locations or to electrical grids in small increments, and those proposed to generate process heat for industrial applications, such as crude oil extraction. Therefore, grid-appropriate reactors could be any of the recently proposed advanced reactor designs, including high-temperature gas-cooled reactors (HTGRs), a helium-cooled very-high-temperature reactor, sodium-cooled fast reactors (SFRs), a potassium-cooled hydride reactor, and small light-water reactors (LWRs).

Criteria for Including Grid-Appropriate Reactors into Future Budget Proposals

Consistent with the direction provided in the May 10, 2005, SRM, the staff plans to continue to include in its budget proposals all pre-application reviews, DC reviews, early site permit reviews, and COL reviews that are reasonably expected to be submitted in the budget year or beyond (i.e., where the uncertainty associated with receiving the request for review is low to medium). When applying this Commission direction, the staff has not differentiated by size or type of commercial or prototype reactor. Therefore, the staff currently plans to apply the same criteria to grid-appropriate reactor license applications that it uses for LWR reviews when determining whether to include a proposed application in future budgets. When it comes time to execute the budget, the staff will apply the Commission directions provided in its May 10, 2005, and November 16, 2006, SRMs, if funding is not approved to review all of the applications.

Criteria for Accepting a Design Certification Application for a Grid-Appropriate Reactor

In accordance with 10 CFR 2.815, “Docketing and Acceptance Review,” the staff will assign a docket number to a DC application after it has evaluated the tendered application for completeness and technical adequacy. The staff will conduct a completeness review to ensure that the DC applicant has submitted all of the information required to address pertinent technical matters, and it will perform a technical sufficiency review to ensure that the application contains sufficient technical information in scope and depth for the staff to begin its detailed technical review and complete it within a predictable timeframe. The staff will use the same process for accepting a DC application for a small, grid-appropriate reactor as that used for the acceptance review of a large LWR, to the extent possible given the stage of development of the knowledge base and review guidance for these types of reactors. Allowing for differences in design, the staff will generally apply the acceptance review guidance described in the Office of New Reactors Office Instruction NRO-REG-100, “Acceptance Review Process for Design Certification and Combined License Applications,” using acceptance criteria tailored for the type of design under review. For example, many of the Commission’s regulations, regulatory guides

(RGs), and other review guidance for LWRs will likely be applicable to small grid-appropriate LWRs. However, the staff may have to consider whether the application adequately addresses specific technical areas where the design significantly deviates from the Commission's regulations and regulatory guidance. In order to prepare for the review, the staff will have to develop the requisite technical knowledge and review guidance for areas where grid-appropriate LWR designs significantly deviate from large LWR technology.

Furthermore, for non-LWR designs, the staff will have to determine whether the application addresses all pertinent licensing matters for those designs, including key technical areas that significantly deviate from LWR-specific regulations and regulatory guidance. The staff will also have to identify and resolve gaps in the regulations to address unique attributes of those designs. This will present special challenges for the acceptance and license reviews. The preferred approach is to develop staff expertise, guidance for conducting the review, analytical tools, and the safety bases against which to judge the application prior to receipt of the application. These development efforts would need to address design-specific issues involving power generation systems; fuel design, performance, and qualification; balance-of-plant design; security and safeguards; spent fuel; environmental matters; and inspection and startup testing. However, this approach has the potential to result in extended schedules for acceptance of the application as well as review of the design. As an example, the licensing strategy for the next generation nuclear plant includes a 3-year pre-application interaction with the NRC and a 4-year design review.

Conclusion

The staff will apply the same criteria to grid-appropriate reactor license applications that it uses for LWR reviews when determining whether to include a proposed application in future budgets. It will not differentiate by size or type of commercial or prototype reactor. Although acceptance and review criteria need to be developed for advanced reactor designs to support the review of future DC applications, current budgeting restrictions do not fully provide for the development of these criteria within a timeframe to support projected submittals by the advanced reactor applicants. The staff will continue to develop the infrastructure capability for HTGRs consistent with the resources provided. [ ] With the exception of the NGNP, the staff's current plans for FYs 2009 and 2010 are to limit interactions with the designers of grid-appropriate reactors to occasional meetings or other nonresource-intensive activities.

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