

with an application for license amendments to use Framatome Advanced Mark-BW fuel containing M5 cladding material at North Anna, Units 1 and 2. The proposed amendment is currently under NRC staff review. Together, the exemption and amendments would allow Framatome Advanced Mark-BW fuel with M5 cladding to be used at North Anna, Units 1 and 2.

In addition, in accordance with 10 CFR 50.12(a), the NRC staff, upon its own initiative, has developed an exemption from the requirements of 10 CFR part 50, appendix K, with respect to the use of Framatome Advanced Mark-BW fuel containing M5 cladding at North Anna, Units 1 and 2. In its submittal dated March 28, 2002, the licensee indicated that an exemption from 10 CFR part 50, appendix K, was not necessary to use M5 fuel cladding since Framatome Advanced Nuclear Power (ANP) had demonstrated in the NRC staff-approved Topical Report BAW-10227P, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," dated February 11, 2000, that the Baker-Just equation can be used to conservatively predict the metal-water reaction rates for M5 fuel cladding. However, after reviewing its Safety Evaluation Report (SER) dated February 4, 2000, for Topical Report BAW-10227P, the NRC staff has determined that an exemption from 10 CFR part 50, appendix K, was also needed in order to use M5 fuel cladding at North Anna, Units 1 and 2. The NRC staff's rationale for developing this exemption on its own initiative is explained in the following section.

### 3.0 Discussion

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) special circumstances are present. In accordance with 10 CFR 50.12(a)(2)(ii), special circumstances exist whenever application of a particular regulation under the circumstances is not necessary to achieve the underlying purpose of the rule.

The licensee proposes to use M5 material for fuel rod cladding and fuel assembly structural tubing and grids at North Anna, Units 1 and 2. On February 4, 2000, the NRC staff approved Topical Report BAW-10227P. This topical report provided the basis for the use of Framatome ANP's M5 cladding and

structural material in pressurized-water reactor cores. In its SER dated February 4, 2000, for Topical Report BAW-10227P, the NRC staff concluded that M5 properties and the mechanical design methodology as defined in this topical report, "are in accordance with Standard Review Plan Section 4.2, 10 CFR 50.46, and 10 CFR part 50, appendix K, and therefore are acceptable for reload licensing applications up to rod average burnup levels of 62,000 MWd/MTU and 60,000 MWd/MTU for Mark B and Mark-BW fuel designs, respectively." The NRC staff's SER and the approved topical report were published on February 11, 2000, as Topical Report BAW-10227P-A. By letter dated March 28, 2002, the licensee presented a mixed core analysis methodology and a transition core penalty to account for the differences in the core geometry between the Mark-BW fuel and the Advanced Mark-BW fuel proposed for use at North Anna, Units 1 and 2. The NRC staff has determined that Topical Report BAW-10227P-A is applicable to the use of Advanced Mark-BW fuel at North Anna, Units 1 and 2, because the core geometrical differences are consistent with the range of conditions for which analyses of fuel performance are documented in the NRC staff-approved topical report regarding the use of M5 fuel cladding.

The underlying purpose of 10 CFR 50.44 is to ensure that means are provided for control of hydrogen gas following a LOCA. However, this rule applies only to reactors using Zircaloy or ZIRLO cladding. The licensee has provided means for controlling hydrogen gas and has previously considered the potential for hydrogen gas generation stemming from a metal-water reaction. Furthermore, in its NRC staff-approved Topical Report BAW-10227P-A, Appendix A, Framatome ANP demonstrated that M5 fuel cladding material is similar in chemical composition to Zircaloy cladding. Accordingly, this chemical similarity ensures that the previous calculations of hydrogen production resulting from metal-water reaction will not be significantly changed. As such, application of 10 CFR 50.44 is not necessary for the licensee to achieve its underlying purpose in these circumstances.

The underlying purpose of 10 CFR 50.46 is to ensure that facilities meet appropriate acceptance criteria for calculated ECCS performance. However, this rule applies only to reactors using Zircaloy or ZIRLO cladding. In its topical report, Framatome ANP demonstrated that ECCS acceptance

criteria are also applicable to reactors that use M5 fuel rod cladding and structural material. The NRC staff has determined that this finding is applicable to North Anna because the fuel designs are consistent with the range of conditions for which analyses of fuel performance are documented in the NRC staff-approved topical report. Thus, the performance of M5 material is similar to that of Zircaloy and ZIRLO fuel cladding, and application of the regulation (*i.e.*, using Zircaloy or ZIRLO) is not necessary to achieve the underlying purpose of 10 CFR 50.46.

In its submittal dated March 28, 2002, the licensee stated that Framatome ANP had conducted oxidation testing to demonstrate that the Baker-Just equation can be used to conservatively predict the metal-water reaction rates for M5 fuel cladding, and these test results had demonstrated that paragraph I.A.5 of 10 CFR part 50, appendix K, was applicable to M5. The licensee indicated that since these test results were documented in the NRC staff-approved Topical Report BAW-10227P-A, an exemption from the requirements of 10 CFR part 50, appendix K, was not necessary to use M5 fuel cladding. However, based upon the review of the NRC staff's SER for Topical Report BAW-10227P-A, the NRC staff has determined that an exemption from the requirements of 10 CFR part 50, appendix K, is necessary in order for the licensee to use M5 fuel cladding. In section 7.0 of the SER on Topical Report BAW-10227P-A, the NRC staff concluded that while it is appropriately conservative to apply the criteria of 10 CFR 50.46 and 10 CFR part 50, appendix K, to M5 fuel applications, the criteria in the SER are specifically identified for only Zircaloy fuel cladding material. Furthermore, as set forth in that SER, the NRC staff found that an exemption from the requirements of 10 CFR part 50, appendix K, must be obtained in order to use M5 fuel cladding. In short, as set forth in 10 CFR part 50, appendix K, I.A.5, the Baker-Just equation, by its terms, applies only to fuel cladding made of Zircaloy material. As a result, the NRC staff, upon its own initiative, developed an exemption from the requirements of 10 CFR part 50, appendix K, for the requested use of M5 fuel cladding at North Anna, Units 1 and 2.

The underlying purpose of 10 CFR part 50, appendix K, is to ensure that cladding oxidation and hydrogen generation are appropriately limited during a LOCA and conservatively accounted for in the ECCS evaluation model. This regulation sets forth