FRAMATOME ANP

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FRAMATOME ANP, Inc.

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Document Control Desk
ATTN: Chief, Planning, Program and Management Support Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Comments on Draft SER for BAW-10239

A conference call was held between Framatome ANP and the NRC on March 5, 2004, to discuss the draft SER for BAW-10239 that addresses mechanical design criteria for the Advanced Mark-BW fuel design. As a result of this discussion, Framatome agreed to address the draft conditions and to provide additional explanation on the application of this topical report.

The first condition contained in the draft SER specified the use of low enriched UO_2 fuel. Framatome suggested that "low enriched" be deleted because it is ambiguous. The NRC said it may insert the qualifier "equal to or less than 5 percent enrichment" instead. Framatome finds either solution satisfactory. We also agree with the second condition related to burnup.

There were two other statements made in the draft SER that appeared to severely limit the application of the report: the second paragraph in the introduction (which is repeated later in the text) and the third condition. This letter explains the application of this topical report, including previously approved documents, to demonstrate that these two closely-linked statements are unnecessary.

The attachment to this letter summarizes the application of two topical reports (EMF-92-116PA and BAW-10239P) to determine whether design changes comply with established generic design criteria. Following this description of the design change process, we have provided the criteria to be used to ensure adequate safety when making design changes.

The next section of the attachment sets forth examples of typical design changes. Two sets of examples are given: those changes for which no interaction with the NRC is required, and changes that involve modifications to approved methodology (such as DNB correlations) and therefore require review and approval of the revised methods by the NRC. These examples are illustrative only and are not meant to be exhaustive. Because of the large number of parts in a fuel assembly, it is impractical to attempt to list every possible design change.

The fourth part of the attached text addresses the differences between the specific design criteria specified in the two topical reports mentioned above.

When a licensee submits a license amendment request for a new fuel reload, it is obligated to provide an updated set of references in its technical specifications. In addition to referencing the appropriate fuel design report (such as BAW-10239), those references must include all methodologies associated with the assessment of fuel behavior, including DNB correlations and the LOCA and non-LOCA methods.

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In the March 5 conference call, the NRC agreed that if the process of design changes was explicitly addressed, the two statements in question (withholding acceptance of design changes and requiring plant-specific submittals) would be deleted. These two matters are summarized below.

The second paragraph of the introduction has two important elements. The first part addresses the matter of making future design changes. As described in the attachment, detailed criteria and a process for their application have been established to govern the implementation of all design changes. Therefore, it is not necessary to include a statement in the SER restricting design changes.

The second part of the paragraph simply paraphrases the third condition, which specifies the submittal of plant specific analyses. Since the design process is already governed by the criteria and processes described in the attachment and by 50.59, this statement and the third condition are unnecessary.

Very truly yours,

James F. Mallay/sm

James F. Mallay, Director
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cc: M. C. Honcharik
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Attachment 1

1. Design Change Process

The generic design change process described in EMF-92-116PA (Reference 1), in conjunction with the specific design criteria specified in BAW-10239P (Reference 2), will be used to justify fuel design changes for the Advanced Mark-BW without requiring NRC review and approval when BAW-10239P is referenced. Design changes are subject to the requirements in 10 CFR 50.59, and a licensee's application of this regulation will determine whether a submittal to the NRC is required.

Reference 1 provides generic design criteria and a process to demonstrate their application. In summary, compliance to these criteria can be demonstrated by:

- Documenting the fuel system and fuel assembly design drawings.
- Performing analyses with NRC-approved models and methods.
- Confirming the adequacy of significant new design features using prototype tests or lead test assemblies prior to full reload implementation.
- Continuing irradiation surveillance programs, including post irradiation examinations, to confirm fuel assembly performance.
- Using the QA procedures, QC inspection program, and design control requirements set forth in the NRC approved Framatome ANP quality assurance program.

2. Criteria Used to Ensure Continued Safety When Making Design Changes

Design changes in a fuel assembly are any changes that (1) may be made in accordance with 10 CFR 50.59(c) without submitting a license amendment and (2) meet all of the following criteria:

- The change does not result in an unreviewed safety question.
- No changes in plant technical specifications are required.
- The applicability of NRC-approved methodologies is demonstrated to be valid.
- Burnup limits are within those approved by the NRC.

Changes shall be developed within the conditions of the NRC-approved methods. If a change in methodology is made that meets any of the following criteria, the modified methodology will be submitted to the NRC for review and approval.

- An existing approved design code or method is replaced.
- A new core power distribution monitoring method is implemented.
- A method is applied beyond its approved limits.

3. Types of Design Changes

Examples of design changes that Reference 1 can be used for are presented in a letter of clarification to the NRC (Reference 3), and the NRC's concurrence is documented in Reference 4. The examples provided in Reference 3 are summarized below.

- A change in the attachment of the spacer to the guide tubes.
- A change in the strip thickness of the spacer.
- A change in cladding thickness.
- The first use of an assembly design feature previously irradiated in conjunction with one lattice (i.e. 14x14) in a different lattice (i.e. 17x17).
- A change in enrichment.
- A change in gadolinia-bearing rod locations.

Additional examples are provided in Reference 3 which, while not requiring a submittal to the NRC for the design change, would require an NRC submittal to gain approval for a new or revised model, such as:

- New cladding material.
- A spacer with a new functional mixing behavior or new rod support mechanism.
- A change that would alter the fuel behavior relative to NRC-approved models; for example, rod growth, assembly growth, or clad corrosion.

4. Comparison of Design Criteria

In addition to a description of the design change process, the topical report EMF-92-116PA also includes a specific set of design criteria. The criteria specified in BAW-10239 are identical to those in EMF-92-116PA in most cases. Differences in the criteria specified in these two topical reports are:

Internal Hydriding – In EMF-92-116PA the internal hydriding is controlled by manufacturing specifications and verified by QC inspection. In BAW-10239P the internal hydriding is controlled by a specific limit of 1.5 ppm on the hydrogen content during manufacturing.

Cladding Collapse – In EMF-92-116PA the cladding is prevented from collapsing by requiring that no gaps be allowed to form during irradiation. In BAW-10239P a calculation is performed to evaluate the potential for gap collapse for a defined gap size.

Loading Limits on Assembly Components – The loading limits on assembly components are required in EMF-92-116PA to comply with ASME criteria. In BAW-10239 specific non-ASME criteria are defined to prevent guide tube buckling.

Fretting – Both EMF-92-116PA and BAW-10239P require that the fuel rod be designed to prevent failure due to fretting. BAW-10239 imposes an additional limit on maximum cross flow velocity.

Assembly Liftoff – EMF-92-116PA requires that no liftoff occur for normal operation and anticipated operational occurrences. In BAW-10239P the assembly is allowed to lift for pump overspeed conditions as long as the spring does not go solid and the fuel assembly remains engaged with the reactor internals.

Fuel Assembly Handling – In EMF-92-116PA the fuel assembly handling limit is specified as 2.5 times the assembly weight. BAW-10239 does not specify a handling limit.

In summary, the generic design change process described in EMF-92-116PA (Reference 1)*, in conjunction with the specific design criteria specified in BAW-10239P (Reference 2), will be used to justify fuel design changes for the Advanced Mark-BW without requiring NRC review and approval when the topical report BAW-10239P is referenced. Design changes are subject to the requirements in 10 CFR 50.59, and a licensee's application of this regulation will determine whether a submittal to the NRC is required.

* Note that the criteria in EMF-92-116PA were developed for zircaloy cladding and modified in Reference 5 for M5 cladding. The modifications to the criteria in EMF-92-116PA, as described in Reference 5, are based on the NRC approved topical report, Reference 6.

References

1. EMF-92-116(P)(A), Revision 0, "Generic Mechanical Design Criteria for PWR Fuel Design," Siemens Power Corporation, February 1999.

2. BAW-10239P, Revision 0, "Advanced Mark-BW Fuel Assembly Mechanical Design Topical Report," Framatome ANP, March 2002.

3. Letter, James F. Mallay (Framatome ANP) to Document Control Desk (NRC), EMF-92-116(P), "Generic Mechanical Design Criteria for PWR Fuel Designs," NRC:99:029, July 9, 1999.

4. Letter, Stuart A. Richards (NRC) to James F. Mallay (Framatome ANP), "Seimens Power Corporation Re: Request for Concurrence on Safety Evaluation Report Clarifications (MA6160)," November 3, 2000.

5. BAW-10240(P), Revision 0, "Incorporation of M5™ Properties in Framatome ANP Approved Methods," September 2002.

6. BAW-10227(P)(A), Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," Framatome Cogema Fuels, February 2000.