



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 31, 1992

TO: ALL LIGHT-WATER REACTOR LICENSEES AND APPLICANTS

SUBJECT: SUPPLEMENT 1 TO GENERIC LETTER 90-02, "ALTERNATIVE REQUIREMENTS FOR FUEL ASSEMBLIES IN THE DESIGN FEATURES SECTION OF TECHNICAL SPECIFICATIONS"

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this supplement to Generic Letter (GL) 90-02 to clarify the limitations on the application of currently NRC-approved analytical methods and to withdraw and replace the model technical specifications (TS) which were recommended by GL 90-02, to be consistent with realistic reconstitution configurations.

BACKGROUND

GL 90-02 provides guidance for a line-item change for "Fuel Assemblies" in Section 5, "Design Features," of the TS. This change provides flexibility in the repair of fuel assemblies containing damaged and leaking fuel rods by reconstituting the assemblies.

Historically, licensees have concluded that the reconstitution of a fuel assembly of an approved design with similar fuel rods does not represent an unreviewed safety question and therefore have performed fuel reconstitution under the provisions of 10 CFR 50.59. In addition, the staff has approved the use of stainless steel filler rods in fuel assemblies at low-power core peripheral locations to replace fuel rods damaged by baffle jetting or to reduce the neutron flux in the reactor vessel in response to pressurized thermal shock considerations. Previous reconstitution practice also included a few cases involving the use of filler rods or vacancies, which were limited to two per assembly and to one or two assemblies in the core.

In May 1988, the staff approved a licensee's request to implement a TS change that provided a greater flexibility in fuel reconstitution by removing the peripheral location restriction on dummy rods and relaxing the limitations on fuel rod substitutions in the "Design Features" of the TS for that licensee. The staff did not consider the limitations on the application of approved analytical methods. Later, the staff selected this TS as part of a TS improvement for a model TS for the line-item change to permit fuel reconstitution, and issued GL 90-02 on February 1, 1990. The model TS provided with GL 90-02 permits the licensee

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to substitute Zircaloy-4 fuel rods with stainless steel filler rods or vacant water spaces if the substitution is justified by cycle-specific reload analyses using an NRC-approved methodology. In the generic letter, the staff defined "NRC-approved methodology" as any one of those methods acknowledged in the final safety analysis report and applied to support the original operating license or subsequent methodologies that have been submitted to and accepted by the NRC staff as amendments to the operating license. However, the model TS were in error, since a broad range of fuel configurations were identified that extend well beyond the scope of applications that have been justified by the tests and analyses for the fuel design and the design methods currently approved by the NRC.

COMMON PROBLEM OBSERVED BY THE STAFF IN REVIEWING LICENSEES RESPONSES TO GL 90-02

Upon receiving the industry's applications to implement GL 90-02, the staff found that the generic letter had prompted many licensees to incorrectly assume that their currently approved analytical methods could be extended to proposed configurations permitted by the model TS in GL 90-02. This resulted in the staff having to perform plant- and cycle-specific TS changes to allow necessary fuel reconstitution, which lead to increased staff and licensee expenditures. The staff is issuing this supplement to clarify the limitations on the application of currently NRC-approved analytical methods used in the analysis of reconstituted fuel.

All analytical methods currently approved by the NRC were based upon appropriate tests and analyses for specific fuel assembly configurations. Current NRC-approved methodologies apply to only a few of the reconstituted fuel configurations allowed for by the model TS. The extreme range of the reconstituted fuel configurations allowed for by the model TS is outside the scope of application of these NRC-approved methodologies. Applying these approved methods to configurations for which they were not intended, such as generalized "dummy rod" and "vacant water space" configurations, leads to safety concerns about the conformance of the fuel assembly to specified acceptable fuel design limits that are necessary to preclude the fuel cladding from failing. When responding to GL 90-02, licensees should have evaluated the applicability of the test data used to derive the correlations and limits for the departure from nucleate boiling ratio (DNBR) or for the critical power ratio (CPR) for proposed configurations. The licensees should also have considered the effect on the mechanical design such as the effect of differential thermal expansion on the proper seating of the fuel rod or on the relaxation of the spacer spring which could lead to

fretting wear. In addition, the licensees should have analyzed changes in the fuel design that affect the grid strength or the mass, stiffness, and fundamental frequency of the fuel assembly to ensure that the seismic and loss-of-coolant accident (LOCA) design loading conditions will not cause any structural deformation that could prevent fuel coolable geometry or control rod insertion. The staff did not approve many of the requests to implement the model TS in GL 90-02 because these requests did not meet the analytical justification requirements discussed above.

To resolve the error that prompted many licensees to misinterpret the applicability of existing methodologies in implementing the GL 90-02, the staff presents the following modified guidance to provide flexibility in reconstituting the fuel assemblies, based on the considerations mentioned above.

GUIDANCE FOR FUEL RECONSTITUTION

The reconstitution of a fuel assembly to replace damaged and leaking fuel rods is not considered to be an unreviewed safety question if the repaired fuel assembly constitutes a previously approved design. The licensee may perform such a reconstitution under the provisions of 10 CFR 50.59 without prior approval of the NRC staff if (1) an unreviewed safety question does not exist, and (2) the reconstituted fuel does not require a change to the "Design Features" section of the TS.

The staff considers an NRC-approved methodology to be any methodology that the NRC staff has explicitly approved in a written safety evaluation, or a plant-specific technical specification basis. That NRC-approved methodology must be used only for the purpose and the scope of application specified in the reviewed document as approved or modified in the NRC approval documentation. In general, the scope of application for generic methods is limited to fuel configurations that are represented by fuel assembly test configurations used to validate an approved methodology.

In a few cases, the NRC has approved the use of a fuel assembly with one or two filler rods at an interior core location for specific reload core designs. Such fuel loadings were justified on the basis of the applicability of fuel test configurations with unheated rods (simulating control rod guide tubes) and/or clearly conservative analytical methods for the reconstituted fuel assembly.

Where filler rods fuel configurations are to be proposed for use, the staff encourages licensees and fuel vendors to submit generic topical reports that justify the specified fuel configurations

with filler rods and that define and justify the analytical methods for core analysis to support fuel reconstitution. Applicable data from fuel assembly tests must support the specified fuel configurations to the extent normally required for the nuclear, thermal-hydraulic, and mechanical design of a new fuel type. The justification of the core analysis methods must address the effect on core-wide analyses of permissible core configurations with the reconstituted fuel. The staff has issued the drafts of the new Standard Technical Specifications (STS) for public comment, including the following specification for fuel assemblies under the Design Features Section:

The reactor shall contain [] fuel assemblies. Each assembly shall consist of a matrix of zircaloy clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide as fuel material[, and water rods]. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with NRC-approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff-approved codes and methods, and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core regions.

Licensees may propose this modification as a line-item improvement to accommodate limited fuel reconstitution based on NRC-approved generic topical reports or may develop similar plant-specific specifications, if needed. The NRC has not reviewed topical reports to justify a generalized fuel configuration with filler rods. Therefore, the staff will accept this TS but not the model TS described in GL 90-02. Although the staff does not require that licensees withdraw previously approved amendments to the TS of that form, licensees, in the future, should interpret the phrase "NRC-approved methodology" in such TS in accordance with the guidance of this supplement to GL 90-02. Licensees planning to submit future TS amendments to permit fuel reconstitution with filler rods are encouraged to ensure that the analytical methods to support these amendments are approved well in advance of the operational need.

BACKFIT DISCUSSION

The NRC staff has determined that core alterations performed in accordance with the guidance provided in Generic Letter 90-02 do not ensure acceptable protection against loss of integrity of the fuel cladding. General Design Criterion (GDC) 10 requires that

the reactor core be designed in accordance with the specified acceptable fuel design limits (SAFDL). This Supplement 1 to GL 90-02 clarifies that, when revising their TS to permit fuel reconstitution, licensees need to justify the applicability of existing NRC-approved methodology or develop a modified methodology which is applicable for the safety evaluation, in order to ensure that proposed configurations of reconstituted fuel assemblies conform to the SAFDL. Although this supplement contains a change in staff position with respect to meeting the analytical requirements for revising TS on fuel reconstitution, licensees are not required by this supplement, or by GL 90-02, to change their TS. However, the staff has concluded that this change in staff position is a backfit which is necessary in order to ensure compliance with GDC 10. The basis for the determination is set forth in the preceding discussion of this supplement. Accordingly, pursuant to 10 CFR 50.109(a)(4)(i) a backfit analysis is not required.

This supplement does not seek to collect any information, and hence, the Paperwork Reduction Act does not apply.

No response is required to this letter. If you have any questions regarding this matter, please contact the technical contact listed below.

Sincerely,



James G. Partlow
Associate Director for Projects
Office of Nuclear Reactor Regulation

Enclosure:

List of Recently Issued NRC Generic Letters

Technical Contact: Laurence E. Phillips, NRR
(301) 504-3232

LIST OF RECENTLY ISSUED GENERIC LETTERS

<u>Generic Letter No.</u>	<u>Subject</u>	<u>Date of Issuance</u>	<u>Issued To</u>
<u>87-02 SUPPLEMENT 1</u>	SAFETY EVALUATION REPORT NO. 2 ON SQUG GENERIC IMPLEMENTATION PROCEDURE, REVISION 2.	05/22/92	ALL USI A-46 LICENSEES WHO ARE SQUG MEMBERS
<u>92-03</u>	COMPILATION OF THE CURRENT LICENSING BASIS: REQUEST FOR VOLUNTARY PARTICIPATION IN PILOT PROGRAM	03/19/92	ALL NUCLEAR POWER PLANT APPLICANTS AND LICENSEES
<u>92-01 REVISION 1</u>	REACTOR VESSEL STRUCTURAL INTEGRITY, 10CFR50.54(f)	3/06/92	ALL HOLDERS OF OP LICENSES OR CONST. PERMITS FOR NUCLEAR PWR PLANTS (EXCEPT YANKEE ATOMIC FOR YANKEE NUC PWR STA.)
<u>92-02</u>	RESOLUTION OF GENERIC ISSUE 79, UNANALYZED REACTOR VESSEL (PWR) THERMAL STRESS DURING NATURAL CONVECTION COOLDOWN	03/06/92	ALL HOLDERS OF OP LICENSES OF CONST. PERMITS FOR PWRs
<u>92-01</u>	REACTOR VESSEL STRUCTURAL INTEGRITY, 10CFR50.54(f)	<u>NOT ISSUED</u> Revision Listed Above	ALL HOLDERS OF OP LICENSES OR CONST. PERMITS FOR NUCLEAR PWR PLANTS (EXCEPT YANKEE ATOMIC FOR YANKEE NUC PWR STA.)
* <u>89-10 SUPPLEMENT 4</u>	CONSIDERATION OF VALVE MISPOSITIONING IN BWRs	02/14/92	ALL LICENSEES OF OP NUC PWR PLANTS AND HOLDERS OF CONSTRUCTION PERMITS OR PWR PLANTS
* NOTE: 89-10 Supp. 4 - Accession No. 9202070037 has been changed to <u>9202250311</u> .			
<u>88-01 SUPPLEMENT 1</u>	NRC POSITION ON INTER-GRANULAR STRESS CORROSION CRACKING (IGSCC) IN BWR AUSTENITIC STAINLESS STEEL PIPING	02/04/92	ALL LICENSEES OF OP BWRs & HOLDERS OF CONST. PERMITS FOR BWRs
<u>91-19</u>	INFO TO LICENSEES RE: NEW TELEPHONE NOS. AT NRC WHITE FLINT NORTH BLDG.	12/19/91	ALL HOLDERS OF OP LICENSES OR CONST. PERMITS FOR NPRs

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Criterion (GDC) 10 requires that the reactor core be designed in accordance with the specified acceptable fuel design limits (SAFDL). This Supplement 1 to GL 90-02 clarifies that, when revising their TS to permit fuel reconstitution, licensees need to justify the applicability of existing NRC-approved methodology or develop a modified methodology which is applicable for the safety evaluation, in order to ensure that proposed configurations of reconstituted fuel assemblies conform to the SAFDL. Although this supplement contains a change in staff position with respect to meeting the analytical requirements for revising TS on fuel reconstitution, licensees are not required by this supplement, or by GL 90-02, to change their TS. However, the staff has concluded that this change in staff position is a backfit which is necessary in order to ensure compliance with GDC 10. The basis for the determination is set forth in the preceding discussion of this supplement. Accordingly, pursuant to 10 CFR 50.109(a)(4)(i) a backfit analysis is not required.

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Sincerely,

James G. Partlow
Associate Director for Projects
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