

# BWR OWNERS' GROUP

J. E. Conen, Chairman  
Tel: (734) 586-1960  
Fax: (734) 586-4208  
conenj@dteenergy.com

Detroit Edison, A DTE Energy Company • Fermi 2 • 6400 North Dixie Highway • Newport, MI, 48166

BWROG – 06009  
March 30, 2006

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Subject: BWR Owners' Group Alternate Source Term High Burn Up BWR Fuel Rod Gap Release Fractions

## **BWROG Project Number 691**

Enclosures: (1) NEDO-33163, "High Burn Up BWR Fuel Rod Gap Release Fractions", dated October 2004.  
(2) BWR Fuel Data Input for BWROG BWR Fuel Gap Fraction Analysis", dated October 2004. **(GE Proprietary Information)**  
(3) Evaluation of the Impact of Fast Transients on the Gap Release Fractions, dated October 2004. **(GE Proprietary Information)**  
(4) Affidavit Requesting Withholding of Enclosures 2 and 3.

Reference: B. Pham to S. Dembek, Summary of Meeting held on April 28, 2004, with the Boiling Water Reactor Owners' Group (BWROG) to Discuss Fuel Gap Fraction Topical Report Submittal, dated May 7, 2004. (ML041310018 and ML041250486)

Kenneth Putnam to NRC, Subject: "BWR Owners' Group Alternate Source Term High Burn Up BWR Fuel Rod Gap Release Fractions," dated October 8, 2004. (BWROG 04027)

B. Pham to Kenneth Putnam, Request for the Review of Licensing Topical Report (LTR) NEDO-33163, "High Burn Up BWR [Boiling Water Reactor] Fuel Rod Gap Release Fractions". (TAC No. MC3869)

The BWR Owners' Group (BWROG) is re-submitting the enclosed Licensing Topical Report (LTR), NEDO-33163, "High Burn Up BWR Fuel Rod Gap Release Fractions", dated October, 2004, and other associated attachments, under the NRC licensing topical report program for review, approval and safety evaluation for future referencing by BWROG licensees in subsequent licensing actions.

D044

Following a pre-submittal meeting in April of 2004, this LTR was originally submitted October 8, 2004 by the BWROG. The NRC declined to review the LTR since the NRC's Office of Research currently had a similar study underway such that a review of NEDO-33163 was deemed counterproductive. On January 11, 2006, Michelle Honcharik of NRC informed the BWROG that review of the BWROG LTR would now be appropriate in addressing gap fractions for high burnup fuel, and she requested that BWROG resubmit the LTR for review.

A significant number of Boiling Water Reactors (BWRs) have been licensed to the Alternative Source Term (AST) using the guidance in Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors". Table 3 of RG 1.183 reports NRC-approved gap fractions for non-LOCA events. To ensure the applicability of these gap fractions with the underlying technical bases, Footnote 11 to RG 1.183 contains a limitation that restricts the application of the report gap fractions to those fuel designs with a peak burnup up to 62 GWd/MTU provided that the maximum linear heat generation rate does not exceed 6.3 kW/ft peak rod average power for burnups exceeding 54 GWd/MTU.

Although the power of BWR fuel rods<sup>1</sup> at high-exposure is limited by Technical Specifications on Linear Heat Generation Rate (LHGR), the limitations required by Footnote 11 of RG 1.183 are currently challenging for certain BWR core designs. Footnote 11 of RG 1.183 indicates that, as an alternative, fission gas release calculations using NRC-approved methodologies and projected power histories that bound the limiting projected fuel power history may be considered on a case-by case basis. The Enclosure 1 LTR documents the basis and approach for alternative gap fractions for BWR fuel types based on robust fuel power histories to obtain conservative bounding BWR gap release fractions.

Enclosure 2 provides the application fuel design data for GE fuel types (GE Proprietary) to support the Staff's review of the LTR.

The BWROG presented a summary of the known conclusions of this LTR in the reference April 2004 pre-submittal meeting. At that meeting, the NRC Staff expressed a concern regarding the applicability of the calculated gap fractions in the event of a fast reactor power transient. In response to the Staff's inquiry, BWROG developed Enclosure 3, "Evaluation of the Impact of Fast Transients on the Gap Release Fractions", dated October 2004 (GE Proprietary), to provide a technical justification that supports the application of these gap fractions considering fast reactor power transients.

Enclosures 2 and 3 contain GE Proprietary Information that GE maintains in confidence and withholds from public disclosure. The Enclosure 4 affidavit identifies that the designated information has

---

<sup>1</sup>-BWR fuel, as described in Attachment 1, includes GE, Framatome and ABB BWR fuel designs.

been handled and classified as proprietary to GE. Along with the affidavit, this information is suitable for review by the NRC. GE hereby requests that the designated information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

To allow application of AST methodology for projected BWR core designs, the BWROG proposes revised non-LOCA gap fractions for BWRs supported by the technical bases discussed in Enclosure 1. As described in Enclosure 1, when local power peaking effects are considered, bounding bundle-average gap fractions can be developed for the existing BWR fuel types. As shown in the Table below, the only change from the RG 1.183 gap fractions was found to be an increase in the alkali metal gap fraction from 12% to 16%. With NRC approval of the proposed gap fractions presented in Enclosure 1, it is the BWROG position that the limitations in Footnote 11 to RG 1.183 would not longer be applicable to BWRs.

**Comparison of Proposed BWR  
Gap Fractions to Table 3 of RG 1.183**

	<b>Proposed BWR Non-LOCA Gap Fractions</b>	<b>Table 3 to RG 1.183</b>
I-131	0.08	0.08
Kr-85	0.10	0.10
Other Noble Gases	0.05	0.05
Other Halogens	0.05	0.05
Alkali Metals	0.16	0.12

As new BWR fuel designs are introduced or, in the unlikely event that plants are projected to operate for a short period outside the power history bounds of this LTR, it is requested that the FRAPCON-3 methodology described in Enclosure 1 be approved for continued applicability of the proposed BWR gap fractions including its use for new BWR fuel gap fractions. Such approval would be expected to be subject to the following restrictions:

1. Only BWR fuel designs are to be evaluated, and
2. Rod and local exposures are to be no greater than those licensed for the fuel design.

The BWROG requests a waiver for the fees associated with the requested NRC review of this LTR pursuant to the provisions in 10 CFR 170.11, specifically:

1. This request will assist the NRC Staff in developing revised NRC regulatory guidance (on acceptable BWR fuel gap fractions) in accordance with 10 CFR 170.11(a)(1)(ii).
2. This request will support NRC generic regulatory improvements in accordance with 10 CFR 170.11(a)(1)(iii).
3. NRC request for BWROG to resubmit the LTR for review.

The BWROG believes that this request qualifies for waiver of review fees, and requests that the NRC not initiate review of the LTR until this determination is made. BWROG requests prompt notification if the fee waiver is denied.

BWROG-06009

March 30, 2006

Page 4

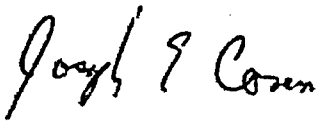
The BWROG requests NRC review and approval of the Enclosure 1 LTR (NEDO-33163) by December 31, 2006. As preliminary core designs are developed for future cycles, the deletion of the limitation in Footnote 11 of RG 1.183 would permit more reload design flexibility and consequently, more efficient core designs.

While this LTR, and associate attachments, have been endorsed by a substantial number of the members of the BWR Owners' Group, it should not be interpreted as a commitment of any individual member to a specific course of action. Each member must endorse any BWROG position in order for that position to become that member's position.

In accordance with NRC procedures, three (3) copies of the Attachments are being provided to the BWROG NRC Project Manager for Staff use during the review.

Any questions regarding this submittal can be directed to the undersigned or Greg Broadbent (Entergy-GGNS), BWROG AST Committee Chairman at (601) 437-6224.

Sincerely,



JE Conen, Chairman  
BWROG Owners' Group

Cc: BWROG EOC  
BWROG Primary Representatives  
BWROG AST Committee  
Michelle C. Honcharik, USNRC (3 copies)  
TG Hurst, GE Energy  
KA McCall, GE Energy