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COMMENT ON DRAFT REGULATORY GUIDE DG-3023, *NUCLEAR CRITICALITY SAFETY STANDARDS FOR FUELS AND MATERIAL FACILITIES*, PROPOSED REVISION 1 OF REGULATORY GUIDE 3.71, DATED AUGUST 1998

References: (1) NUREG CR-6801 "Recommendations for Addressing Axial Burnup in PWR Burnup Credit Analyses," March 2003
(2) Framatome ANP Inc. Calculation "BWR Axial Burnup Profile Evaluation," July 2004
(3) Bechtel SAIC Company, LLC, "Source of Burnup Values for Commercial Spent Nuclear Fuel Assemblies," December 2004
(4) Ltr, Ziegler to Director, Division of High-Level Waste Repository Safety (NRC), dtd 1/11/05 (Transmittal of Criticality Information Addressing Open Item 1 from Safety Evaluation Report for Disposal Criticality Analysis Methodology Topical Report)

The U.S. Department of Energy provides the following comment in response to the U.S. Nuclear Regulatory Commission (NRC) notice requesting public comments on Draft Regulatory Guide DG-3023 (Draft Regulatory Guide), Proposed Revision 1 of Regulatory Guide 3.71, "Nuclear Criticality Safety Standards for Fuels and Material Facilities," issued in May 2005.

We offer the following comment to further clarify the purpose and use of the Draft Regulatory Guide:

Section C, Regulatory Position

The last sentence of the fourth bullet of Item 2, "ANSI/ANS-8 Nuclear Criticality Standards Endorsed by the NRC with Exceptions" states, "The only exception is that the licensees and applicants may take credit for fuel burnup only when the amount of burnup is confirmed by physical measurements that are appropriate for each type of fuel assembly in the environment in which it is to be stored."

Our suggested change to this statement is: "The only exception is that the licensees and applicants may take credit for fuel burnup only when the amount of burnup is verified as appropriate for each type of fuel assembly in the environment in which it is to be stored."

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The rationale for the suggested change to the draft guide is that reactor records are a more accurate source of fuel assembly burnup data than physical measurements. The available physical measurement systems rely on reactor records for at least part of their calibration, so the accuracy of systems are limited by the accuracy of the records, and there are additional uncertainties associated with measurement which further reduces the accuracy of physical measurement systems. There have been issues identified by the NRC staff with accepting the reactor records without verification. The specific issues include:

1. The quality and accuracy of the assigned burnups are not uniform for all utilities and for all years of reactor operation;

2. The effect of non-uniform burnup as a function of position along the axis of the fuel assembly needs to be accounted for; and

3. A misload of an assembly cannot be ruled out; and therefore, the criticality effects of a misload must be accounted for.

However, there are alternative means of providing the verification and addressing the issues, other than physical measurements.

For issues with the quality and accuracy of the assigned burnups, the record verification effort can identify uncertainty with the records and alternative means, or additional margins can be used for the assemblies with uncertain records. For the issue of non-uniform axial burnup, there is a large database of axial burnup values for assemblies described in Reference 1, and there are methods as described in Reference 2 for conservatively accounting for the axial burnup variations. For the issue of misloading assemblies, the probability of misloading assemblies can be evaluated, and, with appropriate operational controls implemented (e.g., independent checking), the probability of misload can be lowered. Physical measurements of burnup are not guaranteed to prevent issues like misload. Consequently, physical measurements should not be the only specified means of providing verification that a fuel assembly's burnup value is acceptable.

A more extensive discussion of the reasoning and alternative methods can be found in Reference 3, which has been provided to the NRC by Reference 4.

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