

DOCKET: 70-1113

LICENSEE: Global Nuclear Fuel-Americas, L.L.C.  
Wilmington, NC

SUBJECT: SAFETY EVALUATION REPORT: REVISION TO CHAPTER 6 (TAC L31910)

## BACKGROUND

Global Nuclear Fuel - Americas (GNF-A) submitted a revision to the criticality safety program requirements in Chapter 6 of its Consolidated Application, currently revision 4. This revision was submitted under Section 1.3.1.2, "Changes Not Requiring the U.S. Nuclear Regulatory Commission (NRC) Approval," of the current Consolidated Application. Section 1.3.1.2 allows changes without prior NRC approval under certain conditions specified in the license. Section 1.3.1.2 states in part that "GNF-A is authorized to make changes to the commitments in the licensed safety program without prior approval, provided that the changes do not decrease the effectiveness of the approved commitments." The amendment involves a revision to the following sections of the license application:

- Chapter 6, Section 6.2.2, Means of Control
- Chapter 6, Section 6.2.3, Analysis Methods

The licensee stated that the proposed changes to Section 6.2.2 would align the definitions of passive engineered, active engineered, and administrative controls with NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility." The licensee also indicated that the proposed changes to Section 6.3.2 would align the  $k_{\text{eff}}$  limit and criticality code validation technique descriptions with current methods and terminology in use at the facility.

On January 17, 2006, the NRC sent a Request for Additional Information (RAI) to GNF-A. The licensee provided its response to the RAI by letter dated February 21, 2006. On March 28, 2006, the staff held a teleconference with the licensee to obtain clarifying information on the response to the RAI. On April 4, 2006, the staff requested further clarification via email. As a result of the additional correspondence, the licensee formally re-submitted a page change to Chapter 6.0 on April 11, 2006.

## DISCUSSION

### 1. Licensee's Submittal:

The application license amendment included replacements in their entirety to the Table of Contents, the Revisions by Chapter, and Chapter 6.0. The changes to Section 6.2.2, "Means of Control," revised the definitions of passive engineered controls, active

engineered controls, and administrative controls. The changes in Section 6.3.2, "Analysis Methods," included revisions to Section 6.3.2.1, " $k_{\text{eff}}$  Limit," and Section 6.3.2.3, "Validation Techniques." In the current license, Section 6.3.2.1 requires that  $k_{\text{eff}}$  for accident conditions be less than or equal to 0.97. The revised application modifies this requirement by stating that the  $k_{\text{eff}}$  for accident conditions be less than or equal to the established Upper Subcritical Limit (USL). The USL was not previously defined or discussed in the current license, but the revised Chapter 6.0 defines the USL as the sum of one plus the bias minus the bias uncertainty and the Margin of Subcriticality (MoS). The revised section identifies a minimum MoS of 0.03 that is used to establish the acceptance criteria for criticality calculations. This revision to  $k_{\text{eff}}$  for accident conditions includes the addition of the bias uncertainty term.

In the revision, Section 6.3.2.3, "Validation Techniques," has been rewritten. A description of the validation methodology including definitions for the bias, bias uncertainty, and the margin of subcriticality are now provided. The validity of the calculational method is demonstrated and documented in validation reports pursuant to internal procedures. The validation of the computer code must determine its calculational bias, bias uncertainty, and the MoS. The bias is defined as the systematic difference between the calculational results and the experimentally-measured values of  $k_{\text{eff}}$  for a fissile system. The bias uncertainty is defined as the integrated uncertainty in the experimental data, calculational methods and models, and is estimated by a statistical analysis of calculated  $k_{\text{eff}}$  values for critical experiments. The MoS is defined as an allowance for any unknown uncertainties that may affect the calculated value of  $k_{\text{eff}}$  beyond those accounted for in the bias and bias uncertainty. The validation of the calculational methods considers a diverse set of parameters, and the selection of critical experiments incorporated are assessed for completeness, accuracy, and applicability to the facility. The statistical methods that are used in determining the calculational bias, bias uncertainty, and USL are also described. The calculational bias is determined to be constant if no trends exist or as a smooth function by regression analysis if trends exist. The bias uncertainty is estimated by a confidence interval that ensures that there is at least a 95% level of confidence that future  $k_{\text{eff}}$  will be above the lower confidence limit.

## 2. NRC Nuclear Criticality Safety Review:

The staff reviewed the September 29, 2005, license amendment and the RAI responses provided by GNF-A dated February 21, 2006, and April 11, 2006. The staff reviewed the revised Section 6.2.2, "Means of Control," and finds that it is acceptable because the changes to the definitions of passive engineered controls, active engineered controls, and administrative controls are administrative in nature and do not alter their meanings. Additionally, the revised definitions are consistent with the acceptance criteria provided in NUREG-1520, which the NRC has previously determined to be an acceptable means to demonstrate meeting the requirements in 10 CFR Part 70.

The staff reviewed the revised Section 6.3.2, "Analysis Methods," and finds that it is acceptable because it includes a summary of the validation report that is consistent with the acceptance criteria discussed in Section 5.4.3.4.1 of NUREG-1520. Specifically, the revised section contains a summary description of the methodology; a commitment to

use pertinent computer codes, assumptions, and techniques in the methodology; a commitment to properly perform the mathematical operations in the methodology; a commitment to use data based upon reliable and reproducible experimental measurements; a commitment to use plant-specific benchmark experiments and data derived therefrom to validate the methodology; and a commitment to use controlled software and hardware when using the methodology.

Based on the NRC staff review as described above, the staff concludes that there is reasonable assurance the licensee's conduct of operations will be based on nuclear criticality safety (NCS) methodologies and NCS technical practices, which will ensure that the fissile material will be possessed, stored, and used safely according to the requirements in 10 CFR Part 70. Additionally, the licensee has in place an NCS program in accordance with the subcriticality of operations and margin of subcriticality for the safety requirements in 10 CFR 70.61(d).

## ENVIRONMENTAL REVIEW

The revision of Section 6.2.2 to align passive engineered, active engineered, and administrative control definitions with the Standard Review Plan, NUREG-1520, and the revision of Section 6.3.2 to align the  $k_{\text{eff}}$  limit and criticality code validation technique descriptions with current methods and terminology are administrative in nature.

In accordance with 10 CFR 51.22(c)(11), the issuance of amendments to licenses for fuel cycle plants that are administrative, organizational, or procedural in nature, or which result in a change to process operations or equipment are eligible for categorical exclusion provided that:

- (i) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.
- (ii) There is no significant increase in individual or cumulative occupational radiation exposure.
- (iii) There is no significant construction impact.
- (iv) There is no significant increase in the potential for or consequences from radiological accidents.

These changes do not affect the scope or nature of the licensed activity and are administrative in nature, so they will not result in a significant change in the types or amounts of effluents released offsite; there will not be a significant increase in individual or cumulative occupational radiation exposure; and there will not be a significant increase in the potential or consequences from radiological accidents. There is no construction associated with these changes, so there will not be any impact from construction.

The staff has determined that the proposed changes do not adversely affect public health and safety or the environment and are categorically excluded from the requirement to prepare a site-specific environmental assessment. Therefore, in accordance with 10 CFR 51.22(c)(11), neither an Environmental Assessment nor an Environmental Impact statement is warranted for this action.

## CONCLUSION

The staff concludes that there is reasonable assurance the licensee's conduct of operations will be based on nuclear criticality safety (NCS) methodologies and NCS technical practices, which will ensure that the fissile material will be possessed, stored, and used safely according to the requirements in 10 CFR Part 70. The staff concludes that the changes do not decrease the effectiveness of approved commitments, and were therefore submitted in accordance with Section 1.3.1.2 of the consolidated license application. The staff recommends approval of the request that Section 6.2.2 of the license application be modified to align passive engineered, active engineered, and administrative control definitions with the Standard Review Plan, NUREG-1520, and Section 6.3.2 of the license application be modified to align the  $k_{\text{eff}}$  limit and criticality code validation technique descriptions with current methods and terminology.

## PRINCIPAL CONTRIBUTORS

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