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June 6, 2012

Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Subject: Submission of EPRI Reports *"Benchmarks for Quantifying Fuel Reactivity Depletion Uncertainty"* and *"Utilization of the EPRI Depletion Benchmarks for Burnup Credit Validation"*

Attn: Sheldon Stuchell

Enclosed are five (5) paper copies of the reports "*Benchmarks for Quantifying Fuel Reactivity Depletion Uncertainty*" and "*Utilization of the EPRI Depletion Benchmarks for Burnup Credit Validation,"* EPRI reports 1022909 and 1025203, respectively. The documents are available to the public and can be downloaded at the following EPRI web site:

http://my.epri.com/portal/server.pt?Abstract_id=000000000001022909
http://my.epri.com/portal/server.pt?Abstract_id=000000000001025203

These reports are being transmitted to the NRC staff to directly support the long term resolution of spent fuel pool criticality issues through NRC's development of a Regulatory Guide as described in the *On Site Spent Fuel Criticality Analyses NRR Action Plan.* Implementation of methods to calculate depletion uncertainties by licensees is an important part of the long term resolution of the spent fuel criticality issues. Currently, the approach heavily relies on an engineering judgment of 5% of the reactivity decrement. It is expected that any new guidance would update this approach.

By submitting the reports, EPRI is seeking approval to use the benchmarks developed in Report 1022909 for validation of the delta k of depletion in the manner demonstrated in Report 1025203. Report 1025203 demonstrates the validation for SCALE 6.1, but the approach is valid for other computer codes and libraries. The analysis of the benchmarks results in a bias. The uncertainty in that bias comes from the benchmark uncertainty (found on Table C-1 in Report 1022909). This bias and uncertainty removes the need for a bias and uncertainty related to isotopic concentration and worth. Fresh fuel (UO_2) critical experiments are still required to determine the bias and uncertainty in the initial conditions, but MOX critical experiments and the HTC critical experiments are not needed in this approach.

The NRC is giving consideration to a methodology for calculation of the depletion uncertainty through work contracted with ORNL. It is important to note that there are distinct differences in

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the fundamental approaches taken by ORNL and EPRI. ORNL's work is based upon chemical assay measurements and critical experiments, while EPRI's approach is based upon reactor critical conditions. As a result, NRC review of both ORNL and EPRI approaches will result in concise regulation and potentially fewer exceptions from licensees. Furthermore, it would enable NRC to develop improved guidance which has the benefit of being informed by two distinct approaches for determining the depletion uncertainties in spent fuel pool criticality analyses.

Prior to completing the methodology documented in the subject EPRI reports, the proposed methodology was presented to NRC at public meetings in September 2010 and May 2011. Since these meetings, NRC has re-iterated their interest in reviewing the methods in the EPRI reports as documented in Action Item #24 of *On Site Spent Fuel Criticality Analyses NRR Action Plan*, last updated March 2012, which specifically states that staff will review these methods once submitted by EPRI. Consistent with Action Item #24, the EPRI reports are being submitted in order to provide information for staff consideration in the development of regulatory guidance.

If you have any questions on these reports or this submittal, please contact me (650-855-2164) or Albert Machiels (650-855-2054).

Sincerely,

Christine King

Christine King
EPRI
Director, Nuclear Fuel and Chemistry

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