Westinghouse

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Site
P.O. Drawer R
Columbia, South Carolina 29250
USA

U. S. Nuclear Regulatory Commission
ATTN: Ms. Breeda Reilly, Project Manager
Office of Nuclear Material Safety and Safeguards
Fuel Manufacturing Branch
Division of Fuel Cycle Safety and Safeguards
Mail Stop EBB2-40
Washington, DC 20852

Direct tel: 803-647-3137
Direct fax: 803-695-3964
e-mail: alstadcd@westinghouse.com
Your ref:
Our ref: LTR-RAC-07-85

November 9, 2007

SUBJECT: AFFIDAVIT TO WITHHOLD INFORMATION FROM PUBLIC KNOWLEDGE

I, Cary. D. Alstadt, do hereby state,

1. I am the Columbia Fuel Fabrication Facility (CFFF) Plant Manager, Westinghouse Electric Company, LLC, (WEC), and am authorized to make and execute this affidavit.
2. On November 9, 2007, WEC provided to representatives of the Nuclear Regulatory Commission license amendment information per WEC letter number LTR-RAC-07-84. It is Westinghouse's position that the Nuclear Criticality Safety Calculations attached to this WEC letter should be withheld from public disclosure as confidential commercial information under 2.390(a)(4). Enclosed with this affidavit is a redacted version of the documents which may be made publicly available.
3. The information provided is routinely withheld from public disclosure, was submitted to the Commission in confidence and is not available in public sources.
4. Disclosure of the subject information would harm the competitive position of Westinghouse since this report contains substantial sensitive information related to the company's nuclear criticality safety program.

For all the foregoing reasons, Westinghouse requests that the subject information be withheld from public disclosure by virtue of 10 CFR 2.390(a)(4).

for Cary. D. Alstadt, CFFF Plant Manager
November 9, 2007

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Site
P.O. Drawer R
Columbia, South Carolina 29250
USA

U. S. Nuclear Regulatory Commission
Ms. Breeda Reilly, Project Manager
Fuel Manufacturing Branch
Division of Fuel Cycle Safety and Safeguards
11545 Rockville Pike
Mail Stop EBB2-40
Washington, DC 20852

Direct tel: 803-647-2045
Direct fax: 803-695-3964
e-mail: couturgf@westinghouse.com
Your ref:
Our ref: LTR-RAC-07-84

November 9, 2007

SUBJECT: WESTINGHOUSE LICENSE SNM-1107 AMENDMENT REQUEST (TAC NO. L32650)

Westinghouse Electric Company, LLC (WEC) hereby submits the following information in support of our September 13, 2007 license amendment, and as requested in your October 18, 2007 acknowledgement letter. The validation report, *Determination of Bias for Heterogeneous Systems Modeled Using MCNP-5, CN-CRI-06-39, Rev. 1,* is provided in response to the first item within the acknowledgement letter.

In regard to the second item, there is no additional justification necessary for the use of a minimum margin of subcriticality (MoS) of 0.02. The license amendment as requested is to allow for normal case conditions involving operations taking place in the final assembly wash pit to exceed 0.95 only. All other requirements contained in SNM-1107 will continue to be adhered to, including those requirements applicable to conditions that utilize the minimum allowed MoS of 0.02. All required justifications provided for the use of a MoS of 0.02 apply to this license amendment, as it does not involve any alteration of the upset scenario requirements (for which the MoS of 0.02 applies).

If you have any questions, please contact me at (803) 647-2045 or Ralph Winiarski at (803) 647-3173.

Sincerely,

Gerard F. Couture, Manager,
Licensing and Regulatory Programs
Westinghouse Columbia Fuel Fabrication Facility

Docket 70-1151 License SNM-1107

Attachment

cc:

U. S. Nuclear Regulatory Commission, Region II
Mr. Richard Gibson
Sam Nunn, Atlanta Federal Center
61 Forsyth Street, SW., Suite 23T85
Atlanta, GA 30303

NCS Calculation Note Number:	Revision:	Page Number:	Total Pages:
CRI-06-39	1	1	28

NCS Calculation Note Title:

Determination of Bias for Heterogeneous Systems Modeled using MCNP 5

Objective:

The objective of this calc note is to document the bias and bias uncertainty for heterogeneous systems modeled at the Columbia Fuel Fabrication Facility (CFFF) using the MCNP 5 code. The configuration controlled MCNP 5 was executed on an HP-ML370 platform running the SLES9 Linux operating system identified as NF Compute Cluster. The MCNP 5 code bias and bias uncertainty was calculated for a collection of heterogeneous benchmark critical experiments using the default cross section library.

Results:

The Upper Subcritical Limit (USL) for heterogeneous uranium oxide (UO_2) modeled using MCNP 5 and the default cross section library is:

The USL includes a 0.02 Margin Of Subcriticality (MOS)

. The analyzed system k_{eff} is determined to be acceptable if:

where:

$k_s = k_{eff}$ from MCNP 5, and

σ_s = the standard deviation in k_{eff} from MCNP 5

Author (Print):	Author (Sign):	Date:
S. M. Revolinski		
Technical Reviewer (Print):	Technical Reviewer (Sign):	Date:
M. R. Corum		
NCS Engineering Manager (Print):	NCS Engineering Manager (Sign):	Date:
R. J. Winiarski		

Revision Log

Rev	Date	Revision Description/Reason
0	01/23/2007	Original Issue
1	02/21/2007	

Table of Contents

1.0 INTRODUCTION **4**

1.1 BACKGROUND/PURPOSE 4
1.2 LIMITS OF APPLICABILITY 4

2.0 CONCLUSIONS **5**

3.0 ASSUMPTIONS & OPEN ITEMS **5**

3.1 ASSUMPTIONS 5
3.1 OPEN ITEMS 5

4.0 ACCEPTANCE CRITERIA **5**

5.0 COMPUTER CODES USED IN CALCULATION **5**

6.0 REFERENCES **5**

7.0 CALCULATIONS **6**

7.1 METHOD DISCUSSION 6
7.2 INPUT 10
7.3 EVALUATIONS, ANALYSIS, AND DETAILED CALCULATIONS 10

1.0 INTRODUCTION

1.1 Background/Purpose

Nuclear criticality safety analysis is performed for all fissile material systems and operations at the Westinghouse Columbia Fuel Fabrication Facility (CFFF). The nuclear criticality safety analysis establishes the nuclear safety operating limits for the systems and operations. Calculational methods are used to provide an estimate of criticality conditions and the margin of subcriticality for the systems and operations under evaluation. The computational methods predict the neutronic behavior of the system and operation. However, certain approximations are inherent in the computer code used including inexact neutron cross section data and statistical uncertainty.

Validation compares the computational method with documented critical experiments to determine any bias that might exist between the calculated reactivity of a given system and the actual conditions. It is a process that determines and establishes computational method applicability, adequacy, and uncertainty.

This calc note documents the validation of the MCNP 5 computer code system for operations at the Westinghouse CFFF that involve heterogeneous fissile materials (UO_2). The validation is conducted using the MCNP 5 default cross section library. The validation is for use by the Nuclear Criticality Safety personnel in performing analysis and evaluation of various plant-site activities involving enriched uranium. Through the selection and validation of appropriate benchmark critical experiments and analysis, the computational method will be validated for the entire range of normal and off-normal operating conditions involving heterogeneous fissile material at the Westinghouse CFFF.

1.2 Limits of Applicability

The Area Of Applicability (AOA) refers to the key physical parameters that define a particular fissile configuration. The AOA is defined by the critical experiment parameters chosen for code validation. The AOA established for systems that include heterogeneous fissile materials at the Westinghouse CFFF is shown in Table 7. The parameters of the system to be analyzed must be checked against Table 7 to determine if the conclusions established in this calc note are applicable. If a system does not fall within the defined area of applicability, justification for using the USLs defined in this calc note must be made, or the margin of subcriticality may be increased (and adequately justified), dependent upon the specific system being analyzed.

2.0 CONCLUSIONS

The Upper Subcritical Limit (USL) for heterogeneous uranium systems modeled using MCNP 5 and the default cross section library is:

The USL includes a 0.02 Margin Of Subcriticality (MOS) and
. The analyzed system k_{eff} is determined to be acceptable if:

where:

$k_s = k_{eff}$ from MCNP 5, and

σ_s = the standard deviation in k_{eff} from MCNP 5

3.0 ASSUMPTIONS & OPEN ITEMS

3.1 Assumptions

No assumptions are made.

3.1 Open Items

No open items exist.

4.0 ACCEPTANCE CRITERIA

The acceptance criteria are established in this calc note. See the Conclusion Section for details.

5.0 COMPUTER CODES USED IN CALCULATION

A computer code was not used to develop the Upper Subcritical Limit (USL) documented in this calc note. Spreadsheet calculations are used for all calculations.

6.0 REFERENCES

1. *Nuclear Criticality Safety in Operations with Fissionable Material Outside of Reactors*, ANSI/ANS-8.1(1983), American Nuclear Society.

2. W. Michael Bowen and Carl A. Bennett. NUREG/CR-4604, PNL-5849. "Statistical Methods for Nuclear Material Management." December 1988.

3. J. C. Dean, R. W Tayloe, NUREG/CR-6698, "Guide for Validation of Nuclear Criticality Safety Calculational Methodology", January 2001

4. *International Handbook of Evaluated Criticality Safety Benchmark Experiments*, NEA/NCS/DOC(95)03, Organization for Economic Cooperation and Development, September 2006.

5. S. M. Revolinski, CN-CRI-06-038. "MCNP 5 Benchmark Calculations for Low Enriched Heterogeneous Systems", January 2007.

7.0 CALCULATIONS

7.1 Method Discussion

7.3 Evaluations, Analysis, and Detailed Calculations

$\overline{x_i}$							

Observation Number	x_i	z_i	$F^*(z_i)$	$G(z_i)$	$\lvert F^*(z_i) - G(z_i)\rvert$	$\lvert F^*(z_i) - G(z_{i-1})\rvert$	T	$w_{0.5}(139)$

Observation Number	x_i	z_i	$F^*(z_i)$	$G(z_i)$	$\lvert F^*(z_i) - G(z_i)\rvert$	$\lvert F^*(z_i) - G(z_{i-1})\rvert$	T^*	$w_{95}(139)$

Observation Number	x	z	F(z)	G(z)	|F(z) − G(z)|	|F(z) − G(z)|	T'	$W_{ss}(1*P)$

Observation Number	x	z	F(z)	G(z)	|F(z) − G(z)|	|F(z) − G(z)|	T*	W_{95}(139)
$\overline{x_i}$								

Experiment	Case	$t_{nominal}$	σ_{calc}	σ_{exp}	β	$\sigma_{nominal}$	ESE

Parameter	AOA from Experiments

Table 8: Default Library Definitions for Various Elements

Element	ZAID	Isotopic Fraction