

## LSNReviews

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**From:** Oleg Povetko  
**Sent:** Friday, February 13, 2009 8:17 PM  
**To:** Whaley, Sheena; Sippel, Timothy; Tripp, Christopher  
**Cc:** Cao, Tianqing; 'Razvan Nes'  
**Subject:** RE: Programmatic Review of Abstract

Regarding direct difference method, it described in NUREG/CR-6811 Section 5.1.3, for actinides only. DOE does not call in LA their method "direct difference" and does not cite this NUREG although they apply the method there for actinides and fission products. All concerns listed below remain. Even for the same NPP, the measured isotopes are different (e.g., some Calvert Cliffs samples contain Sm-149 and Nd-143 but not Rh-103 and Gd-155, some have Gd but not Sm and Nd). The list of samples and measured isotopes is not on the docket, we need to ask them to provide these tables of Calculated/Measured ratios, otherwise, there is no material basis for the questions. We may ask them under RAI #10. We may not though ask them to use different method, where radionuclides are not aggregated (like in HOLTEC SAR). The calculation is described in Section 6.2 of the Isotopic Model AMR (CAL-DSU-NU-000007 REV 00A) which is docketed. I also have question on how they calculated uncertainty for delta-k-iso. I don't see how they accounted for uncertainties in the measurements or measurement conditions.

We can ask questions on BWRs under any of the RAIs since we specified only CSNF, not type of fuel.

Tianqing, you can call me 210-522-5258 if you have any questions.

Oleg.

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**From:** Sheena Whaley [<mailto:Sheena.Whaley@nrc.gov>]  
**Sent:** Thursday, February 12, 2009 12:49 PM  
**To:** Timothy Sippel; Christopher Tripp; Oleg Povetko  
**Cc:** Tianqing Cao  
**Subject:** RE: Programmatic Review of Abstract

If we still have questions about the direct difference method, I would like you to get the information together for Tianqing to look at, both our guidance and DOE's use of it. He said he could look at that this weekend.

Sheena

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**From:** Timothy Sippel  
**Sent:** Thursday, February 12, 2009 1:44 PM  
**To:** Sheena Whaley; Christopher Tripp; Oleg Povetko  
**Cc:** Tianqing Cao  
**Subject:** RE: Programmatic Review of Abstract

Nothing specifically on BWR burnup credit, we didn't think it was very risk-significant, although I do have a License Condition highlighted in Red in Sharepoint that relates to DOE isotopic composition modeling of BWR SNF. The reports that deal with this topic aren't docketed:

Could you double check whether these reports referenced in SAR might be listed under different names?

-Isotopic Generation and Confirmation of the PWR Application Model (BSC 2003a, pp. 15 to 20)

-Isotopic Generation and Confirmation of the BWR Application Model (Wimmer 2004 pp. 16 to 18)

-Radulescu, G.; Mueller, D.E.; Goluoglu, S.; Hollenbach, D.F.; and Fox, P.B. 2007. Range of Applicability and Bias Determination for Postclosure Criticality of Commercial Spent Nuclear Fuel. ORNL/TM-2007/127. Oak Ridge, Tennessee: Oak Ridge National Laboratory. ACC: LLR.20071120.0179.

and:

Calculation of Isotopic Bias and Uncertainty for PWR Spent Fuel (ACC: MOL.20020814.0055)

Calculation of Isotopic Bias and Uncertainty for BWR SNF (ACC: DOC.20031030.0007)

Hopefully we'll be able to get them to supply some of these when answering Chris' RAI (parts 3 and 8). - Tim.

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**From:** Sheena Whaley

**Sent:** Thursday, February 12, 2009 1:29 PM

**To:** Timothy Sippel; Christopher Tripp; Oleg Povetko

**Cc:** Tianqing Cao

**Subject:** RE: Programmatic Review of Abstract

Tim/Chris/Oleg,

Did we ask any RAIs on the issues below? Originally, we thought we might have questions on these. Also, did we ask anything on BWR burnup credit?

The use of the direct difference method used to calculate the isotopic bias and uncertainties from radiochemical assays needs more justification. This is essentially a comparative method and DOE has not justified its comparison of different samples to each other that contain different isotopes. Any method used should account for the time dependent nature of the isotopic bias and uncertainty due to the decay and buildup of radionuclides. There should also be an analysis of any trends in the bias, as well as the range of applicability, consistent with ANSI/ANS standards.

It appears that uncertainty is not properly accounted for in the benchmarking calculations due to the small number of samples measured for some isotopes, particularly fission products. For fission products and minor actinides, it may be preferable to establish a bias and uncertainty for each isotope. Also, the implied assumption that the bias determined from highly subcritical samples modeled uniformly is applicable to a near critical fuel assembly with axial enrichment variability has not been justified. NUREG/CR-6811, Strategies for the Application of Isotopic Uncertainties in Burnup Credit, provides guidance in this area.